# *Can't get there from here? The challenges of innovation and transformation in Wales*

**Wales is a region and nation that has suffered long term relative economic decline, and which is characterised by a lack of economically important capitals and capabilities. It is also a politically autonomous region with a constitutional duty for (and a distinct policy focus on) sustainable development. This paper reflects on how this orientation toward urgent global and regional challenges is shaping innovation strategy and considers whether the Welsh Government approach can influence regional structures and outcomes. It concludes that Wales – and perhaps other peripheral regions – faces significant and enduring barriers to improving challenge-oriented innovation performance within current systems.**

*Gales es una región y nación que ha sufrido un declive económico relativo a largo plazo caracterizada por una importante falta de capitales y capacidades económicas. También es una región políticamente autónoma con una obligación constitucional (y un claro enfoque político) en el desarrollo sostenible. Este artículo reflexiona sobre cómo esta orientación hacia desafíos globales y regionales urgentes está dando forma a la estrategia de innovación y considera si el enfoque del gobierno de Gales puede influir en las estructuras y resultados regionales. Concluye que Gales –y quizás otras regiones periféricas– se enfrenta a barreras significativas y duraderas para mejorar el desempeño de la innovación orientada a desafíos dentro de los sistemas actuales.*

Gales epe luzerako gainbehera ekonomiko erlatiboa jasan duen eskualdea eta nazioa da, kapitalen eta gaitasun ekonomikoen gabezia handia ezaugarri duena. Politikoki autonomoa den eskualdea ere bada, eta garapen jasangarrian betebehar konstituzionala (eta ikuspegi politiko argia) du. Artikulu honek gogoeta egiten du premiazko erronka globaletara eta eskualdekoetara bideratze horrek berrikuntza-estrategiari forma nola ematen dion eta Galesko gobernuaren ikuspegiak eskualdeetako egituretan eta emaitzetan eraginik izan dezakeen aztertzen du. Ondorioztatzen du Galesek –eta agian beste eskualde periferiko batzuek– oztopo esanguratsu eta iraunkorrei egin behar diela aurre, egungo sistemen barruan erronketara bideratutako berrikuntzaren jarduna hobetzeko.

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**Keywords:** Wales, Challenge-Oriented Regional Innovation Systems, Smart Specialisation, Innovation Strategy.

**Palabras clave:** Gales, Sistemas de innovación regional orientadas a desafíos, Especialización inteligente, Estrategia de innovación.

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## 1. INTRODUCTION

Prior approaches to innovation (and economic development more generally) may have in some cases delivered increased growth, but have not been effective in addressing key challenges to wellbeing, socio-economic functioning and the natural environment. Such challenges include the climate and nature emergencies, and increasing income and spatial inequality – and the related rise of populism (Rodrigues-Pose, 2018). It is clear that a vision of innovation based solely on its role in increasing productivity or firm competitiveness is too narrow. Indeed, even where innovation delivers significant reduction in business costs, or entirely new ways of doing business, its deployment into firms or places can have problematic consequences for workers, regions and nature (Coad *et al.*, 2021).

Within this context there is then a persuasive argument for a re-examination of innovation – its origin, processes and outcomes – and a focus on how governments might seek to shape innovation processes to better address this wider set of challenges (Isaksen *et al.*, 2022). We present here an example of this at regional scale. Wales is a relatively poor post-industrial region on the UK periphery, but it is distinct from English regions in that it is home to the nation of *Cymru*, with its distinct history, culture and language, and enjoys a good measure of policy autonomy, which it is using to tread a different path to the UK Government in a number of are-

as. Latterly these areas include responses to COVID, the climate and nature emergencies and, relevant to this paper, the objectives of, and approach to economic development and innovation. Wales' approach is increasingly informed by a raft of laws passed in the Welsh *Senedd* (Parliament), including an Environment Act in 2016, and the Wellbeing of Future Generations Act (WBFGA) of 2015. This requires all (44) public sector bodies in Wales to have mind to the future in the development and delivery of all strategies and policies (Davies, 2017). This WBFGA describes seven 'goal areas' and five 'ways of working' for Wales' public sector bodies, which can be challenged if they develop approaches that are not compliant. However, there is a more important objective; essentially to change how public bodies work, such that long-termism, inclusivity, holism and integration become first-nature, and audit and punishment is unneeded.

This is then an interesting case of how a regional government is working with public, third sector, educational and private partners to develop a more locally impactful regional innovation system. Wales is doubly interesting because whilst it has long been a hotbed of regional innovation *thinking* (including as a regional focus in the seminal work by Cooke & Morgan, 1998), it is not a hotbed of regional innovation *doing*, being a territory that has for decades trailed its comparators in levels of both business and government R&D, and with an only moderately impactful higher education/research sector. Wales is then not particularly good at traditional innovation. This paper seeks to understand whether Wales can be better at new forms of innovation that can help places respond to the wider challenges they face.

