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ORIGINAL PAPER

Widening the innovation gap? the outermost regions in the european research area

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Abstract In their quest for more resilient development models, the European Outermost Regions aim to transition into knowledge economies through a greater integration into the European Research Area. However, some view the advent of a unified research and innovation system as a cause of spatial polarization, leading to a growing "*innovation divide*" and, potentially, to the marginalization of peripheries. The spatial effects of the Framework Programmes have been a topic of ongoing debate, with several institutional publications highlighting the difficulties faced by the Outermost Regions in effectively participating in these programmes due to their geographical characteristics. In the absence of previous evaluation, this study seeks to provide a comprehensive assessment of their participation from FP7 to Horizon Europe, using available data from CORDIS, and to evaluate their performance in the programmes through interregional comparisons. Additionally, it aims to investigate the key factors influencing their participation, particularly their positioning within the networks that dominate the programmes, as well as the influence of regional policies. Against the grain of existing narratives, the study reveals a heterogeneous and surprisingly high level of participation, shedding new light on the geographic pertinence and political uses of "ultra-peripherality" and its influence on regional systems. Such uneven performance notably questions the undifferentiated approach that has so far guided EU policies regarding these regions and highlights the need to adopt both tailor-made and evidence-based interventions at the European level, and

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structural reforms at the regional level, to enable all Outermost territories to fully exploit the opportunities provided by the Framework Programmes and invigorate their research and innovation systems through outward-looking smart specialisation strategies.

Keywords Outermost regions · Islands · Peripheries · European Research Area · Regional innovation systems · Framework programmes

1 Introduction

In an era of competition, collaboration has become imperative. This belief constitutes the cornerstone of the European strategy implemented by the nine Outermost Regions (OR): Guadeloupe, French Guiana, La Réunion, Madeira, Martinique, Mayotte, Saint Martin, the Azores and the Canary Islands. Since their first joint summit in 1988 and the creation of the "Conference of the Presidents" (CP-RUP) in 1995, these regions have established a cooperation framework to coordinate their positions and influence EU policies. This strategy targets the recognition for the "*permanent*" and "*combined" "special characteristics and constraints*"—reduced size, remote position from mainland Europe, dual integration in the EU and foreign geographic basin (Fig. 1), adverse geographic and climatic conditions—which sets them apart the rest of the Union (Article 349 of the TFEU). Following a deterministic tradition, these physical traits—referred to as "*natural handicaps*"—are considered to exert a structural influence, inducing a state of "*backwardness*" (European Parliament 1997) and degraded socio-economic situations (described in Table 1). In a logic typical of "*insularism*" (Taglioni 2010), Outermost representatives construct and mobilize these common geographic specificities through a "*handicap rhetoric*" (Holstein 2014) to secure a tailor-made European integration relying on the adoption of specific support measures and the adaptation of EU rules and policies.

Since the 1999 Memorandum, the Outermost Regions' communications and policies have placed greater importance on research and innovation. However, the ambition to become "*natural laboratories*" (CP RUP 2009b) is hindered by their peripheral condition. In addition to fragile socio-economic characteristics, their small

Fig. 1 Outermost regions

Table 1 Outermost regions' key indicators

Country	Region	Population (2022)	Area (km^2)	Population density (2022)	GDP p. inhab. PPS (2021)	Unemployment rate (2022)	Geodesic distance to national capital*	Regional Innovation Scoreboard/ performance subgroup (2023)	% of pop between 25–64 with tertiary education (2022)	Number of Students enrolled in tertiary education (2021)	Intramural R&D expenditure (% GDP) (2021)
ES	Canarias	2,252,237	7447	302.9	20,100	17.6	1850 (islands average)	57.2/Emerging innovator +	36.9	77,527	0.559
FR	Guadeloupe	407,810	1685	242.8	21,100	18.6	7578	64.4/Emerging innovator + **	24.2	16,244	N/A
	Guyane	296,058	83,751	3.5	14,300	12.5	7841		29.3	4882	N/A
	La Réunion	869,993	2504	350.3	21,500	13.1	9921		22	5316	N/A
	Martinique	352,205	1108	321.3	23,500	18.1	7641		24	26,951	N/A
	Mayotte	299,022	367	804.6	9100	27.8 (2020)	8444		–	2145	N/A
PT	Açores	236,488	2322	102.6	21,300	6	1548	55.6/Emerging innovator +	22.3	2615	0.425
	Madeira	251,182	802	314.4	22,500	7	1041	61.6/Emerging innovator +	19.1	3640	0.462
EU	NUTS 2 (average)	–	–	–	30,640	6.3	–	–	33.3	66,599	1.64

*https://www.europarl.europa.eu/factsheets/en/sheet/100/outermost-regions-ors

** the regional innovation scoreboard is calculated for French ORs as a whole

size limits available resources while physical distance from the most innovative regions inhibits collaborations and the exploitation of "*tacit knowledge*", dependent on physical proximity (Huggins and Thompson 2013).

To overcome these obstacles, the European Research Area (ERA) and associated Research and Innovation Framework Programmes (FP) provide critical opportunities. In theory, a unified European R&I system with transnational collaborations can strengthen peripheral systems' knowledge base, absorption capacity and competitiveness (Hoekman et al. 2008). However, previous studies have shown the existence of "*oligarchic networks*" (Enger and Castellacci 2016; Makkonen and Mitze 2015) that connect "*islands of innovation*" (Hilpert) while excluding peripheries.

In the absence of previous studies, the primary objective of this publication is to assess the integration of the Outermost Regions in the European Research Area (using participation in the Framework Programmes as a proxy) and to evaluate the relevance of dominant discourses and policies that view the geographic characteristics attributed to islands as a "*permanent handicap*" and a source of marginalization. The first section exposes the political and theoretical challenges faced by the Outermost Regions to exploit the opportunities provided by the Framework Programmes and the main research hypotheses; the second confronts these discourses with a detailed assessment of their participation in the FP and the last section opens a discussion on policy orientations.

2 Conceptual framework: can ultra-peripheral regions thrive in the european research area?

2.1 The challenges of knowledge economy in (ultra) peripheries

Since the turn of the century, institutional discourses have presented knowledge economy as an opportunity to offset the detrimental geographic conditions faced by the Outermost Regions (OR). In 2000, the European Commission proposed to support the definition of regional innovation strategies, and in 2004, to consider their assets and specificities in the Lisbon Strategy and to reinforce their integration in the European Research Area. Its 2008 Communication called for a "*paradigm shift*", emphasising competitive advantages stemming from the combination of unique ecological conditions, exclusive economic zones and world-class research and innovation infrastructures in strategic regional basins. Meanwhile, several declarations from the Conference of the Presidents (CP RUP 2001) mention knowledge economy as a means to "*reduce the handicaps associated to isolation*", support economic diversification, address vulnerabilities (CP RUP 2004) and increase competitiveness (CP RUP 2009b) through the valorisation of distinctive assets in the ERA (CP RUP 2001). Once stigmatised, their characteristics are now described as assets to become "*natural laboratories*" (CP RUP 2009) or "*technological platforms*" (CP RUP 2017), providing expertise and innovative solutions to neighbouring countries (CP RUP 2011). However, CP-RUP considers that poor physical and digital connectivity (CP RUP 2011), economic difficulties, limited size and critical mass (CP RUP 2009, 2017) compromise an effective transition and require the adapta-

tion of Europe 2020 to the Outermost Regions' "*specific reality*" through special measures (CP RUP 2010a).

These institutional discourses contrast with the lack of publications on knowledge economy in the Outermost Regions, limited to two institutional reports: a 2002 description of their R&I systems and a 2011 analysis of their "*growth factors*" (Laissy 2011). However, several studies question the possibility for peripheral regions to build knowledge-intensive economies (e.g. Copus 2001; Crone 2012; Eder 2018; Eder and Trippl 2019; Pugh and Dubois 2021; Rodríguez-Pose 2018; Suorsa 2007; Tödtling and Trippl 2005), notably through smart specialisation strategies (e.g. Barzotto 2019; Eder 2019; Foray 2014; Krammer 2017; Kroll 2017; Torre 2022; Trippl et al. 2019; Uyarra and Sörvik Midtkandal 2014; Uyarra et al. 2018; Wibisono 2022; Woolford et al. 2021). Since economic geography considers the performance of regional research and innovation system as "*a function both of its proximity to other economic centres and of its economic size or mass*" (Maggioni et al. 2007), the remoteness and small size of peripheries are reputed to exert a negative influence through three main channels.

First, these regions lack resources to produce knowledge and benefit from agglomeration economies (Benneworth and Charles 2005). They host a limited population, with a reduced level of tertiary education, and few research and innovation infrastructures, organisations, support services, and funding sources (Doloreux and Dionne 2008). Like many peripheries, the Outermost Regions' economic systems are also dominated by very small firms with limited investment in R&D. This creates a typical "*organisational thinness*" (Isaksen 2001) inhibiting the performance of regional innovation systems. Since direct interactions between a large number of varied stakeholders ease knowledge production, diffusion and combination (Crescenzi et al. 2016), peripheries indeed face an atrophied "*local buzz*" (Storper and Venables 2004). Rare inter-organisational networks (Cooke et al. 1997), clusters and "*regional knowledge channels*" (Breschi and Malerba 2009) impede two processes that condition the effective implementation of smart specialisation: the collective capacity to identify key economic and technological opportunities and priorities through the "*entrepreneurial discovery process*" (Hassink and Gong 2019; Papamichail et al. 2022; Trippl et al. 2020), as well as the possibility for emerging knowledge and activities to generate spillovers in existing and new economic sectors by exploiting related diversity.

