How universities can serve as engines of regional economic development

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As governments worldwide grapple with the challenge of creating sustainable, innovation-driven economies, the University of York and York and North Yorkshire region experience offers compelling evidence that universities can be crucial partners in transforming local and regional economic landscapes.

The new economic reality

The modern economy demands a fundamentally different approach to growth. Traditional industries are being transformed by technological advancement, environmental pressures, and changing consumer demands. In this context, the ability of regions to innovate, adapt, and create new industries has become paramount. Universities, with their unique combination of research capabilities, skilled workforce development, and entrepreneurial ecosystems, are perfectly positioned to lead this transformation.

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Government recognition of this potential is evident across multiple policy areas, and York and North Yorkshire exemplify how this vision can be realised in practice. From innovation and research priorities to skills development and regional devolution, there's a growing consensus that universities must play a central role in delivering economic growth. The University of York's experience shows this isn't just about producing graduates; it's about creating integrated ecosystems where academic research translates directly into commercial opportunities and regional competitive advantages.

The bioeconomy: a case study in university-led growth

Perhaps nowhere is this university-driven economic transformation more evident than in the emerging bioeconomy sector. The bioeconomy represents a fundamental shift away from a fossil fuel economy toward using biological resources and processes to create products, materials, and energy that traditionally came from fossil fuels or other non-renewable sources. This sector encompasses everything from agricultural technology to industrial biotechnology for production of bio-based chemicals and renewable materials.

The numbers tell a compelling story. Recent projections suggest that advancements in biological applications could unlock between $2 to $4 trillion in annual direct global economic impact by 2030 to 2040. For the UK specifically, studies indicate a £440 billion growth opportunity within the bioeconomy sector. These figures represent not just economic opportunity, but necessity – achieving global net-zero emissions targets will require exactly this kind of biological innovation at scale.

What makes the bioeconomy particularly interesting from a regional development perspective is how it builds on existing strengths while creating entirely new industries. Rural economies, often struggling with declining traditional agriculture and an aging workforce, can find new purpose through biotechnology applications. The average age of farmers now exceeds 60, presenting both a challenge and an opportunity for technology-driven solutions that can revitalise agricultural communities.

York and North Yorkshire: leading the bioeconomy revolution

The York and North Yorkshire region provides the most compelling example of how universities can drive regional economic transformation through strategic focus and partnership building. The University of York has world-leading capabilities in engineering biology and bioeconomy research, securing over £140 million in competitive grants since 2004 and that in turn has led to the region becoming a nationally significant hub for bioeconomy innovation. This wasn't achieved overnight – it was built on foundations laid 25 years ago with the establishment of the Centre for Novel Agricultural Products (CNAP), which focused on gene discovery and developing practical solutions for the bioeconomy.

The University's research isn't happening in isolation. Through long-term collaborations with pharmaceutical, chemical, and food sector companies, academic discoveries are being translated into commercial applications. One recent example involves the development of a new industrial hemp variety that produces seed oil with altered fatty acid

composition, making it five times more stable than other hemp oils – as stable as olive oil. This innovation, now registered in the UK with patents in place and field trials underway in North America, demonstrates how university research can create entirely new agricultural opportunities.

The region now hosts up to 10% of the UK's entire bioeconomy activity, with a concentration of bioeconomy businesses three times the national average. Employment in the sector has grown by 13% in York and North Yorkshire, compared to just 6% nationally. This success is the result of deliberate strategy, sustained investment, and effective partnership building.

The power of public–private partnerships

Central to York's success has been the development of BioYorkshire, established in 2020 as a public-private partnership between the University of York, Fera Science Ltd, and Askham Bryan College. Led by Professor Ian Graham as Academic Director, this collaboration creates a unique regional strength that spans the entire innovation pipeline, from early-stage research to market-ready solutions.

BioYorkshire supports development across all Technology Readiness Levels (TRLs), from initial discovery research and proof of concept (TRL 1–4) through to product development, testing, and market-ready solutions (TRL 5–9). This comprehensive approach ensures that good ideas don't fall through the gaps between academic research and commercial application – a common challenge in university-industry collaboration.

The partnership also addresses the critical issue of skills development. Through novel higher education and further education partnerships, BioYorkshire creates pathways for people to access higher-skilled green jobs across all levels – from post-16 education and apprenticeships through to degrees, PhDs, and beyond. This includes everything from biotechnology fundamentals to techno-economics, entrepreneurship, and intellectual property management.

Infrastructure and investment: York Central and beyond

The success of the University of York's approach to regional development requires more than just research excellence and good partnerships. It demands significant infrastructure investment and long-term commitment. The York Central development project exemplifies this integrated approach – one of the UK's largest city centre regeneration schemes that will transform 45 hectares of brownfield land with an anticipated £1 billion gross value added impact.

This isn't just about property development; it's about creating integrated innovation ecosystems. The plans include York's first central business district and a new innovation hub specifically designed to support bioeconomy sector growth. This kind of place-based approach recognises that successful innovation clusters require physical infrastructure that brings researchers, entrepreneurs, and businesses together in productive ways.

The University of York's Biorenewables Development Centre (BDC), part of this ecosystem, has already worked on 1,500 projects, taking products from laboratory research into industrial application. Companies like Azotic Technologies demonstrate the potential – this biotechnology company relocated from Nottingham, was incubated at the York BDC, and is now spinning out into permanent facilities in the region, developing natural nitrogen-fixing technology with revolutionary applications in sustainable farming.

Lessons for regional development

The York and North Yorkshire experience offers several key lessons for other regions seeking to leverage university capabilities for economic growth. First, success requires long-term commitment and strategic focus. The 25-year journey from establishing CNAP to today's thriving bioeconomy cluster demonstrates that building genuine competitive advantage takes time and sustained effort.

Second, effective partnerships are essential. Universities cannot drive regional economic development alone – they need strong relationships with industry, government, and other educational institutions. The public-private partnership model creates shared ownership and aligned incentives that purely academic or purely commercial approaches cannot achieve.

Third, infrastructure investment must be strategic and sector-specific. Generic business parks or innovation centres are less effective than facilities designed around the specific needs of target industries. Modern research spaces, state-of-the-art laboratories, and facilities that enable cross-disciplinary collaboration are essential for translating academic research into commercial success.

The path forward

As Government increasingly recognises the need for innovation-driven economic growth, the University of York's model demonstrates how universities can play an ever more important role in regional development. The Yorkshire bioeconomy example shows how academic excellence, strategic partnership building, and targeted investment can transform regional economic prospects while addressing global challenges like climate change and sustainability.

The University of York and the York and North Yorkshire region show that universities are not just educational institutions but powerful economic actors capable of creating new industries, attracting investment, and building the skilled workforce that modern economies demand. The Yorkshire experience demonstrates that regions which successfully harness this university-led potential will be best positioned to thrive in an increasingly competitive and rapidly changing global economy.

Success requires vision, patience, and commitment from all stakeholders – universities, government, and industry. But the rewards, as demonstrated in York and North Yorkshire, can be transformational, creating sustainable economic growth that benefits entire regions while contributing to solutions for global challenges.