The next section of this paper presents a little background on the policy and legal framework in Wales, and its 'hot topics' in economic development. Section 3 then presents a history of innovation and related strategy in Wales, making the case that its socio-economic history and position as a resource periphery limit the scale and ambition of regional innovation. Section 4 presents the current approach of the Welsh Government to innovation, as outlined in its 2023 plan 'Wales Innovates', and then assesses the likely success of the strategy in terms of its stated aims and Wales' wider needs. A concluding Section then levers wider debates on Regional Innovation Systems to reflect on what the ongoing Welsh experience might tell us about the necessary renewal of innovation systems in other regions.

## 2. INNOVATION IN WALES

### 2.1. A Brief History of Innovation and Innovation Strategy in Wales

It is probably fair to say that Wales has not been at the forefront of global (or even UK national) innovation processes since the hydrogen fuel cell was invented there in 1842, or when the Dowlais Ironworks was the first to license the Bessemer process in the 1850s (Franks *et al.*, 2002). The industrial context that spurred those innovations also led to generations (if not centuries) of Wales as a nation of job *tak-*

*ers*, not job *makers*; reliant for employment on the employment of external (to Wales) capital, for example in factories that were placed in the region as part of UK nationalised industries or as multinationals were enticed by public grants (Johnes, 2013). Through the 20th century, Wales' strengths in manufacturing were not mirrored by strengths in entrepreneurship or private enterprise, especially in deprived areas (Thompson *et al.*, 2012). And across the heights of the economy, investors chasing *resources* (not markets) in Wales – coal, water, and then relatively cheap labour – rarely brought the kinds of activities that spur innovation, either within a company or in a wider ecosystem (Morris *et al.*, 2013).

The 1980s and 1990s reinforced this trend of a territory specialising in activities towards the bottom of global value chains in manufacturing, whilst increasingly providing commodities and services – meat and dairy, back-office finance operations, tourism and retail for example – that required little onsite R&D and offered few opportunities to develop or implement innovations (at least until long after they had been developed elsewhere) (Morris *et al.*, 2013; Jones & Munday, 2020). Wales, at this time, was a region that was institutionally stable; was the focus of development policy (and recipient of development resources) from both UK and European scale; and which benefited from a regional development agency (the Welsh Development Agency) that very effectively translated grants and business space into jobs. What it also had, however, was a private sector that added little value, was fundamentally resource-seeking and which relied upon periodic injections of grants, external capital (and indeed external strategic direction) to be viable. Wales was effectively a dependent economy; for example, it shipped many consumer products – but none of these were *Welsh* products (Cooke, 2004).

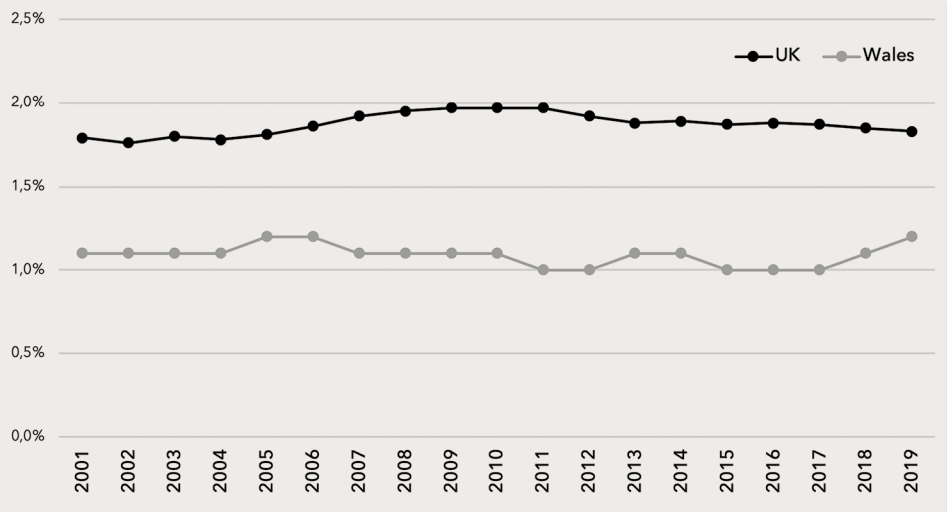
The inauguration of the Welsh Assembly[1] in 1999 did little to change this picture. Some attention was given to economic development, for example in strategies published in 2002, 2005 and 2010, but whilst these strategies recognised Welsh economic dysfunction (low productivity per-job and per-hour, and a low employment rate) they had few responses to the root causes (not least, generations of problematic cumulative causality in economic structures and related socio-economic outcomes) (Bradbury & Davies, 2022). Wales did not close the productivity gap with the UK average throughout the early part of the 21st century, despite this being a longstanding Welsh Assembly Government objective.

