May 2025 - Working Title:

INNOVATION-DRIVEN PRODUCTIVITY: FRAMEWORKING FOR SCOTLAND'S HIGH-PRODUCTIVITY SECTORS

EXECUTIVE SUMMARY

This collaborative initiative between the Scottish Government (SG), the University of Glasgow (UoG) and the Productivity Institute (TPI), seeks to develop a Productivity Methodology and Framework tailored to Scotland's high-value sectors, including advanced manufacturing, engineering, clean-tech etc., (others here). Anchored by three pillars; 1) technological innovation; 2) workplace transformation; 3) sustainability, the project aims to create an actionable framework that can support inclusive and long-term productivity growth in Scotland's highest-productivity potential sectors.

Despite strong institutional assets and emerging clusters in data science, energy tech, life sciences, and creative industries, Scotland faces critical challenges: fragmented innovation systems, underdeveloped collaboration ecosystems, weak diffusion of workplace innovation, and skills mismatches.

To address these, the project advances four strategic pillars:

1. **Skills and Culture** – Embedding innovation-readiness and upskilling into workforces
2. **Strategic Support** – Aligning funding, governance and institutional incentives
3. **Ecosystems and Clusters** – Strengthening collaboration across academia, government, anchor firms and SMEs.
4. **Showcasing Innovation** – Elevating Scotland's innovation narrative through pilots and sector case studies.

Initial pilots will be launched at high value, high-industry companies with connections to both SG and UoG such as Scottish Water, Scottish Power and the whisky distilling industry, serving as testbeds for high-impact innovation. These will combine qualitative insight (stakeholder interviews, cultural diagnostics, management practices etc.) with quantitative measurement (technology / AI adoption, workforce impact).

Outputs will include a new **productivity framework**, regional and sectoral case studies, and targeted policy briefings. The collaboration will culminate in dissemination workshops and strategy sessions aimed at embedding the findings within Scotland's broader economic and industrial agenda that transcends political boundaries.

1. INTRODUCTION

Scotland is home to globally recognized universities, pioneering clean-tech companies, and a vibrant research and innovation ecosystem. Yet, its productivity performance remains mixed – particularly with key industrial sectors such as advanced manufacturing, energy, and health innovation – lagging comparable economies. Persistent gaps in digital and AI adoption, skills alignment, and collaboration between public research and private enterprise continue to limit potential.