Second, geographic distance hampers access to knowledge produced in the European hub regions that concentrate research and innovation capacities, "*decision-making centres*" (Anderson 2000; Hoekman et al. 2008) and tacit knowledge (Morgan et al. 1999). Since the latter spread through face-to-face interactions and knowledge spillovers remain space-dependent, physical distance acts as an invisible boundary restraining their diffusion (Audretsch and Feldman 1996). Studies by Bottazzi and Peri (2003), Moreno et al. (2005) Rodríguez-Pose and Crescenzi (2008) estimate that the impact of domestic R&I activities on the productivity and growth of close regions is limited to a 200 to 300 km radius. Though some regard networks as substitutes for geographic proximity (Johansson and Quigley 2004; Grillitsch and Nilsson 2015) and pathways to valuable knowledge (Davenport 2005) through long-distance communications (Johnson et al. 2006), others question the capacity of peripheral

organisations to integrate major networks and access strategic knowledge (Bergé et al. 2017). With a marginal position vis à vis the "*global pipelines*" that "*channel and diffuse new and valuable knowledge across space*" (Crescenzi and Iammarino 2017), peripheral actors are likely to rely on local knowledge, which can negatively impact productivity and innovation (Boschma and Ter Wal 2007).

Third, peripheries may lack the capacity to absorb external knowledge and generate spillovers. A small size reduces the possibility of combining these inputs with existing "*complementary knowledge*" necessary for effective mobilisation (Döring and Schnellenbach 2006). Additionally, their distance from the knowledge frontier may also restrain the detection and exploitation of valuable assets. Moreover, organisations' absorptive capacity is reputed to be "*history-dependent*" (Cohen and Levinthal 1990) and particularly influenced by regional R&D intensity.

Besides these geographic characteristics, the Outermost Regions concentrate some of the most pressing institutional obstacles to becoming learning regions (Benneworth et al. 2016; Cooke et al. 1997; Morgan 1997; Rodríguez-Pose 2013) and overcome the "regional innovation paradox" (Oughton et al. 2002).

First, their economic models have relied since the 1960s on national and European transfers, which account for 30–40% of their GDP (Laissy, ibid) and support dynamic domestic markets. These consumption-driven and inward-looking economies are dominated by low added-value and poorly diversified services and industries, protected by duties and subsidies. This orientation influences the representations, decisions and attitudes of local stakeholders, notably the adoption of rent-seeking routines; efforts and investments being directed at capturing a larger share of the local market or available funds (Bourdin et al. 2024). The lack of incentive to innovate and explore the opportunities of global value chains thus leads to a typical spatial, cognitive and economic "*lock-in*" situation (Balland and Boschma 2021; Boschma 2005; Tödtling and Trippl 2005), which inhibits learning capabilities as well as the diversification and transformation of the regional economy. Internal competition to control resources also encourages the adoption of non-collaborative attitudes that constrain the emergence of dynamic clusters.

Second, the Outermost Regions provide a typical example of "*policy path-dependency*". Since economic difficulties are naturalised, attributed to "*structural*" geographic constraints, regional priorities focus on preserving the status quo, notably the specific protections and subsidies necessary to maintain established activities, leading to persistent rent-seeking behaviours. Such policies could also be attributed to a willingness to preserve control over innovation as well as to close connections between policy-makers and interest groups (Marques and Morgan 2018; Rodríguez-Pose and Di Cataldo 2015), facilitated by the geographical and social proximity inherent to small island communities. Despite increasing references to knowledge economy in political discourses, innovation thus remains a secondary priority. In the 2014–2020 period, regional managing authorities allocated an average 4% of their ERDF allocation to Thematic Objective 1, dedicated to research and innovation (calculated from the Cohesion open data platform). These limited resources constrain the effective implementation of smart specialisation strategies, which in several Outermost Regions appear primarily as research and innovation policies rather than transformative tools for rethinking regional development models.

Third, the distinctive characteristics and knowledge bases of the Outermost Regions, which could serve as the foundation for competitive advantages, are often overlooked. Regional specificities have historically been viewed as constraints, that should be compensated for and overcome, and not as unique, non-replicable assets, that could provide incentives and resources to develop, test and adapt innovative solutions and be strategically exploited (Eder and Trippl 2019).

2.2 Peripheries in the european research area: the cohesion challenge

Despite such constraints, some argue that efficient research and innovation systems can emerge in peripheral regions (Huggins and Johnston 2009; Uyarra and Sörvik Midtkandal 2014; Zukauskaite et al. 2017), notably with the help of digital communications and external collaborations (Barzotto et al. 2019; Dubois 2016; Eder 2018; Rodríguez-Pose and Wilkie 2016; Woolford et al. 2021) as a means to compensate for the lack of agglomeration (Barzotto et al. 2019). Outward-looking smart specialisation strategies supporting regional integration in dynamic R&I networks and interregional collaborations first provide an opportunity to improve local knowledge-production capacities through learning, cooperation, and access to external knowledge, technologies, infrastructures and services (Varga et al. 2018; Woolford et al. 2021). They may also serve economic and technological diversification through increased absorptive capacities, extended knowledge base and combination possibilities, enabling peripheral regions to overcome lock-in (Ascani et al. 2020; Balland and Boschma 2021; Grillitsch and Nilsson 2015; Hassink 2005). Lastly, greater collaborations are reputed to exert a positive influence on policy-making capacities, notably to design and implement effective smart specialisation strategies (Uyarra et al. 2018).

Considering these opportunities, the European Research Area (ERA) could play a crucial role to support the effective transformation of peripheral regions.

Since 2000, the EU has aimed to structure and integrate national and regional R&I systems through transnational networks supported by the Framework Programmes (FP), the *"European Commission medium-term planning instruments for research and innovation"* (Amoroso et al. 2017). Established in 1984, these programmes have adopted since FP5 a *"mission-orientation"*, addressing global challenges through the production and dissemination of excellent research and operational innovations. (Roediger-Schluga and Barber 2008). As *"funding distribution mechanisms"* (Young 2015), the FP orient research and innovation efforts and promotes collaboration through calls for projects which require in most cases the participation of at least three entities from three Member States.

In addition to funding (€95.5 billion under Horizon Europe), the FP offer peripheries a series of opportunities: access to world-class infrastructures, knowledge and expertise (Bathelt et al. 2004; Rodríguez-Pose and Crescenzi 2008), increased R&I and absorptive capacities via training and collaboration (Polt et al. 2008 quoted in Protogerou et al. 2012). Through long-distance collaborations, the FP contribute to the *"de-territorialisation of closeness"* (Gertler 2003), compensating for the space-dependence of knowledge production, diffusion and spillovers with stronger organisational proximity and dissemination channels (Breschi and Lissoni 2009; Di Cagno

et al. 2016). Collaborations may also reveal distinctive regional assets (Pontikakis et al. 2018), feeding the "*entrepreneurial discovery process*" and promoting brain gain.

Although regions with low R&D spending are reputed to obtain greater spillovers from FP-funded projects (Di Cagno et al. 2016), the programme may present an accessibility issue. Multiple studies have highlighted the dominance of a limited number of core players, bounded by repetitive collaborations in "*persistent oligarchic networks*" (Enger 2018; Makkonen and Mitze 2015; Lepori et al. 2014). For the first seven FP, Protogerou et al. (2012) estimated that 95% of the 44,192 organisations involved participated in only one project, while 156 stakeholders took part in all programming periods. During FP7, 152 higher education institutions accounted for 70% of all projects (Lepori et al. 2014). Besides common intrinsic characteristics (notably a large size), these institutions share a strong reputation and benefit from the "*Matthew effect*" whereby past participations increase the likelihood of successful application submissions (Boyack et al. 2017). To external organisations, these networks appear as "*closed clubs*" (Enger 2018), geographically concentrated in central regions (Maggioni et al. 2007; Hoekman et al. 2008) and tightened by strong organisational proximity.

The geographic impact of the European Research Area has sparked numerous discussions. Empirical studies confirm that geographic and cognitive distance influence cooperation intensity in the FP (Balland 2012; Maggioni and Uberti 2008; Scherngell and Barber 2009). Some studies thus consider that free circulation and polarised networks have contributed to a growing innovation divide; a pool of well-endowed regions concentrating knowledge production and spillovers, notably through interregional collaborations funded by the FP (Benneworth and Charles 2005). Positive feedback loops further support agglomeration, which increases the competitiveness, attractiveness and FP participation of these "*islands of innovation*." At the other end of the spectrum, peripheral regions may experience marginalisation or "*peripheralisation*" (Kühn 2014): weak R&I systems and connections to central networks hinder their capacity to succeed in the FP, which in turn limits regional competitiveness and attractiveness (Varela-Vázquez et al. 2019). As a result, some authors point out the "*potential conflict*" between the cohesion objective of developing and integrating peripheral R&I systems and the EU's ambition of global leadership (Amoroso et al. 2017; Hoekman et al. 2008). Nevertheless, some studies emphasise the abilities of peripheries to join and even hold significant positions in FP networks (Muldur et al. 2006; Varga et al. 2012) and obtain "*more funding relative to their total R&D capacities*" (Sharp 1998; Clarysse and Muldur 2001).