There is an argument that economic development was the poor child in relation to the new Welsh Assembly's preoccupation with its big new responsibilities in education and health. If so, innovation (and science) policy was the even poorer unwanted stepchild. Wales did not have a fully-fledged science policy until 2012. The subsequent innovation strategy in 2013 levered the EU Smart Specialisation framework as narrative but did not flow from substantive 'entrepreneurial discovery',

[1] Later to become the Welsh Senedd (parliament), after gaining primary law-making powers.

leading to what was effectively a sector-support strategy for predetermined (already favoured) sectors (Pugh, 2014). Where innovation was revealed in policy, the Welsh Government rested too much weight upon a higher education sector that underperformed in winning research funding (Morgan, 2017), and where the fruits of that research did not often benefit the 'home' region (Huggins & Kitagawa, 2012). By the end of the Assembly's second decade, it was recognised that innovation policy in Wales was fragmented, poorly communicated, lacked any 'theory of change' and needed substantial overhaul (Reid, 2018; National Assembly for Wales, 2019). Unsurprisingly then, through these two decades, Wales had continued to significantly underperform the UK average on R&D as a percentage of gross value added; policy had moved the dial not at all.

*Figure 1.* **LEVELS OF R&D EXPENDITURE IN WALES AND THE UK (% of GDP)**




*Source:* Office for National Statistics, 2021

## 2.2. The State of the Innovative Art

Wales today then is not, by traditional measures, an innovative place, and this weakness extends to the public as well as private sector: in 2021 only 2.7% of government funded R&D occurred in Wales, despite its population share of 5% and an economy share of around 4% (Office for National Statistics, 2023). More widely, Wales does not present as a dynamic economy. Gross fixed capital formation was around 3% of the UK in 2020 (Office for National Statistics, 2022), and relative wage and value-added levels remain low, as do levels of skills and qualifications.[2]

[2] See https://statswales.gov.wales/Catalogue/Business-Economy-and-Labour-Market for an overview.

Some of this is due to an regional evolutionary geography that has not really evolved in decades, with key industrial players (Tata Steel, Airbus, and Sony for example) being both headquartered elsewhere, and undertaking either very narrow tasks within a global value chain and/or lacking innovative capacity. For example, Airbus makes only wings in Wales, whilst Tata's integrated steel mill at Port Talbot uses technology that is, in basic terms, unchanged since 1950. Meanwhile, Wales' higher education sector (its only research-dedicated agents of any scale) underperforms significantly, attracting only 2% of UK Research and Innovation funding, despite hosting over 5% of UK students (Wyn Jones, 2023). The weakness in public sector R&D can be explained by the longstanding bias toward the 'Golden Triangle' of London and the Southeast, and arguably also the paucity in Wales of (UK) government activities that might spur wider territorial innovation – for example defence (Bishop & Gripaios, 1998).

These *proximate* reasons are themselves an outcome of where Wales sits within the global world system, this comprising not only global value chains, but also the geography and flow of ownership, finance, politics, and power (Wallerstein, 2011). Although part of the global core, Wales is in European and UK terms a resource periphery – and has been for centuries – shaping economic and social structures and relationships with other places. As Jones (2015) points out, Wales (along with other peripheral regions) has long suffered net 'capitals leakage' to other places in terms of natural resources (and their value streams; Jones & Munday, 2020), graduates, and ideas (and their commercialisation). This has occurred via the acquisition (and hollowing out) of interesting Welsh firms and, as important, by embedded resources being owned by 'placeless' actors (Jones, 2022a). There is certainly innovation in Wales – for example, centred on its semiconductor cluster (Munday *et al.*, 2022), around the (publicly owned) broadcast media, and in Cyber and computer games development – but these are relatively small and self-contained activities, in employment and R&D terms at least.

Wales innovative landscape is thus one that has, for decades lacked a strong government focus or private sector 'movers', and where there is little collective understanding regarding its potential impact on regional economic development – or more widely, on regional wellbeing. This is a problem because Wales is a small region with some big ideas.

## 3. WHERE IS WALES GOING?

Wales is unusual in several ways. Not least, it has a legal duty towards sustainable development which was embodied in the Act of UK Government that enabled devolution of political power in 1999 – over education, health, development and the environment for example. Much later, it strengthened and widened this duty with its own Acts of Senedd that prescribe how Wales' natural resources will be exploited and protected, and how Wales' public bodies will make policy in general. Interestingly the WBFGA was shaped and enacted – and a Future Generations Commissioner appoint-

*Figure 2.* **THE WELLBEING OF FUTURE GENERATIONS (WALES) ACT 2015**


*Source:* www.futuregenerations.wales

ed – following an extensive 'big conversation' grassroots programme of consultation with the people of Wales. The Act's seven goal areas, and five ways of working (see Figure 2) are thus (intended to be) an exemplification of 'what Wales wants', albeit subject to many internal and external constraints (Jones, 2022b).

As Figure 2 shows, the 'goal areas' are holistic and include the element of global responsibility (meaning Wales cannot make itself better off by immiserating others). Importantly, the Act requires that *all* public bodies consider *all* goal areas when making policy: thus, the 'healthier Wales' goal is not left to Wales' National Health Service; all Bodies must consider how their actions affect Wales' health. Similarly, when Welsh Ministers (who are subject to the Act) make innovation policy, they must be mindful of all goal areas, and must develop that policy with due regard to the five 'ways of working'.