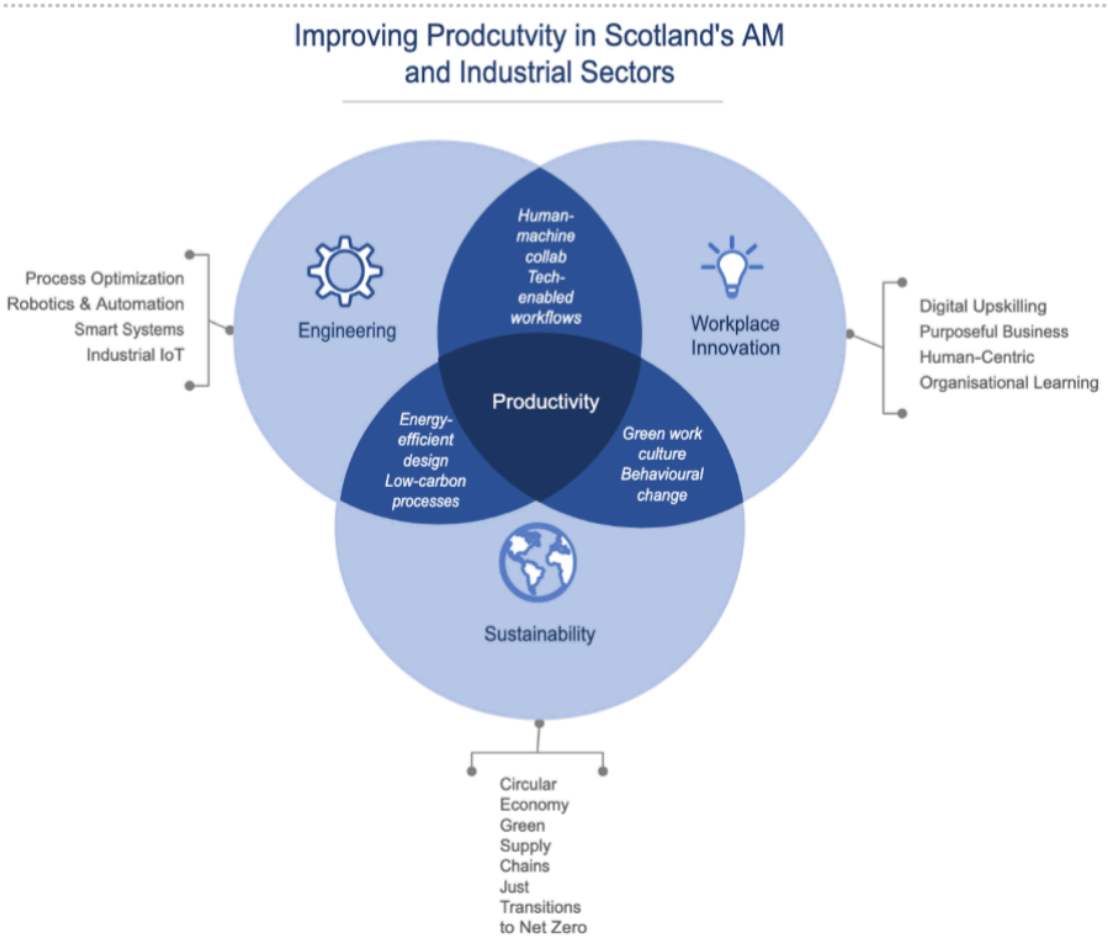
In this context, the UoG and TPI, working in collaboration with SG, have initiated a project designed to **diagnose and reframe productivity challenges** in high-value sectors. The aim is to enhance output and ensure productivity growth is fair, inclusive and resilient; reflecting Scotland's just transition and net-zero ambitions.

This project proposes the creation of a **Productivity Methodology / Framework** – a conceptual and practical toolkit that can support innovation diffusion, strengthen industrial collaboration, and drive performance in targeted regional clusters. The project will have initial focus areas including AI-driven transformation, green supply chains and workplace readiness with a focus on regional and sectoral pilots. These will be examined through collaboration with firms, government agencies and stakeholders, with the aim to lay the foundation for a scalable and policy-relevant productivity agenda by April 2026.

2. RESEARCH AIMS, FRAMEWORK AND METHOD

The central aim of this project is to develop and pilot a scalable methodology / framework for enhancing productivity in Scotland's high-value, high-productivity potential sectors – particularly those at the intersection of advanced manufacturing, engineering, digital innovation and sustainability. By integrating technological advancement, workplace transformation, and green transitions into a unified framework, the project addresses both the structural conditions and cultural enablers of productivity. This is represented below in Figure 1:

Fig.1: Methodology framework for improving productivity in Scotland's high-value sectors.



Rather than viewing productivity purely through traditional economic outputs, this initiative focuses on the institutional, behavioural, and systemic levers that enable innovation to diffuse and deliver measurable impact.

Key Research Objectives:

1. ***Develop a productivity methodology*** *that incorporates:*
   a. *AI adoption and digital transformation readiness*
   b. *Organisational and cultural change practices*
   c. *Green supply chain integration and sustainability metrics*
2. ***Pilot the methodology*** *in targeted sectors (water, energy, distilling) to test its real-world relevance and transferability.*
3. ***Map productivity drivers*** *using qualitative insights (interviews, organisational diagnostics) and quantitative indicators (digital adoption rates, workforce impact, SME engagement etc).*
4. ***Support public-private collaboration,*** *aligning innovation ecosystems with national productivity goals and regional strengths.*

Conceptual Framework: Four Pillars

The project's framework rests on four interconnected pillars that define the conditions under which innovation translates into productivity gains:

Pillar	*Focus*
Skills and Culture	Embedding innovation-readiness, upskilling, leadership development, and open culture for change across sectors
Strategic Support	Evaluating alignment and gaps in funding, policy mechanisms, and industrial support infrastructure
Collaboration Ecosystems	Strengthening ties between universities, anchor firms, innovation hubs and SMEs to improve knowledge diffusion and capability building
Showcasing Innovation	Identifying and amplifying success stories and best practices from pilots and sector leaders to catalyse wider adoption

A Testable Model for Sectoral Change

The framework will be applied in pilot case studies – starting with Scottish Water, Scottish Power, and whisky distilling firms – which represent strategically important, innovation-facing industries. These testbeds will allow the team(s) to;

- Co-design interventions with firms and stakeholders
- Capture cross-sector insights or barriers and enables
- Build a flexible *metrics system* including short-, medium-, and long-term outcomes

The research will also draw from prior conceptual work, such as *Beatriz's ecosystem mapping* and the National Innovation System (NIS) framework, to situate findings with Scotland's evolving policy environment and ensure resilience to political change.

3. FRAMING PRODUCTIVITY IN HIGH-VALUE SECTORS

This project will begin from the recognition that Scotland's high-value, high productivity sectors – particularly advanced manufacturing, clean energy and export-oriented industries – face a unique set of productivity challenges. These are not solely about output per hour, but are fundamentally tied to **innovation diffusion**, **workplace change readiness,** and **integration of sustainability** across supply chains.

Within this context, productivity is defined as *the capacity to translate innovation and investment into sustainable, inclusive economic outcomes*. This includes the ability of firms, clusters, and regional systems to adopt new technologies, transform organisational cultures / practices, and generate measurable improvements in performance, resilience and impact.

Based on early scoping, several challenges were identified that shape productivity performance across high-value sectors:

- **Fragmented public funding** and poor institutional coordination
- Weak **innovation diffusion**, particularly outside the Central Belt and among SMEs
- Limited integration between **academic R&D and commercial needs**
- Gaps in **digital adoption, data readiness** and **AI capability**
- Structural barriers to inclusive participation, such as low graduate retention and workforce gender disparities

These factors all influence the rate at which innovation can be adopted, scaled, and translated into productivity outcomes.

Rather than relying on narrow productivity metrics, this study will adopt a more dynamic framework that tracks technology adoption and innovation diffusion within pilot sectors. Indicators will include:

Measure	Purpose
Tech adoption rate (AI, digital tools etc.)	Evaluates real-world uptake of productivity-enhancing technologies
Workforce upskilling initiatives	Tracks alignment between training and firm-level innovation goals
Organisational change-readiness	Captures structural and cultural factors within firms that enable or inhibit innovation
Collaboration density (R&D ties, ecosystem participation etc.)	Measures embeddedness in innovation networks, clusters, public-private relationships
Sustainability practices	Evaluates integration of green supply chains, net-zero transitions and 'green-washing'

4. REGIONAL AND SECTORAL FOCUS

Scotland's high-value sectors are distributed across diverse regional geographies, each with distinct industrial strengths, institutional capacities, and labour market challenges. This project adopts a **place-based lens,** recognising that regional productivity performance is inseparable from the local ecosystems in which innovation is developed, diffused, and adopted.

The study will focus on regions where clusters and innovation opportunities converge with longstanding structural issues. These regions provide fertile ground to pilot a productivity methodology that is sector sensitive and considers regional delivery contexts.

Regional Sector Mapping:

Fig. 2: Regional mapping of Scotland's high-value sectors

Region	Sectoral Focus	Key Institutions / Businesses	Innovation Themes	Challenges
Edinburgh & Lothians	AI, Data Science, Software, Fintech	Bayes Centre, DDI (UoE), SNIB, Skyscanner, CodeBase, FanDuel	High concentration of tech jobs (~40,000) innovation, tech scale-ups	Talent competition with London, Cost of living, Early-stage funding gaps
Glasgow City Region	Life Sciences, Precision Medicine, AM	UoG, PMIS-IC, MMIC, Lifeglass	High employment in life sciences (~8,000), Biotech Diagnostics, Clinical trials, Health innovation	High rate of economic inactivity, High levels of zero qualifications, Low business formation rate, Weaker SME scale-ups
Aberdeen and Northeast	EnergyTech, Hydrogen, Subsea AI, Transition to Renewables	NetZero Technology Centre, Aberdeen Hybdrogen Hub, Global Energy Group	Clean energy transition (£45m hydrogen hub project), Leading clean energy R&D, Subsea robotics, High AM and engineering, Industrial AI	Overreliance on fossil fuel industry, Reskilling and workforce transition, Ageing infrastructure, Diversification risks, Shrinking productivity metrics
Highlands and Islands	SpaceTech, Remote Sensing, Green energy infrastructure	Orbex, SaxaVord Spaceport, Space Intelligence	Abundant natural capital, Access to launch zones for space tech, Links with UHI on green skills	Infrastructure (housing, roads), Workforce shortages and attraction , Connectivity
Dundee and Tayside	Gaming, Creative tech, Digital health	Outplay Entertainmnet, 4J Studios, Abertay University	High concentration of creative sector jobs (~3,500), Tay Cities Deal	Mid-tier funding access, Retaining local graduates
Fife and Central Belt	Photonics, Microelectronics, Clean Manufacturing	Semefab, Flex Medical	Manufacturing above Scottish average, Low costs	Ageing industrial base, Skills transfers

Figure 2. outlines the key regions and sectors and their relevant key actors, challenges and opportunities. So why these regions? Each region is selected due to its alignment with project goals and its role as a testbed for innovation-to-productivity transitions. The sectors proposed for investigation are either:

- **Undergoing strategic transformation** (e.g., energy transition in Aberdeen)
- **Emerging globally competitive clusters** (e.g., creative tech in Dundee, biotech in Glasgow)
- **Lagging productivity centres with high potential** (e.g., Central Scotland, parts of the Highlands and Islands with space tech)

These regional concentrations also match priority areas in the NIS (AM, Energy Transition, Data/Digital, Health & Life Sciences), reinforcing the policy relevance of this study.

The regional mapping also informs:

- **Pilot site selection** e.g., Scottish Water (infrastructure and sustainability), Scottish Power (clean energy, digitisation, sustainability), whisky distilling (high-value rural exports)
- **Productivity methodology development**, adaptable to sectoral and place-based variations
- Future deployment of a **dashboard tool**, tracking productivity levers across differing regional conditions

Using a regional lens ensures that findings will be transferable, while also grounded in specific industrial realities of Scotland's economic geography.

5. POLICY IMPLICATIONS AND EXPECTED CONTRIBUTIONS

This project is designed to inform practical, evidence-based policy that strengthens productivity through innovation, inclusion, and sector transformation. Key outputs will support both planning and delivery across government and industry.

Policy Contributions and Impact:

- **Productivity Methodology**

  A transferable framework that links technological innovation, workplace change, and sustainability to measurable productivity outcomes.

- **Regional and Sectoral Insights**

  Case study evidence to support place-based industrial strategies among high-value, high-productivity sectors.

- **Metrics Dashboard**
  A prototype tool for tracking innovation uptake, skills development, and productivity outcomes at the firm and regional level.

- **Policy Briefings and Workshops**

  Targeted outputs for SG, UoG, TPI, enterprise agencies (e.g., SE, Prosper) and sector stakeholders – focused on translating research into action.

- Support delivery of the **NIS** and **NSET**
- Enhances alignment between **public investment, firm-level change** and **inclusive growth**
- Build evidence for effective **scaling models** across regions and sectors

6. CONCLUSION

Scotland's strong potential in its high-value, high productivity potential sectors could be the driving force in its pursuit of a more productive, sustainable and inclusive economy. However, persistent challenges in skills, digital / AI adoption and regional inequalities continue to constrain impact.

This project responds with a practical, collaborative approach: developing a productivity methodology / framework that integrates technology, workplace innovation and sustainability, tested through real-world pilots in strategically important sectors.

By focusing on adoption and system readiness, this initiative reframes productivity as a shared outcome of investment, capability and coordination. The project's output aim to support national policies, regional strategies, and organisational change in a way that is resilient and long-term.