2.3 The framework programmes, an inaccessible horizon?

The Outermost Regions' position in the Framework Programmes has been a long-standing policy issue. EU decisions on FP5 and FP6 already stated that: "*The participation of the outermost regions (...) through appropriate mechanisms adapted to their particular situation should be facilitated.*"

Successive EC Communications on the Outermost Regions (European Commission 2000a, 2004, 2007, 2008, 2012, 2017 and 2022) have promoted the FP to

enhance R&I capacities, visibility, and competitive advantages. Recalling the eligibility of the OR to all FP calls, the Commission has consistently encouraged them to apply and establish greater synergies between structural and competitive funds.

While acknowledging the benefits of the FP, the Conference of the Presidents (CP RUP 2003, 2004, 2006, 2010a, 2011, 2015, 2017a, 2018), the European Parliament (2000, 2005) and the Economic and Social Council (2004) have criticised the lack of proper, "specific" treatment. In its 2003 contribution, CP-RUP initiated a discourse that still orients the European agenda, with the support of the Parliament in four successive reports in 2012, 2014, 2017, and 2021. The Outermost Regions are reputed to experience a low participation and success rate in the FP due to their "*specific characteristics*" and to the inadequacy of EU requirements. On one hand, their R&I systems suffer from geographic remoteness, limited critical masses and public-driven efforts. On the other hand, FP calls are described as "*discriminating*", due to the lack of attention given to the Outermost Regions' challenges and expertise in the work programmes and the focus on "*excellence*" during the evaluation process.

Denouncing an "*unequal treatment*" (EU Parliament 2000) and an "*eviction*" (CP RUP 2017a), the Outermost Regions have defended the adaptation to their "*singularities*" with the support of Article 349 (CP RUP 2003, 2004, 2006, 2009a, 2011, 2017a, 2019), and advocate for 5 types of "positive discrimination" measures (CP RUP 99 2009b, 2017b): dedicated calls; representatives in the Programme Committees to orient calls content; specific evaluation procedures and "bonuses" for consortia integrating Outermost partners; financial incentives (e.g. higher co-financing rate) and reserved programs or instruments.

With the support of the Parliament, this lobbying strategy paid off. In 2004, FP7 introduced a dedicated instrument—"research potential of convergence regions" (REGPOT)—to increase the integration in the European Research Area, which benefited Guadeloupe, French Guiana, and La Réunion. In 2017, a specific call to increase their participation in Horizon 2020 was awarded to a consortium of 24 Outermost Partners, the "Forward" project. Since 2021, Horizon Europe has granted access to the "*Widening Participation and Spreading Excellence*" instrument, previously restricted to less advanced national R&I systems.

The pervasiveness of the arguments developed by the Outermost Regions contrasts with the absence of studies. Though the participation of other peripheral regions in the FP has been analysed (Makkonen and Mitze 2015; Pontikakis et al. 2018), only one Commission report addressed the question in 2002. It highlighted limited and diminishing involvement with 108 and 38 participations in FP4 and FP5 respectively; and a strong polarisation around the Canaries, which accounted for 75.3% of these participations. Though this report offered a valuable outlook, it lacked comparison with other regions to decipher their singularities.

The combination of the claims of the Outermost Regions' claims, and insights from literature leads to three main hypotheses:

1. the common, distinctive geographic characteristics shall hinder the participation of all outermost regions in the programmes equally;

2. the Outermost Regions shall present a significantly weaker performance in the Framework Programmes than continental regions;
3. the Outermost Regions shall seldom collaborate with the programmes top-participating regions.

3 Data sources and methods

To establish an up-to-date description and performance assessment of the Outermost Regions' participation in the Framework Programmes and test these hypotheses, our analysis draws on two main sets of data: CORDIS database and associated Horizon dashboards, which provide data on funded FP projects, and Eurostat datasets.

A first database of 966 participations involving outermost organisations in projects funded under FP4, FP5, FP6, FP7, H2020 and Horizon Europe (up to October 2023) was constituted with all available data on participant (name, type, role), project (acronym, title, budget), call (programme, pillar, topic). For each project, we identified the related S3 thematic as defined in the Forward project. The localisation of participants was based on their legal address. 2 participations involving beneficiaries from Saint Martin (NUTS3) were allocated to Guadeloupe (NUTS2).

A second database of 242 NUTS2 (2021 classification) compiles regional agglomerated participations (sum of all participations of beneficiaries based in an EU27 NUTS2 region) in projects funded by FP7, H2020, and Horizon Europe (up to October 2023). This database was used to identify the top 10 and top 20 regions with the highest EU contribution obtained during the three programmes, as a proxy of the core regions of the European Research Area. It also served to evaluate the regional performance in the programme, calculating the "net EU contribution per capita" obtained by a region in the FP, a measure developed by the JRC (Pontikakis et al. 2018) to minimize NUTS2 size heterogeneity. To establish interregional comparisons, we adopted a stratified benchmarking framework to position each Outermost Region within structurally comparable reference groups of regions that present close geographic and socio-economic characteristics, using 6 Eurostat indicators:

- Size: Population
- Economic development: GDP per capita in PPS
- R&I capacities: % of 25–64 population with tertiary education, R&D personnel and researchers as % total employment
- R&I performance: Intramural R&D expenditure (GERD) as % GDP, 2023 Regional innovation scoreboard.

The R&I indicators were selected among the limited Eurostat's "*regional science and technology*" indicators covering the 9 Outermost Regions, to cover the 4 dimensions of the European Innovation Scoreboard: framework conditions, investment, innovation activities and impacts.

The first four indicators were averaged over 2007–2021, ranked, and used to partition the 242 EU NUTS2 regions into deciles of equal size to yield homogeneous peer sets. Within each decile, regions were subsequently ordered by their Net EU contribution per capita to refine relative performance assessments. For GERD in-

tensity and RIS level, custom peer groups were defined: the former comprising the 52 NUTS 2 regions with R&D intensities below 0.607%, and the latter including all regions classified as "Emerging Innovators" in the 2023 Regional Innovation Scoreboard. We then positioned each Outermost Region in a "reference group" and calculated its rank vis à vis group members in terms of total and per capita EU contribution under FP7, H2020 and HEurope. We finally applied one-sided parametric Z-tests and non-parametric Wilcoxon signed-rank tests to assess whether the relative rankings of each outermost region (RUP) across multiple indicators were statistically significantly above or below the median of their respective reference groups.

A third database was constituted to map under H2020 interregional (NUTS2) and international collaborations (with EU member states, Horizon Europe associated countries, and Interreg Strand 2 B partner countries). This database describes all consortia that involve at least one legal entity based in an Outermost Region, representing 273 projects and 5268 participations. H2020 was considered because of its complete and recent termination to ensure stabilized results. Using a simplified research network analysis (inspired by Hoekman et al. 2008), the collaboration intensity between an outermost region and a region X is defined by the number of projects including legal entities from these two regions. We used "full counting" to measure the interaction intensity between two regions (or countries). For example, if a project involves an outermost region and two other regions (or countries), the interaction intensity between the outermost and each region is 1. If the same project involves more than one entity from the outermost region and more than one entity from the other region (or country), the interaction intensity between the 2 regions (or country) counts as one. The list of Interreg Partner countries is based on the Interreg Amazonia, Caribbean, Indian Ocean, Macaronesia and Mozambique channel programmes.

4 Unveiling outermost paradoxes in the framework programmes

4.1 A growing yet unequal involvement

Since FP participation is determined by the geographic and organisational proximity to core networks, the performance of regional innovation systems and the profile of candidate organisations, the characteristics of the Outermost Regions should theoretically be detrimental.

4.1.1 A burgeoning participation ...

Yet, available data tell a different story. A story of continuous and growing involvement. From FP4 to Horizon 2020, participations increased from 74–428, the number of unique participant organisations from 27–127, and the EU contribution obtained from 4.9–90 M€. Horizon Europe confirms this dynamic with 57 M€ raised two years after the launch of the program (Table 2). Such progression can be partially attributed to the Outermost Regions' integration in the "Widening Participation and

Table 2 Outermost regions' participation in European R&I framework programmes

Programme	Net EU contribution (€)	Nb. of participations	Nb. of projects	Nb. of organisations	Nb. of coordinations*	Nb. of proposals	Nb. of applications
FP4	4,878,895	74	66	27	13	n/a	n/a
FP5	11,642,893	91	76	38	13	n/a	n/a
FP6	10,980,964	78	61	29	3	n/a	n/a
FP7	37,267,105	163	127	66	12	716	882
H2020	89,973,491	428	280	127	17	1640	2150
HE	56,982,724	132	84	57	11	528	835
Total	211,726,072	966	694	250	69	3099	3867

*Excluding monobeneficiary (e.g. SME Instrument) and mono-regional participations (e.g. Enterprise Europe Network)

Strengthening the ERA" component, which was restricted until 2021 to lagging-behind countries and already represents 39% of the contribution obtained by the regions under Horizon Europe.

Data also show a remarkable progression of applications (882 in FP7, 2150 in H2020, and already 835 in HEU), revealing a growing perception of the programmes' individual and collective benefits. As a result, the success rate has slightly decreased from 19.8% in FP7 to 14.3% in Horizon Europe. However, it remains above EU average, contradicting discourses that denounce the programme as too competitive. The inadequacy of FP calls is also questioned by the strong alignment of the 1024 participations with smart specialisation priorities, particularly in ocean sciences, energy transition, space science, agriculture and natural resources, climate change, ecological conservation, and health (Fig. 2).