The goal areas of the Act are 'high level', requiring significant interpretation in the development and implementation of policy, with this interpretation left largely to individual parts of the public sector. This interpretation is clearly influenced by socio-economic and environmental conditions in Wales, notably by high and enduring levels of deprivation, poor educational attainment, and poor health outcomes[3]. These contextual factors and the new laws, arguably combined with a long-standing inability (along with other UK regions) to 'move up' the competitive--region hierarchy using traditional development policies (Jones, 2015), have led to a markedly different approach to economic (and spatial) development policy in Wales. These differences can be summarised as follows:

Firstly, policy and law in Wales is more respectful of the role of natural resources, a stable climate, and well-functioning ecosystems in supporting sustainable well-being than the government in Westminster. For example, in Wales the Government legislated in the Environment Act (2016) to require the proactive and integrated sustainable management of natural resources, and to enforce carbon reduction budgets (as well as to introduce the UK's first disposable plastic bag charge). A moratorium on new fossil fuel developments was announced in 2021, and an (effective) halt to most new road building in 2023 (Welsh Government, 2023).

Secondly, Welsh Government policy is increasingly concerned with creating and protecting (sustainable) wellbeing for the people of Wales, to be achieved whilst appropriately respecting notions of fairness and social justice, and this has been accompanied by a dilution of the importance of growth in gross value added/GDP and productivity. To some extent, this is a legal requirement of the WBFGA, but it is notable how these themes have gained in prominence since the inauguration of the Act in 2015. Early, 'tick box' approaches by the Government and others are giving way to a situation where even documents that are *conceptually* quite a long way from wellbeing concerns repeatedly reference the WBFGA, and have wellbeing as a core concern (see Section 4 on Innovation).

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[3] See https://www.gov.wales/wellbeing-wales-2021-html

A third difference, from UK approaches at least, is that Welsh Government policy and narrative is more locally oriented and communitarian (than in England at least). Wales has long had a reputation as a communitarian polity, comprised of highly interlinked communities, embedded in their *Cynefin*[4]. The functioning of these communities is challenged by non-local and 'placeless' actors which hold dominant market power (Jones, 2022a) – thus enabling the appropriation of land, housing and natural resources important to places and to Welsh cultures – and Welsh Government and municipal policy has begun to recognise this with interventions in the housing and visitor markets to 'rebalance towards the local' (see for example Senedd Research, 2022). This orientation has seen the Welsh government enthusiastically support the notion of the 'Foundational Economy' (Froud, 2022), which celebrates the importance of 'mundane' employment distributed across the territory.

Innovation policy made within this context then will be different. One might expect its development to be more collaborative, and its objectives to be more impactful across a wider range of society (and indeed for the climate and nature) than has been the case prior or in other places. The participant set may also differ. The next Section tests these assumptions by examining the 2023 innovation strategy for Wales, '*Wales Innovates*', and then assessing its objectives and chances of success.

## 4. WALES INNOVATES?

### 4.1. Stronger, Greener, Fairer? The Aims & Approach of the Welsh Government

The Welsh Government Innovation Strategy[5] was published in February 2023, after a three-month period of consultation that gathered over 150 responses. The current Welsh Government approach is explicitly *mission based* – following the fashion most strongly associated with Mazzucato (see for example, Dosi *et al.*, 2023; Wanzenböck *et al.*, 2020; Henderson *et al.*, 2023). This approach is a novelty compared to both earlier Welsh Government approaches, and the approach by the UK Government. Table 1 summarises the innovation missions, and some identified participants and themes. Reading the Strategy, it is clear that a different approach is being attempted, not least with the four Missions clearly 'front-and-centre', framing the plan – unlike, for example the UK Innovation Strategy, where innovation missions are mentioned, but only as the fourth of four 'pillars', and here with no clear indication as to what the missions actually *are* (Department For Business, Energy & Industrial Strategy, 2021). For Wales, the four missions are clear (if ambitious): to make 'better' Wales' (1) education activities; (2) its economy and (3) health and care sectors; and (4) to respond to the climate and nature emergencies. This is clearly challenge–led innovation – and focussed on challenges, that although only briefly

[4] A word meaning (roughly) in English the totality and sense of local place.

[5] Wales Innovates: Creating a stronger, fairer, greener Wales https://www.gov.wales/sites/default/files/publications/2023-04/wales-innovates-creating-a-stronger-fairer-greener-wales.pdf

described in the document, are clearly very relevant to Wales (for example Wales is poor in health, economic performance, and qualifications/skills relative to other UK regions) but this has been less addressed in previous innovation debates.