However, the coordination of collaborative projects remains an exception with only 69 experiences; a result coherent with previous studies stressing the monopolisation of leadership positions by "core" organisations.

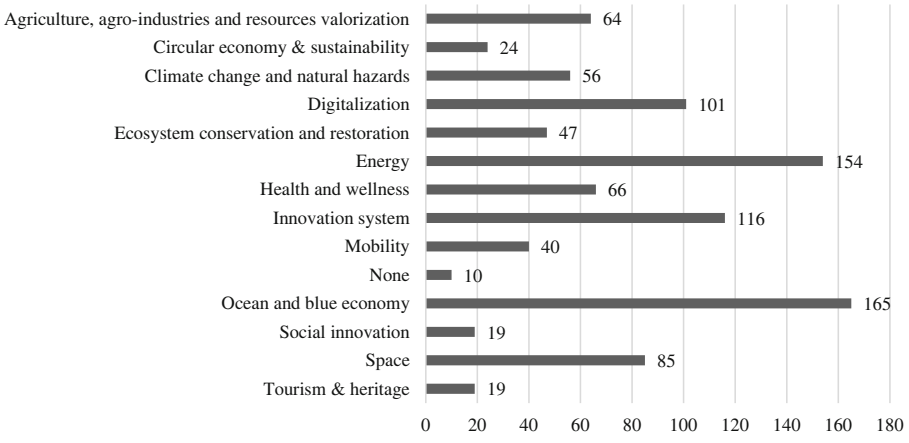

Fig. 2 Number of Outermost participations (FP7 to HEU) according to RIS3 priorities

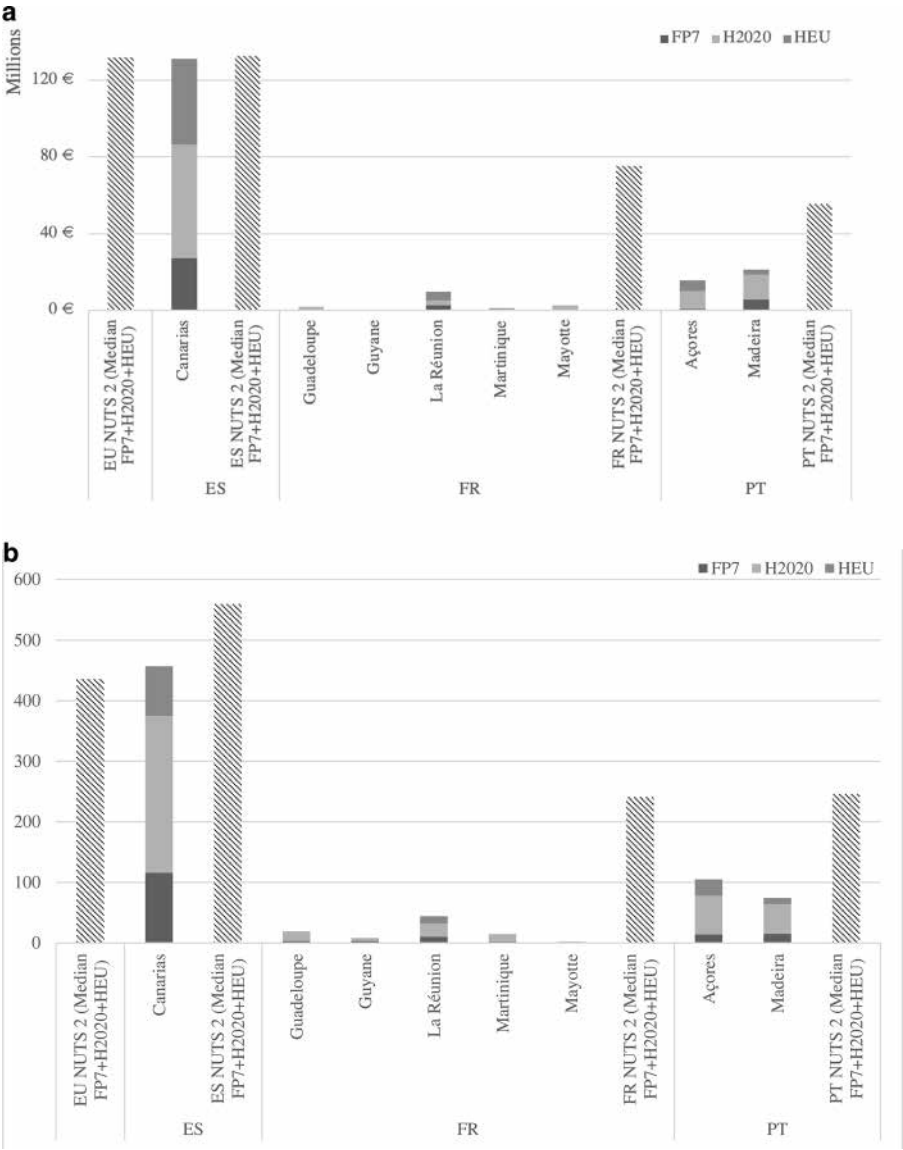

Fig. 3 Participation in the framework programmes per outermost region. (**a**) Net EU contribution. (**b**) Number of participations

4.1.2 An uneven participation driven by the Canary Islands ...

In contrast to homogenising discourses, the Outermost Regions constitute a heterogeneous group.

With 648 participations, 153.7 M€ raised and 133 participant organisations since FP4, the Canary Islands account for 67%, 73%, and 55% respectively of the

Table 3 Mobilisation profile

		Number of unique organisations participating in FP projects per program and group of programs				Concentration of participations (from FP7 to HEU)		Number of applications		
Country	NUTS 2	FP7	H2020	HEU	FP4-HEU	% EU contribution awarded to the 3 main regional participants	Nb. of participants accounting for 75% of the regional EU contribution	FP7	H2020	HEU
ES	Canarias	36	57	33	133	45	7–8	583	1 473	526
FR	Guadeloupe	3	10	–	12	59	11–12	13	46	15
	Guyane	3	4	–	7	73	3–4	7	8	3
	La Réunion	6	7	6	13	91	1	96	75	33
	Martinique	2	7	1	9	76	2–3	4	36	9
	Mayotte	0	2	–	2	100*	–	ND	4	ND
PT	Açores	7	19	12	31	61	4–5	ND	243	127
	Madeira	9	21	5	35	47	9–10	179	265	122

*Mayotte has only 2 participations, with one accounting for 94% of the budget awarded to the region

group's involvement (Fig. 3 and Table 3). This dominance seems logical since the archipelago hosts 44.8% of the population and the most developed R&I system with 58% of total human resources for research and technology. The growing Canarian leadership is also grounded in a long history of networking. Alone, the University of Las Palmas surpasses the combined 5 French regions in terms of participation (108 vs. 87) and contribution (22.8 M€ vs. 16.5 M€).

Despite their limited size, human resources (8.4% of the Outermost HRST) and economy (9.3% of the total GDP), Madeira and the Azores together provide 24% of the participations and 19.7% of the budget. Their participation tripled during H2020 highlighting the possibility of escaping path dependency, potentially through the structuration of internationalized high-level research centres, like IMAR in Madeira. Another hypothesis lies in the post-2008 economic crisis and the associated reduction of national and regional R&I subsidies, which may have encouraged local organisations to reorient their funding strategies.

The French OR present the opposite profile. With 44.9% of the group's population and 48% of its GDP, they account for only 7.8% and 4.5% of FP contribution and participation respectively. This reduced involvement is itself heterogeneous, with La Réunion alone concentrating 60% of the EU contribution since FP7 and 93% under Horizon Europe (the reasons for this growing gap are detailed in Sect. 3c). A second group, composed of French Guiana, Guadeloupe, and Martinique is characterized by its volatility: despite their assets and marked progress during Horizon 2020, these regions have not capitalized on these experiences with so far no participation under Horizon Europe. Mayotte and Saint Martin share a distinctive profile: with embryonic research and innovation systems, lacking structured universities and permanent research centres, their participation is limited to exceptional calls and projects (such as Forward).

4.1.3 ... with diverse regional profiles

Besides an unequal level of participation, the Outermost Regions present diverse patterns detailed in Tables 4 and 5, and synthesised in Table 6. Schematically, 3 profiles emerge. First, an "institutional" orientation, typical of the French Caribbean, where most projects involve public bodies (such as regional authorities engaged in institutional cooperation projects like ERA-NET, and universities) and focus primarily on the development of the regional innovation systems through region-oriented projects, such as Entreprise Europe Network, coordination and support actions dealing with policy-making and co-fund projects bringing together funding authorities. In collaborative projects, regional organisations play a marginal role, systematically as participants or third parties from national research centres, and with a reduced budget reflecting limited activities. The Azores and La Réunion form a second, "academic-driven", group, whose participation relies on universities and research centres and contributes to the internationalisation and development of strong regional research identities, notably ocean sciences in the Azores, health and climate change in La Réunion. Though higher than the French Caribbean, their role in consortia still appears limited, with few coordination positions. Madeira and more strikingly, the Canary Islands, show a more varied, and "competitive" profile, with a larger involve-

Table 4 Regional orientations

		Top 3 thematic (% of total net EU contribution under FP7-H2020-HEU)		Pillars (% of total net EU contribution under H2020/HEU)				Type of organisations (% of total net EU contribution under FP7-H2020-HEU)				
Country	NUTS 2	Thematic	%	Excellent Science (in %)	Societal/ Global Challenges (in %)	Swafs/ Spreading/ Widening (in %)	Industrial Leadership/EIC (in %)	HES (in %)	OTH (in %)	PRC (in %)	PUB (in %)	REC (in %)
ES	Canarias	Space	17.9	29.7	**39.9**	19.8	9.0	23.4	4.2	**38.3**	18.2	16.0
		Energy	17.7									
		Ocean-Blue economy	17.6									
FR	Guadeloupe	Innovation system	50.3	12.8	36.4	**50.0**	0.9	26.7	6.7	6.7	**36.7**	23.3
		Energy	19.8									
		Tourism & heritage	11.3									
	Guyane	Innovation system	62.8	3.2	0.0	**96.8**	0.0	25.0	25.0	12.5	25.0	12.5
		Health and wellness	33.5									
		Ecosystem conservation	2.1									

Table 4 (Continued)

Country	NUTS 2	Top 3 thematic (% of total net EU contribution under FP7-H2020-HEU)		Pillars (% of total net EU contribution under H2020/HEU)				Type of organisations (% of total net EU contribution under FP7-H2020-HEU)				
		Thematic	%	Excellent Science (in %)	Societal/ Global Challenges (in %)	Swafs/ Spreading/ Widening (in %)	Industrial Leadership/EIC (in %)	HES (in %)	OTH (in %)	PRC (in %)	PUB (in %)	REC (in %)
	La Réunion	Health and wellness	28.0	4.7	36.3	**57.6**	1.4	**56.8**	6.8	22.7	6.8	6.8
		Climate change/ natural risks	27.8									
		Energy	15.6									
	Martinique	Ocean-Blue economy	66.6	0.0	**77.6**	10.3	12.1	0.0	0.0	28.6	**64.3**	7.1
		Innovation system	13.2									
		Circular Economy & sustainability	7.9									
	Mayotte*	Energy	93.8	0.0	**93.8**	6.2	0.0	0.0	0.0	50.0	50.0	0.0
		Innovation system	6.2									

Table 4 (Continued)

		Top 3 thematic (% of total net EU contribution under FP7-H2020-HEU)		Pillars (% of total net EU contribution under H2020/HEU)				Type of organisations (% of total net EU contribution under FP7-H2020-HEU)				
Country	NUTS 2	Thematic	%	Excellent Science (in %)	Societal/ Global Challenges (in %)	Swafs/ Spreading/ Widening (in %)	Industrial Leadership/EIC (in %)	HES (in %)	OTH (in %)	PRC (in %)	PUB (in %)	REC (in %)
PT	Açores	Ocean-Blue economy	50.5	6.5	**83.0**	7.8	2.7	13.3	14.3	9.5	28.6	**34.3**
		Innovation system	8.5									
		Climate change/ natural risks	7.7									
	Madeira	Mobility	30.5	2.5	**84.1**	4.0	9.4	17.6	9.5	**28.4**	18.9	25.7
		Digitalization	17.6									
		Energy	15.5									

Table 5 Influence in projects

		Type of projects (% of total Nb. Participations)			Roles			Budget captation		
Country	NUTS 2	Collaborative (in %)	Mono-beneficiary (in %)	Region-oriented (in %)	Coordinator (in %)	Participant (in %)	ThirdParty (in %)	Average % budget share (in %)	Average Net EU contribution (in €)	Average Project Net EU contribution (in €)
ES	Canarias	82.5	7.9	9.6	9.3	90.5	0.3	6.0	286,599	6,992,751
FR	Guadeloupe	57.9	0.0	42.1	0.0	59.3	40.7	3.6	105,004	4,106,890
	Guyane	50.0	0.0	50.0	0.0	87.5	12.5	2.0	82,022	4,799,808
	La Réunion	75.0	4.5	20.5	2.9	80.0	17.1	3.5	223,733	5,013,686
	Martinique	42.9	7.1	50.0	0.0	85.7	14.3	4.1	99,441	3,204,837
	Mayotte	100.0	0.0	0.0	0.0	100.0	0.0	17.4	1,275,869	5,989,206
PT	Açores	86.7	0.0	13.3	2.1	97.9	0.0	4.0	150,337	7,272,059
	Madeira	73.0	9.5	17.6	3.6	96.4	0.0	6.3	290,043	6,355,620

Table 6 Regional participation profiles

Participation profile	Mobilisation	Orientation	Relational pattern	Regions
"Institutional"	Few organisations and applications	*Beneficiaries*: Mainly public authorities *Scope*: Structuration of the regional innovation system	*Directionality:* Inward-looking, focusing on internal challenges and intra-OR cooperation *Relational weight:* Low share of the budget *Roles:* Participants & third parties	Guyane Guadeloupe Martinique
"Academic driven"	Few participant organisations A moderate number of applications	*Beneficiaries*: Mainly universities and research centres *Scope*: Concentration on the main regional scientific fields	*Directionality*: Outward-looking, addressing global challenges with ERA champions *Relational weight:* Low share of the budget *Roles:* Few coordinations	Açores La Réunion
"Competitive"	A large number of organisations & applications	*Beneficiaries:* A variety of organisations, notably companies *Scope*: Diverse fields of expertise, with various TRL, exploiting the full range of pillars	*Directionality*: Outward-looking, addressing global challenges with ERA champions *Relational weight:* Substantial share of the budget *Roles:* Higher coordinations	Madeira Canarias

ment of private companies; a potential sign of maturity of their innovation systems, also illustrated by a more distributed participation across regional actors, pillars, TRLs (from basic research to market-driven innovations), and thematics. The latter mirror the archipelagos' smart specialisation strategies priorities in highly competitive fields, such as space science and engineering, and energy, in the Canary Islands, mobility and digital solutions in Madeira. Regional organisations demonstrate leadership and networking capacities, with regular coordination of collaborative projects, and substantial responsibilities reflected by larger budgets and budget shares.

4.2 A geographic remoteness compensated by promising relations

The spatial analysis of the Outermost collaborations in the Framework Programmes provides insights into their level of integration in the European Research Area and regional basins.

4.2.1 A strong dependence on the mainland

The Outermost Regions were shaped by colonial governmentality and still exhibit a political and economic dependence on their mainland. Since the 1980s, the development of their R&I systems has been driven by investments and partnerships with national authorities and research centres, as exemplified by PLOCAN, a joint

Table 7 Main collaborations (under H2020)

	ES	FR					PT	
	Canarias	Guadeloupe	Guyane	La Réunion	Martinique	Mayotte	Açores	Madeira
Number of international projects (i.e. involving one or more partners from other countries)	163	8	3	15	2	2	38	24
Share of international projects without national partner	23%	0%	0%	20%	0%	0%	37%	38%
Top 5 partner countries (Nb of projects)	Spain (128) Germany (111) UK (110) France (108) Italy (108)	France (11) Spain (8) Germany (5) Portugal (5) UK (5)	France (3) Portugal (3)	France (15) Italy (12) Spain (12) Germany (11) Netherlands (11)	France (5) Portugal (2) Spain (2)	n.app	France (32) Spain (32) Portugal (28) Germany (25) Italy (23)	Portugal (28) Spain (16) France (15) Germany (13) Italy & UK (12)
Nb of EU-27 NUTS2 regions with which the OR collaborates	208	65	30	116	16	20	116	112
Nb of Top 10 partner regions part of Top 10 EU ranking	9	3	1	5	2	n.app	4	3
Nb of Top 20 partner regions part of Top 20 EU Ranking	14	n.app	n.app	10	n.app	n.app	10	9
Share of projects involving one or more partners from another OR	12%	73%	67%	44%	100%	100%	40%	54%

Table 7 (Continued)

	ES	FR					PT	
	Canarias	Guadeloupe	Guyane	La Réunion	Martinique	Mayotte	Açores	Madeira
Nb of projects involving an OR partner and partners from countries listed in the OR's Interreg programmes (Strand D)	4	3	1	3	1	0	2	0
Total Nb of H2020 projects involving partners from countries listed in the OR Interreg programme (strand D)	88	297	297	639	297	297	88	88

oceanic platform established in 2007, and currently the third largest FP participant in the Canaries. The French OR host regional delegations of national research centres and various mixed research units with major EU participants, such as CNRS and INSERM.

As a result, their participation in the FP shows a strong national focus (Table 7). In all regions, but the Azores, mainland organisations remain the most frequent partners (expressed in number of H2020 projects). This dependency is especially striking in the French Caribbean, whose consortia systematically include a national partner, in contrast to a third of the projects developed by the Azores and Madeira, highlighting their capacity to be identified as valuable partners in European networks.

4.2.2 A promising, yet underexploited connection with EU champions

Empirical studies and political discourses insist on the difficulty for peripheral newcomers to join the "*closed clubs*" that dominate the Programmes. However, under H2020, the 2997 collaborations with 209 NUTS2 regions reveal repeated cooperation with leaders. Indeed, 9 of the 10 most frequent partner regions of the Canary Islands belong to the 10 most FP active regions: Ile de France, Ober Bayern, Madrid, Cataluña, Zuid-Holland, Lazio, Bruxelles-Capital, and Hovedstaden. The 20 most active FP regions also account for 70%, 50%, 50% and 45% of the 20 most frequent partners of the Canaries, Azores, La Réunion and Madeira, respectively. This result shows both the critical role of core regions and the existence of a relational capital that can be leveraged by the Outermost Regions to increase their participation.