*Table 1.* **WALES INNOVATES IN SUMMARY**

| Mission | Participants & Themes | Comments |
|---|---|---|
| An **education** system that supports the development of innovation skills and knowledge throughout people's lives in Wales. Schools, colleges, universities and research organisations create knowledge through research. This research can lead to commercialisation, create societal value, and support a stronger economy | • Schools, colleges & Universities<br>• Education funding and regulatory bodies (e.g., Commission for Tertiary Education)<br>• Sêr Cymru talent-attraction programme (£10m over 2 years)<br>• Regional Skills Partnerships<br>• *Better integration of employability, innovation, and skills.*<br>• *Improved impact of tertiary education*<br>• *Digital skills at all levels/ settings* | • Largely focussed on structures, bodies and agents that are primarily concerned with education, rather than innovation.<br>• No new bodies, incentives or approaches that might imply a step change in activity or impact: almost wholly a continuation of existing approaches.<br>• Not yet any measurable aims, or clear audit/evaluation structures. |
| An **economy** that innovates for growth, collaborates across sectors for solutions to society's challenges, adopts new technologies for efficiency and productivity, uses resources proportionately, and allows citizens to share wealth through fair work. | • UK Government (as key funder & partner)<br>• Micro and SMES; social enterprises<br>• Public sector (£20m grant support over 3 years)<br>• Key sectors & firms (inc. digital, optronics, semiconductors,, food & drink…)<br>• Key innovation campus assets.<br>• *Digital innovation; circular economy; international partnerships.*<br>• *Align support with wider WG requirements for the use of Welsh, fair work, equality, decarbonisation and protecting nature*<br>• *use public procurement to 'buy innovatively'*<br>• *Access to repayable loans via Wales Development Bank (£500m+)* | • Wide range of technologies, sectors, assets, participants noted across the chapter, but with limited detail.<br>• No explicit recognition of structural economic weaknesses – let alone how to remedy them.<br>• No new approaches, structures or incentives.<br>• Alignment with wider economic framings inc. 2018 Economic Contract[6] & UK GOV Innovation Strategy<br>• Aim to «consistently achieve 3% of UK Innovation funding in three years' time (2026) … with a more even geographical spread, with a view to increasing this to 5% in seven years' time (2030)» |

.../...

[6] https://businesswales.gov.wales/economic-contract

.../...

| Mission | Participants & Themes | Comments |
|---|---|---|
| A coherent **health** & **well-being** innovation ecosystem where the health and social care sector collaborates with industry, academia and the third sector to deliver greater value and impact for citizens, the economy, and the environment. | • NHS Wales & University Health Boards<br>• Research organisations (Health and Care Research Wales; Higher Education Funding Council)<br>• Universities providing management training to NHS staff<br>• *Aligning health & social care innovation systems*<br>• *A Social Care Innovation Plan*<br>• *Co-ordinating health and care priorities with the wider economy and community innovation capability*<br>• *Other themes include Leadership & Culture / Infrastructure / Funding / Building capability / Digital transformation / Meeting net-zero.* | • A wide range of strategies, objectives and themes cited and identified, but with no unifying theory of change.<br>• Framed within «A Healthier Wales: our Plan for Health and Social Care[a]».<br>• Some new plans; no changes to structures, incentives etc.<br>• No supporting funding.<br>• Not yet any measurable targets/outcomes. |
| Optimise our natural resources for the protection and strengthening of **climate and nature resilience**. We will focus innovation efforts of the ecosystem towards tackling the climate and nature crises simultaneously ensuring a just transition to a wellbeing economy. | • High level narrative identifying few participants<br>• *Urgent need to transform the food, energy and transportation systems in Wales.*<br>• *«…continuing a regionally planned approach not top down/market driven… leaving no-one and no place behind».*<br>• *Meeting climate targets (requiring innovation in heating & cooling buildings, transport)*<br>• *Maintaining & enhancing resilient ecological networks.*<br>• *Forestry & Land use; Marine; Awareness raising* | • As above, wide range of themes identified.<br>• No detail on governance structures, participants, responsibilities etc.<br>• No new specifically eco-innovation oriented structures or funding<br>• No discussion of innovative responses to key constraints – e.g. the UK-level management of Wales' electricity grid, finance etc.<br>• Progress measured by how nature is recovering; reduction of greenhouse gas emissions; how resilient communities are to climate change; how harmful pollution is being prevented. |

[a] https://www.gov.wales/healthier-wales-long-term-plan-health-and-social-care

*Source:* Own elaboration.

The Strategy also takes cues from a variety of wider framings, not least the WB-FGA and the increased importance of (regional) wellbeing. Wellbeing is mentioned 27 times throughout; but competitiveness four times, and value added only twice. Wider framings also include the Welsh Government's approach to business support (the Economic Contract), where it is seeking to shape the nature of investment into Wales, and the nature of business in Wales more generally (Jones, 2022a). Also evi-

dent is an attempt to integrate and cross-reference between the four missions – with for example the themes of climate and decarbonisation, and fairness and social justice, recurring across all. A third notable quality of the Strategy is its inclusiveness – a wide range of private, public, and civic actors are recognised as being part of the innovation landscape, rather than the document concentrating upon private firms (in key sectors) and universities and research bodies. This of course raises the question of how far such bodies and agents can be (or might wish to be) innovative (de Vries *et al.*, 2016; do Adro *et al.*, 2020). Of course, our earlier discussions show that this question could be asked equally of firms and universities in Wales.

Whilst this innovation strategy thus displays some interesting approaches, a number of further questions arise as to its likely success in making Wales the 'better' place envisaged. There is a significant distance to go in making Wales innovation system more 'functional'.

### 4.2. **Assessing the Potential**

Whilst the prior subsection notes some interesting and welcome facets to the Welsh Government approach, the strategy has attracted some criticism – but with this in terms of how it addresses Wales' longstanding innovation weaknesses, rather than asking how far this strategy can respond to the new(er) and existential challenges of runaway climate heating and ecological collapse, or diminished social functioning and cohesion (IPCC, 2023; Martin *et al.*, 2021). There are several issues that will affect the effectiveness of the strategy in generating a step-change in the scale and impact of Welsh innovation.

#### 4.2.1. ***Continuity versus transformation in structures***

There has been a distinct sense from stakeholders and informed commentators over many years that innovation strategy in Wales needed to engender radical change in the scale of (and perhaps even change the *concept* of) innovation in the region. The consultation draft and final strategy reflected some of these concerns, for example in the missions approach, and in the 'outreach' to the public sector (Delbridge *et al.*, 2021). Whilst, however, the overarching narrative on innovation has changed and broadened, there little sense of any change in the institutional framing of innovation in Wales. As Table 1 shows, it is hard to discern many new structures[7] (or much in the way of new funds) that is tasked with making challenge led, holistic and integrated innovation activity a reality (as Ashelford, 2022 suggests might be needed). The participants alluded to in the report are either research-oriented organisations siloed within delivery areas, or bodies whose primary responsibility is *not* innovation – educators, development authorities and NGOs, for example. In the absence of any new innovation focussed structure, with firms structurally weak, and as

[7] There is however to be a new committee of civil servants with participants drawn from across Government departments; Wyn Jones, 2023.

Welsh Government itself does no innovation, the burden as 'primary innovative mover' falls (again) on universities, but there is real tension here. Firstly, Wales' universities underperform in both attracting research money, and in the commercialisation and application of research. Nothing in the new approach is a lever to change this performance in any significant way, despite the attribution of targets for research income in the strategy (Table 1; Wyn Jones, 2023). Indeed, it may be the case that chasing increased income is counterproductive to the research > innovation > application > impact pathway in Wales. There are many academics across social and hard science disciplines who will (quietly) attest to the difficulties with achieving large scale UK research funding for 'Wales only' projects, the implication being that these are seen as parochial; more 'sellable' innovation projects may be those that are less 'Welsh'. It may then be that in a time of significant policy divergence at regional level, the circle cannot easily be squared between UK funding structures (and indeed incentives for individual academics) that reward global impact, comparability and universality, and the somewhat particular needs of a small, rather boring peripheral region. Or rather, it may be that these things *are* 'squarable', but the Welsh Government does not recognise the problem, let alone look to solve it.

#### 4.2.2. ***The Missing Pieces***

If there is lack of transformation (or even incremental change) in innovation structures, there are also important pieces missing from the 'Wales Innovates' narrative. Firstly, is any change in the *incentives* for firms, public agencies, civic bodies or indeed individuals within them to encourage or undertake innovation. Within firms, innovative agents may not exist, or be under-resourced in micro and small businesses (see Saunila, 2020 for a review) and in large corporates, be located a long way from Wales. Meanwhile, encouraging innovation in non-profit contexts, and especially in the public sector, requires deep thought around how to create space for innovative thought and how to reward innovators when financial returns are inappropriate or inflexible promotion processes rule. There is also tension between the risks of innovation and organisational ethos, be this the stewardship of public money or ensuring existing services remain appropriately resourced (de Vries *et al.*, 2016). Whilst the strategy mentions the 'risk' issue, it is only in terms of 'sharing innovative risks'. No mention is made of the organisational cultures, line management, or audit processes that need to change to allow innovation. One might argue that the extensive set of themes, actors and objectives of the strategy itself in fact highlights the risk averse nature of the Welsh public sector – Wales would like to keep both baby and bathwater, but prioritise neither.

A second missing element in the strategy is any detail on prioritisation implementation, evaluation or audit. Implementation will be tasked to an upcoming Action Plan but with (at time of writing) no detail on scope and timescale. As it stands, the strategy is largely bereft of measurable objectives or relevant timescales. The oversight and evaluation for the Action Plan will come from the *Innovation Adviso-*

*ry Council for Wales*, comprising 18 voluntary members, raising the question as to how rigorously far the strategy's wide range of (often vague and unfocussed) themes, actions and partnerships will be assessed in terms of outcomes.

A final missing element is – as the Welsh Government acknowledges – substantive new money, with (apart from repayable loans from Wales' Development Bank) only a few tens of millions of new dedicated regional funds identified. In the absence of any deep cultural or institutional change, it is thus hard to see from where the step change will originate.

#### 4.2.3. *Recognising the role of the 'Innovation World System'*

Earlier Sections of this paper have argued that Wales suffers an innovative shortfall due to its economic history and its (related but different) position in the political-economic 'world system'. The latter means firstly that the proportion of innovation expenditure in Wales is structurally and long-term lower than that in core (or even average) regions (Flanagan & Wilsdon 2018), and that this is due as much to exogenous as regional factors. Wales' peripherality also means that every £1 spent on innovation and related high value activities in Wales is less likely to have regional impact than in core regions. A grant given to a company to develop a new process will increase the likelihood of that company's appropriation and hollowing out by a non-regional firm; our best educated students are likely to leave, before or after university (Faggian *et al.*, 2017); technological advances in employed capital will benefit remote shareholders; and longstanding attempts to 'upskill' our research capacity will deliver no demonstrated regional development or wellbeing impacts, because the research happens *in* Wales but is not *of* Wales.[8]

In this context, welcome aspirations to better align skills, education and innovation with regional outcomes must be cognisant of the networks and power relationships within which Wales sits; and on whose behalf relevant human capital (and intellectual property) is being employed. Otherwise, the extremely porous nature of the regional economy (and its hierarchical position) means we are blindly building a regional *innovation* system upon a regional *economic* system that is nothing of the sort (Jones, 2015).