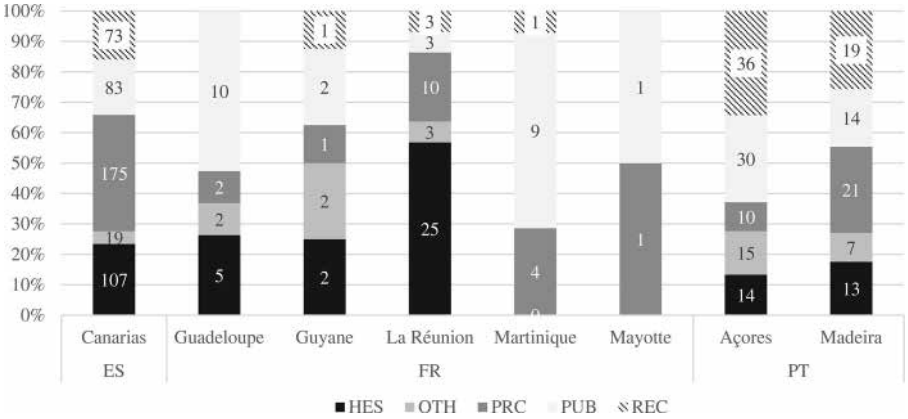

Fig. 4 Number of participations under FP7, H2020 and HEU per type of organisations: Higher education institutions (HES), Research organisations (REC), Private for profit (PRC), public bodies (PUB) and other (OTH) (*107* number of participations of Higher education institutions in the Canary Islands)

Interregional collaborations also highlight asymmetric relations among the Outermost regions. While only 12% of Canarian projects involve another outermost partner, this proportion reaches 73% in Guadeloupe and 100% in Martinique, which have so far utilised collaborative projects for institutional cooperation only.

4.2.3 Strategic european hubs or cul-de-sac?

In its 2008 Communication, the European Commission described the Outermost Regions as "outposts of the European Union in the world". This "*hub*" or "*platform*" rhetoric of knowledge providers in their respective neighbouring countries, central to Interreg Programmes, appears overlooked. Despite the involvement of Interreg partner countries from the Caribbean and the Indian Ocean in 297 and 639 H2020 projects, respectively, only 3 integrated a partner from Guadeloupe and La Réunion. This raises questions about their recognition as expertise centres or bridges to enter the FP. Partner countries from Interreg Macaronesia show a more limited participation in Horizon Europe, but also seldom cooperate with Madeira, the Azores, and the Canaries.

4.3 Overcoming geographic determinism

The third main result questions the existence of exceptional, specific obstacles inhibiting the participation of all Outermost Regions in the FP.

4.3.1 An outermost curse?

Though all outermost regions belong to the 50% least performing regions at the national level, the Canary Islands have obtained an EU contribution close to Spanish NUTS2 median since FP7 (Fig. 4). A larger focus on the 242 EU NUTS2 regions confirms this remarkable performance, the archipelago being part of the top 50%

Table 8 Decile position and ranking of outermost regions on 242 EU NUTS2 regions (under FP7, H2020 and HE)

Country	Label Nuts2	Net EU Contribution (EUR)	NUTS2 EU Decile position (Net EU contribution)	NUTS2 EU Rank (Net EU Contribution) On 242	Net EU Contribution per capita	NUTS2 EU Decile position (Net EU Contribution/capita)	NUTS2 EU Rank (Net Eu Contribution/capita) on 242
ES	Canarias	131,064,627€	D5	122	62.4	D4	150
FR	Guadeloupe	1,995,075€	D1	236	4.6	D1	231
	Guyane	656,172€	D1	240	2.6	D1	236
	La Réunion	9,844,246€	D1	220	11.8	D2	217
	Martinique	1,617,570€	D1	237	4.2	D1	232
	Mayotte	2,551,738€	D1	230	10.2	D1	225
PT	Açores	15,790,831€	D2	210	63.6	D4	147
	Madeira	21,173,124€	D2	199	81.3	D5	130
EU	NUTS 2 EU average	453,756,253€	–	–	217.9€	–	–
	NUTS 2 EU median	131,789,552€	–	–	97.4€	–	–

participating regions. In contrast, all other OR stand within the 50 least participating regions; French Guiana, Guadeloupe, Martinique and Mayotte being part of the 15 least involved regions (Table 8).

The EU contribution expressed per capita confirms the marginal position of the French Caribbean regions and Mayotte, which remain among the 20 least involved regions (Fig. 5). Yet, this indicator modifies the perception of the Azores and Madeira: though they remain below the national median (Fig. 6), they respectively belong to the 40% and 50% most involved regions per capita, with their reduced population. Despite their large population, the Canaries still occupy a surprisingly high position, ranking 150 out of 242 NUTS2 regions (Table 8).

4.3.2 A striking performance vis à vis other NUTS2 regions

The comparison with reference groups of regions presenting close characteristics confirms the performance of Macaronesia, the Azores and Madeira systematically obtaining a higher participation per capita than most groups' members (Table 9). Their highest positions are reached among regions with close R&D population and RIS level, confirming their capacity to participate more in the FP than their regional characteristics would suggest. The Canaries also confirm their median position among NUTS2 with close population, GDP or tertiary education levels, but outperform in groups with close GERD, R&D population and RIS level. On the opposite end of the spectrum, the French OR consistently occupy lower positions.

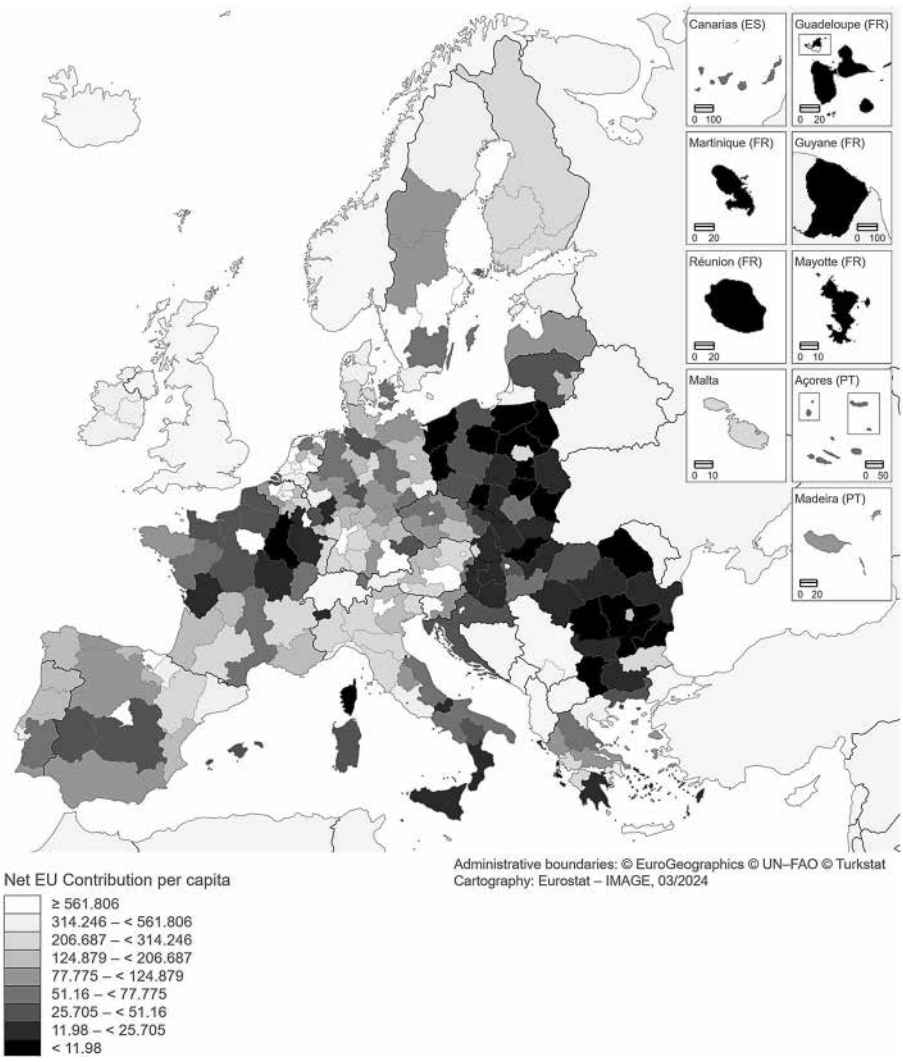

Fig. 5 Net EU contribution per capita among NUTS2 Regions

These results contradict deterministic, homogenising discourses that denounce insurmountable "*natural handicaps*". Indeed, three Outermost Regions show a higher participation per capita than continental regions with close economic and scientific capacities, and the Canary Islands perform better in absolute terms than many more advantaged and central regions. Representatives from the Macaronesia archipelago also obtained a higher participation per capita than closer island regions from the Mediterranean with greater R&I capacities such as Kriti, Sicily, Sardegna and Baleares (Fig. 7), questioning the influence of geographic distance.