#### 4.2.4. *The Great (Unmentionable) Transformation*

A criticism of Wales Innovates, but by extension of (probably) all similar regional strategies, is their complete inadequacy in the face of global climate, ecological and inequality challenges, with technological disruptions (not least via AI) to be added to the list. Most critically of these, the current mode of capitalism is intimately connected to (and responsible for) not just the wild climactic changes seen in recent years, but also the wholesale denuding of nature (Moore, 2015). Meanwhile, a (global) spatial rebalancing

[8] For example, see the woeful level of detail associated with the actual outcomes of the Sêr Cymru project: https://www.gov.wales/ser-cymru.

of wellbeing is continually challenged by the dominant financial and value-flow paradigm (Hickel *et al.*, 2022), and by the increasing dominance and value exploitation of global tech platform firms (Feldman *et al.*, 2021). Only the most optimistic commentators (Mcafee, 2019) could imagine that current systems, incentives and regulations will deliver resilience for human systems (at various spatial scales) without radical changes in production, intermediation, distribution and consumption (not least of food) and deliver this, as necessary, within the current decade (IPCC, 2023; Dempsey *et al.*, 2022).

There is indeed an argument that in the absence of (global-level, absolute, urgent and unproven) decoupling of economic growth from climate and natural resource inputs, the material-financial *scale* of economies in developed countries (including their poor regions) must reduce to give the poorest places and people the natural and climate 'room to grow' within remaining global climate and ecological constraints (Hickel, 2020). Whilst the lack of any wider challenge to global capitalism is typical of (western) innovation and economic strategies, things are (or should be) somewhat different in Wales, where the WBFGA explicitly demands a (legally binding) commitment to global responsibility. Current regional systems (and Wales' participation in wider systems) are not delivering this responsibility, nor are they on track to do so (Buckland-Jones, *et al.*, 2021; Climate Change Committee, 2023). As the Welsh Government effectively seeks to support and grow these systems, and the size of the Welsh economy, its legal responsibilities are brought into sharp relief. Again, there may be a way to square this circle, but the debate has not been started.

The above then suggests that Wales Innovates faces an uphill struggle; fairly clear on what is wanted from innovation in Wales, but lacking any deep analysis of the core issues; under-resourced; incremental rather than transformational; and fundamentally lacking any structural remedy or theory of change. The question then of course arises, are these rare or uniquely Welsh problems, or are some of these issues likely generalisable to other places?

## 5. CONCLUSION: THE PROSPECT FOR CHALLENGE-ORIENTED REGIONAL INNOVATION SYSTEMS IN PERIPHERIES

What is research, development and innovation for? And why do we want more of it at regional scale? One might reasonably expect the answer to be to make the world a better place, and its regions better places – safer, nicer, more sustainable, more resilient, and of course more prosperous. For a long period, the 'why' of the regional innovation question was not asked, at least in individual regions, with the implicit assumption then that we undertake R&D by levering regional resources to make our own region more competitive, driving economic scale and value added, and hence making the money which then makes 'the region' better off. The emergence of the climate and nature emergencies, and of left behind places and their problematic behaviours (Rodríguez-Pose, 2018), has of course generated some soul searching. Key innovation players like the European Commission have recognised

that regional approaches to 'evening out' development – primarily Smart Specialisation – must be cognizant of immutable planetary limits, this for example spurring a focus on Circular Economy (Vanhamäki *et al.*, 2021) that is replicated in many regions. Innovate Wales displays this orientation, and the Commission's view that innovation should be, at heart, *problem solving*.

Notably, however for the Commission (and almost all relevant governmental agencies), addressing regional problems should not require abandoning the fundamental view of regions as a conceptually alike class of agents that lever innovation to compete for investment, jobs and hence growth:

> *«(S3 should) prioritise domains, areas and economic activities where regions or countries have a competitive advantage or have the potential to generate knowledge-driven growth and to bring about the economic transformation needed to tackle the major and most urgent challenges for the society and the natural and built environment»*[9]

In this view 'knowledge driven growth' is necessary, and perhaps by implication in this quote *sufficient,* to address societal and climate-nature challenges (as long as, one assumes, it occurs in a 'circular' way). Of course, in the EU case, given wider European Union structures and regulations, there is to be no regionally-driven deep refashioning of economies – through for example, public ownership, the erection of trade barriers, or transformative market interventions (like regionally bespoke subsidies, taxes, caps or bans). The single market – or rather, the vision of Europe as a set of inter-related, integrated and (internally) spatially free markets – comes first. This approach to regional innovation – replicated far beyond the EU of course – is reductive. It is 'our way or the highway', with no consideration of whether the notion of innovation – of progress – needs to be wider and more inclusive of society, and more cognizant of trade-offs – especially, for example, in a context where circular economies are long and much talked about, but non-existent (at any significant scale), and with very series barriers to development (Grafström & Aasma, 2021). Regional public bodies are unable to influence the basic mode of production in their locality; research and innovation policy must thus seek 'indirect' change, often delivered piecemeal or contextually inappropriate ways, through agents who are sometimes only partially capable, engaged or interested (Kempton, 2021), and with minimal resources relative to the size of regional economies, or to regional public budgets. This is then a poor second-best way of influencing (and is unlikely to transform) the regional economic path (Isaksen *et al.*, 2022).