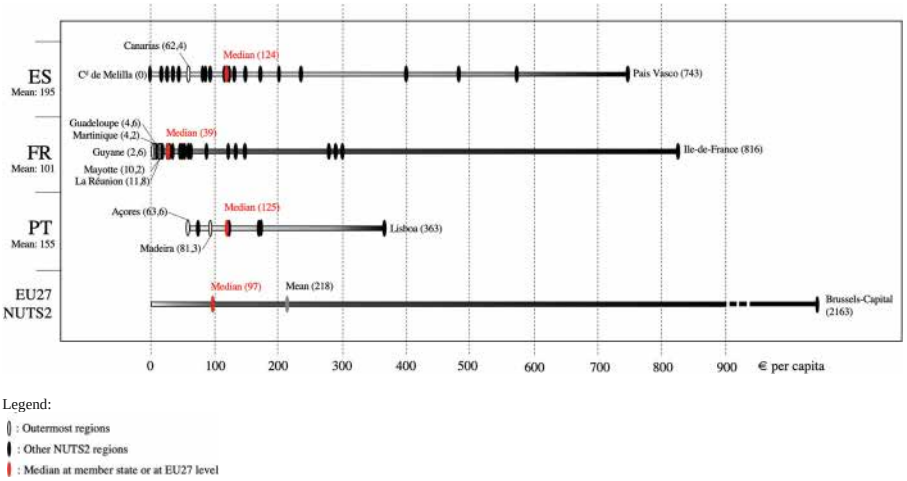

Fig. 6 NUTS2 distribution in Net EU contribution (FP7 + H2020 + HEU) per capita in Spain (ES), France (FR) and Portugal (PT)

4.3.3 A french paradox?

To explain why the French OR present substantially lower participation rates compared to regions with close characteristics, some point at a headquarters effect (Dotti and Spithoven 2018), European databases ignoring the contribution of national centres' researchers based in regional delegations. However, such an explanation is inadequate. An exhaustive census in La Réunion, which hosts the largest number of researchers from national centres, revealed only 2 H2020 participations totalling 457 k€. Calculated per capita, the revised EU contribution obtained from FP7 to Horizon Europe would thus increase from 11.8–12.3 €, leaving the island among the 30 least participating NUTS2 regions. Another inadequate interpretation underlines the incapacity to submit competitive proposals; yet these regions present a higher success rate than the Canary Islands, Madeira and the EU average (Table 10).

The underperformance primarily stems from a structural, internal obstacle: a lack of interest in the FP. Collectively, the French OR submitted only 245 eligible proposals under FP7 and H2020, while Madeira alone contributed to 371 proposals (Fig. 8). This low submission activity is also heavily concentrated among a small number of organisations (Sect. 2) and individuals. The decision not to apply to competitive calls is a typical "*self-selection*" mechanism (Pontikakis et al. 2018) that operates at three levels:

- Regional authorities, managing structural funds, adopt policies to maximize absorption, providing local beneficiaries easily accessible and important financial resources to engage in R&I activities, reducing the incentive to apply to the FP, perceived as more competitive and uncertain.
- R&I organisations adopt ESIF-oriented economic models, policies and support-services at the expense of horizontal programmes. As an example, no organisation

Table 9 Comparison with NUTS2 reference groups

Country	NUTS 2	Population	GDP per capita	GERD/ %GDP	Ed 5-8 25-64	RD pop	RIS2023	Z-score	p (Z-test)	p (Wilcoxon)	Comments
ES	Canarias	(D8) 13/24	(D4) 11/24	09/52	(D6) 12/26	(D3) 6/24	07/42	–2.86	≈ 0.0021	0.031	Statistically significantly above the median
FR	Guadeloupe	(D2) 24/24	(D3) 22/23	38/52	(D3) 21/24	(D1) 19/29	39/42	+2.00	≈ 0.023	0.031	Statistically significantly below the median
	Guyane	(D1) 23/25	(D1) 27/28	425/52	(D3) 23/24	(D1) 24/29	41/42	+3.44	<0.001	0.016	Statistically significantly below the median
	La Réunion	(D3) 21/24	(D3) 21/23	31/52	(D3) 18/24	(D1) 13/29	32/42	+3.12	<0.001	0.031	Statistically significantly below the median
	Martinique	(D1) 22/25	(D4) 23/24	41/52	(D5) 23/24	(D1) 20/29	40/42	+8.19	0.000	0.016	Statistically significantly below the median
	Mayotte	(D1) 21/25	(D1) 20/28	37/52	(D1) 23/26	(D1) 18/29	34/42	+2.17	≈ 0.015	0.031	Statistically significantly below the median
PT	Açores	(D1) 08/25	(D3) 9/23	08/52	(D1) 05/26	(D1) 03/29	06/42	–3.01	<0.001	0.016	Statistically significantly above the median
	Madeira	(D1) 07/25	(D4) 9/24	04/52	(D2) 09/26	(D2) 03/22	04/42	–2.86	≈ 0.0044	0.016	Statistically significantly above the median

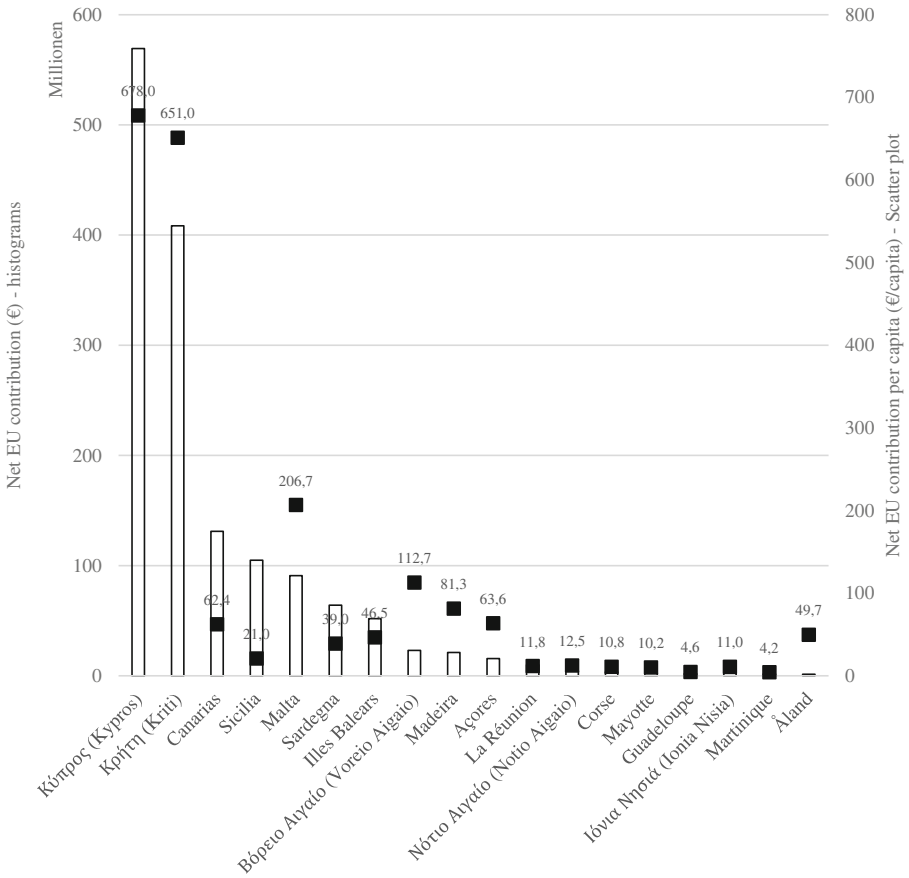

Fig. 7 Islands' participations from FP7 to HEurope

based in the French Outermost Regions has adopted so far, a pro-Horizon Europe strategy and policy, with precise objectives, incentives and expert services to boost their participation.

- Individual researchers orient their funding strategies toward available structural funds, Conversely, preliminary data suggest that many potential candidates (with a relevant scientific profile) consider they lack the skills and resources to engage in a costly and uncertain project development, and find the internal support from their organisation inadequate.

As a result, the limited submission intensity that explains the marginal position of French regions can be attributed to a "substitution effect" between structural funds and the FP: 1€ of ERDF invested in R&I activities in the French OR generated on average 3 cents on Horizon 2020, 36 cents in Madeira, 1.1€ in Widening regions and 8.2 in all NUT2 regions.

This inward-looking strategy is consistent with "rent-seeking" behaviours described earlier and particularly developed in the French Outermost (Jean-Pierre and

Table 10 FP success rates

Country	NUTS 2 Name	FP7	H2020	HEU	Global
Success Rate % (Nb of proposals)					
ES	Canarias	15.1% (478)	12.8% (1208)	16.6% (380)	13.9% (2066)
FR	Guadeloupe	25% (12)	31.6% (38)	n.app (0)	23.5% (64)
	Guyane	28.6% (7)	33.3% (6)	33.3% (3)	31.3% (16)
	La Réunion	15.2% (92)	25% (68)	40% (25)	22.2% (185)
	Martinique	33.3% (3)	21.4% (28)	14.3% (7)	21.1% (38)
	Mayotte	n.app (0)	50% (4)	n.app (0)	50% (4)
PT	Açores	n.app (n. a.)	22.1% (195)	30.4% (79)	24.5% (274)
	Madeira	15.9% (151)	10.5% (220)	14.8% (81)	13.1% (452)
EU 27		17.9% (110,382)	11.6% (229,569)	17% (48,912)	14.1% (388,863)

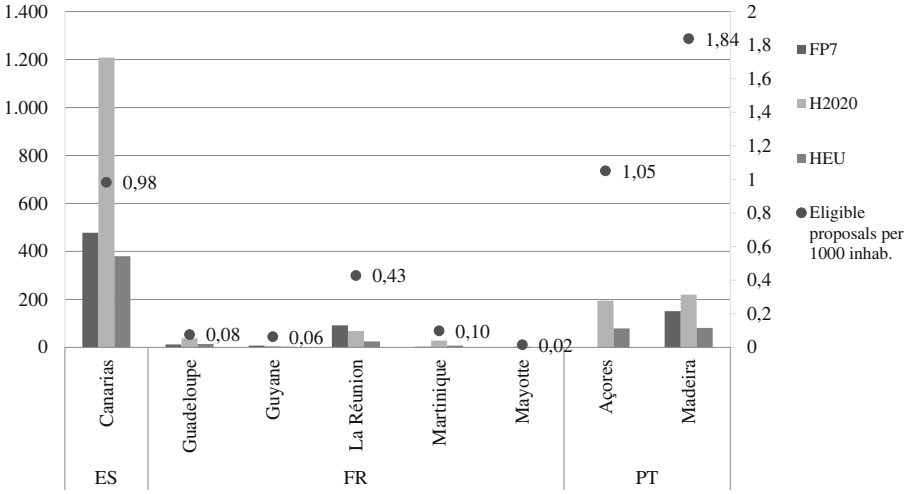

Fig. 8 Eligible proposals (expressed in total number & total number per 1000 inhab.)