Given the lack of 'direct' control over the structure of regional economies within the region, and with this more obvious in the periphery, Regional Innovation Systems carry a weighty policy burden. Yet their continued relevance, and even existence, requires justification (Asheim *et al.*, 2016). However, even if we accept RIS

[9] https://s3platform.jrc.ec.europa.eu/what-we-do

as an appropriate framing for policy, the extent to which they are applicable and effective away from the 'bright lights' of the regional innovation exemplars, in the peripheral dark lands, is a very real question (Phelps *et al.*, 2018; Eder, 2019; Bonaccorsi, 2017). We have made the point that peripheries like Wales suffer from a problematic position in global value chains, and within national structures (Calignano, 2022), and are subject to the leakage of key resources and capitals (or the value they create). They are unable to escape their economic history because any locally arising innovations – technological or social – are likely to be appropriated by economically powerful, non-regional actors, or will simply leave in search of richer markets and more capable partners. Innovation, then is not only more difficult in the periphery, but in traditional forms at least, may be less impactful.

Most of these challenges go unmentioned in the strategy of Welsh Government, and indeed in a wider debate which has under-examined the processes and outcomes of innovation in (perhaps less interesting) peripheral (and indeed rural) places (Phelps *et al.*, 2018; de Souza, 2017). It is illustrative that criticisms of the Welsh Government approach (this paper aside) relate largely to how it fails to increase the *scale* of innovative activity (traditionally defined) or to effectively lever traditional innovation actors like universities, research centres and firms (Delbridge *et al.*, 2021; Wyn Jones, 2023; Ashelford, 2022; Reid, 2018). Recommendations for improvement thus centre on improving performance within the established (and exogenously determined) system, not challenging the system itself. Effectively, given where Wales is in the innovative landscape, we are merely hoping to become 'more average'. What is clear however is that Wales' innovation strategy is constrained by a series of significant, enduring, and possibly unbridgeable gaps – in regional autonomy and capacity within the private sector; in public finance; and in control over key economic and regulatory levers.

What, then is to be done? Or rather, what *can* be done in the absence of wider system change? Perhaps a mission-based approach has the value of revealing the areas where Wales has most autonomy and scope for movement, in terms of both its devolution settlement, and national and global economic systems. This is unlikely to be in the traditional industrial areas where S3 concentrates, but rather the fully devolved health, education, planning and environment areas. Necessarily, this work may be prosaic and long-term. For example, the 7% of Wales' land mass covered in non-native conifer plantations, and the 80% currently home to (largely) struggling sheep farmers could be transformed into a world-leading sustainably managed landscape that optimises across outcomes including, for example, renewable electricity, carbon sequestration, biodiversity, rural employment, and recreation for wellbeing. This would require both social and technical innovations, necessarily perhaps rooted in place and of significant benefit to regional wellbeing - but would of course take more than a generation, and involve spearing a number of sacred cows, not least the socio-culturally important farming lobby (Wales & Bory, 2020). Meanwhile, Welsh Government's total control over education to the age of 18 (and

partial effective control over its universities) could be a fruitful avenue for significant innovation, equipping the next generation of citizens to be ethically grounded, future-skilled and AI- and climate prepared, whilst trialling approaches to schooling and qualifications that are more inclusive and context-relevant (Jones,2019).

So far, however, there has been limited evidence of structural or institutional innovation in these areas of public delivery. New farming subsidy schemes merely require sheep farmers to plant 10% of their land with trees; the remainder, one assumes remaining hard-to-sell and climate-problematic red meat and dairy. Meanwhile, Wales new school curriculum, launched in 2022, places GCSE exams – first used in 1988 and almost unchanged in concept and approach – as the key school-leavers' outcome. Schooling remains stuck in a Fordist rut, with children educated largely based on their year of manufacture. So far, the story is of an inability of the regional government (perhaps for reasons of electoral risk or internal capability) to conceptualise and narrate an approach to innovation that is as radical and holistic as the ecological, climate and social context – and actual *law* in Wales – demands. Wales may thus not be able to 'get there from here' if there is no bridge or means to build one. If these factors are replicated across some, most, or all peripheral regions, then the prospects for existing innovation approaches to provide the economic reorientation required to protect regional wellbeing and sustainability may be slim indeed. Our approach to innovation – and to economic development more generally – may then need to be conceptually and structurally transformed to bring about the wider transformation we need.

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