Rochoux 1999). These regions may therefore be trapped in a typical path-dependency situation where individual, organisational and institutional mindsets, resources and strategies focus on capturing "local" resources, at the expense of a greater integration in the ERA. The modestly "better" results in La Réunion and the growing gap with other French regions can be attributed to the creation of a mutualised expert

support service, the "European office" which encourages, connects and accompanies organisations and individuals to design competitive proposals. Since 2013, this office has contributed to 84 of the 93 proposals submitted on the island. Managed until 2023 by the agency in charge of the design and implementation of the smart specialisation strategy, the team played a critical role in the recent evolution of regional policies, through the definition of the first regional "Roadmap to ERA" (Holstein and Tarnus 2023) at the EU level, and the introduction of policy tools for greater funding synergies.

5 Discussion and conclusion

From the perspective of the 10th Framework Programme, this first assessment of the Outermost Regions' participation opens up policy debate and perspectives.

Since FP5, discourses and interventions have adopted a deterministic approach which considers that the Outermost Regions' distinctive geographic characteristics set them apart from the rest of the EU, inhibit their performance and must be compensated by specific measures. However, the growing participation since FP7, higher-than-average success rates, as well as the ability of the Macaronesia regions to perform better than continental regions with close or even more advantageous characteristics challenge this approach, confirming finding by Muldur et al. (2007) which show that regions with limited R&I resources can disproportionately participate in the FP. This assessment also illustrates the persistence of a negative (self) perception and construction (Schulz 2019) of the Outermost Regions and more broadly peripheral regions, defined, through a series of binary oppositions to the centre, as deficient, powerless and deprived of agency. Rather than emphasising their uniqueness, the Outermost Regions would benefit from increased collaboration with continental regions, notably in peer-learning activities and common advocacy to request a clearer integration of the regional and cohesion dimensions in the programmes' objectives and calls to support a more inclusive and geographically diverse ERA.

In their communications, the Outermost Regions develop a homogeneous narrative and call for common interventions that overlook their highly diversified participation patterns. Yet, the comparison with NUTS2 regions reveals the existence of 3 performance groups: a normal-performer, the Canaries whose participation is close to EU NUTS2 median and to regions sharing close characteristics; two over-performers, the Azores and Madeira, with a higher participation per capita than their counterparts; and a heterogenous group of under-performing, and diverse French regions. Implementing one-size-fits-all and indiscriminate policies poses the risk of exacerbating such heterogeneity: for example, the Outermost Regions' recent integration in the "Widening" component disproportionately benefited the Canary Islands, which is already the most structured and internationalised R&I system. Therefore, we recommend adopting more tailor-made interventions at the EU level, targeting groups of regions presenting close performance and challenges independently of their geographic location.

Such interventions should be complemented by regional policies to structure, reform and internationalise research and innovation systems and address the effective

internal bottlenecks that inhibit participation in the Framework Programmes, notably in the French Outermost Regions. The comparative analysis of the 2014–2020 and 2021–2027 smart specialisation strategies indeed reveals a strong correspondence between the observed performance groups and regional orientations, in line with previous results from Eder and Trippl (2019) showing that peripheries may either treat their characteristics as disadvantages that need to be neutralized through "compensation" strategies or as tangible assets mobilized in "exploitation" strategies to dynamize their R&I systems. As presented in Table 11, the respective S3s present three major differences. First, the Azores, the Canary Islands and Madeira,

Table 11 Regional performance profiles

Performance profile	FP performance (based on EU contribution per capita)	Dynamics of engagement	Regional Policies (S3)	Regions
"normal-performer"	Close to the EU NUTS2 median Close to regions sharing close characteristics	Active engagement of various organisations and researchers, with multiple applications Capitalization on a long history of participation	*Ambition* Global knowledge platforms through greater integration in the ERA and value chains, using the FP as strategic internationalisation levers *Funding synergies with regional and structural funds* Precise FP participation objectives, supported by a holistic strategy to increase the capacities and willingness to apply. Strategic alignment of regional priorities with EU orientations	Canarias
"over-performer"	Close to the EU NUTS2 median Higher than regions sharing close characteristics	Active engagement of various organisations and researchers with multiple applications Capitalization on a long history of participation	*Ambition* Global knowledge platforms through greater integration in the ERA and global value chains, using the FP as strategic internationalisation levers *Funding synergies with regional and structural funds* Strong emphasis and incentives to participate in the FP. Strategic alignment of regional priorities with EU orientations	Açores Madeira
"under-performer"	Lowest positions in the EU NUTS ranking Lowest positions compared to regions sharing close characteristics	Self-exclusion of organisations and researchers leading to a limited number of applications Strong dependency to individual capacities and decisions	*Ambition* Structuration of the R&I systems to support established sectors, and become regional leaders *Funding synergies with regional and structural funds* Except in La Réunion, emphasis on the obstacles to FP participation; limited, punctual and end-of-pipe support to application development. Strong availability of easily accessible structural funds competing with Horizon Europe applications; leading to high substitution effect	French ORs

and to a lesser extent La Réunion, have adopted since 2014 a clear ambition to use their distinctive characteristics to reinforce regional competitiveness and reinvent their development models through research and innovation, positioning themselves as international knowledge platforms, providing expertise in global value chains. Meanwhile, Guadeloupe, Martinique and Mayotte mainly consider S3 as an opportunity to support their R&I system and the increased efficiency of established sectors, through the adaptation of technologies to local context. Their S3s provide no assessment of global value chains and regional competitiveness and seldom introduce dedicated and precise internationalisation interventions. Besides this typical inward/outward-orientation, the respective S3s present a differentiated geographic scope. While Macaronesia regions consider since 2014 the integration in the European Research Area and global knowledge networks as a necessary condition for the effective implementation of S3s and precisely detail in their 2021–27 versions the priority EU initiatives, platforms and networks to join in each thematic priority with the support of defined funding tools, the French OR privilege a more regional scope concentrated on the Amazonian, Caribbean and Indian ocean basins, and the intensification of existing collaborations with the mainland. Last but not least, regional perceptions of, and support, to the Framework Programmes strongly vary. Presented mainly as an important, yet poorly accessible, funding source in most French regions, Horizon 2020/Europe is described in Macaronesia as a strategic internationalisation lever, notably to accelerate the emergence of key fields of expertise, which are strongly aligned with the programme's priorities. Participation strategies also differ greatly. While the French Regions privilege a end-of-pipe approach, focused on the dissemination of relevant calls, specialised trainings and the creation of professional project-development units, the Portuguese and Spanish regions capitalise on their experience in past programmes to propose a multidimensional approach which targets the reinforcement and internationalisation of R&I capacities through talent attraction and retention measures, strategic integration of major infrastructures in EU networks, strong partnerships with leading international institutions, incentives to apply to the programme, and stronger synergies with structural funds.

Considering that most French OR policies lack a proper outward dimension, overlook the participation in Horizon Europe, and suffer from a clear substitution effect with structural funds which deter stakeholders to apply, we suggest to explicitly integrate policy objectives and dedicated resources to support the participation in FP10 and the integration in the ERA in the mandatory criteria, considered by the EC to assess the "*good governance of regional smart specialisation strategies*". We also advocate for greater conditionality on structural funds, through the systematic introduction of funding synergies in ERDF operational programmes.

Outermost representatives have so far mainly requested dedicated calls for projects to reinforce their participation. In an oligarchic ERA, dominated by "*closed clubs*", this option poses the risk of a greater peripheralisation. Limited regional resources may be diverted to inter-OR initiatives at the expense of necessary connections to core organisations and regions. To support a long-lasting participation in the FP and prevent the growing innovation gap between core and peripheral regions, we recommend systematising in relevant FP calls the need for applicants to reflect the EU's geographic diversity in consortia composition, activity design and

expected results. This dimension could also be considered in the evaluation criteria. In a complementary approach, the "Widening" component should be consolidated to foster new connections with advanced European institutions and overcome both geographic and institutional distances, particularly in peripheral and less-participating regions.

Capitalising on the conclusions from this first assessment, future studies may notably broaden the comparative performance analysis with other NUTS2 regions by exploring alternative dimensions such as productive and technological orientations, and geographic distance from core regions. An estimation of the impacts of FP participation on research and innovation systems and regional development could also contribute effectively to next-generation policies. Despite their apparent singularities, the Outermost Regions can also provide strong case studies to investigate more general and widespread phenomena. Future research on the multidimensional factors behind the depicted "substitution effect" and the practical obstacles to funding synergies could for instance, both contribute to policy and to research advancements, and hence reposition the Outermost Regions as islands of innovation in the European Research Area.

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