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Value Chain activities of Small and Medium Food Manufacturers in Wales, United Kingdom: The KITE Project

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ABSTRACT

The Knowledge Innovation Technology Exchange (KITE) Feasibility Project (2008-2015) was implemented in Wales, to improve food science/technology knowledge and sustainable innovation in food manufacturing small to medium enterprises (SMEs). From this model, the study aimed to identify the salient features of such a paradigm to contribute to 'value-added gains' for competitive advantage. Cumulatively, >90 KITE interventions in 43 Welsh SME partners, were evaluated according to mappable value chain 'primary activities' and 'support activities'. Findings from case study purposive samples conducted in 13 out of 43 KITE partner SMEs, identified added value activity across manufacturing and processing activities that positively impacted the food sector.

***Keywords**: SME; Value Chain; Competitive Advantage; Knowledge Transfer; Food Manufacturing.*

1 Introduction

It has been established that the food sector plays an important part in the European Union (EU) economy. In 2007 it had a 1.9% share of the value-added of the total economy with a 2.2% share of employment predominantly in rural areas. The value-added of the food industry was identified as growing faster than any other manufacturing industry and the EU, wanting to further develop the competitive position of the food sector for economic growth, identified sectoral growth weaknesses pertinent to food and drink processing. Such weaknesses included slower growth in value-added and export volumes compared to its competitors, benchmarked as the United States, Australia, Brazil and Canada. Within the EU, the food sector consisted of 50% of businesses being Small to Medium Enterprises (SMEs) that had more challenges to navigate than large international companies such as raw material quotas, increasing power of retail chains, environmental policies and food legislation uncertainty (European Commission, 2007).

As a result, the EU provided agri-business provided funded support from the European Agricultural Rural Development Fund (EARDF) to include the United Kingdom (UK), an EU member state since 1973 (Campos and Coricelli, 2017) (the then European Economic Community), and its devolved nations. The funded support was in response to the UK, observing that between 1998 and 2005, the nations' Food, beverages and tobacco manufacturing labour productivity GVA growth per £million (m), over the same period, lagged behind other incrementing sectors, for example, Transport equipment; Chemicals and pharmaceuticals; Computer and electronics and Wood, paper products and printing (Office for National Statistics, 2022).

The EU support was intended to be used by the UK as part of its schemes and assistance to support the delivery of the UK Government's Food Industry Sustainable Strategy 2006, which aimed to improve the efficiency and performance of food and drink manufacturing and processing (FDMP) small and medium-sized (SME) businesses, as a way to make the necessary *"productivity increases, greater investment in capital, research and development, innovation and a better qualified and skilled workforce working"* (Defra, 2005).

FDMP SMEs in the following case study area (see, 1.1) engaged with EARDF-funded support via a university-led triple-helix food sector Knowledge Innovation Transfer Exchange (KITE) intervention. However, other than evaluations of the overarching scheme and contributory initiative, an analysis of the SMEs' internal organisational activities that contributed to value-added for competitiveness had not been undertaken. Therefore, the objectives of this paper were to identify which key elements of the EARDF-funded food sector intervention impacted FDMPs' internal activities for SME competitive advantage and to determine where in the business such SMEs gained added value to internal manufacturing and processing activities. To attain the study objectives a case study approach was adopted for its ability to conduct an in-depth investigation.

1.1 The Case Study Area

In Wales, a devolved nation of the UK, labour productivity GVA per £million (m) over the 1998 to 2005 period was in an improved growth position than the UK whole, and saw the Food, beverage and tobacco sector as the most incremental sector (up by £272m), followed by Transport equipment (up by £192m), and Basic pharmaceuticals (up by £28m), see Figure 1 (Office for National Statistics, 2022).

Then, in 2006, the Welsh Government's Economic Research Advisory Panel observed a growth trend specifically in the nation's food production sector. FDMP labour productivity GVA £m had incremented year on year from £632m in 1998 to £847m, see Figure 2 (Office for National Statistics, 2022), and the government indicated that to prosper and promote strong growth, these businesses would need a positive climate and active support to thrive (Welsh Government, 2007).

The Welsh Government also recognised the need for Agri-food processing SME investment to establish alternative or new markets and responded by developing the EARDF-funded Rural Development Plan Processing and Marketing Grant Scheme (PMG) 2007-13, in line with its Food and Drink Strategy for Wales 2008-2020. Increased export and marketing orientation in the sector were also supported by the PMG scheme. The scheme was designed to help Agri-businesses, including FDMPs, to add value to Agri products primarily through innovation, improve the competitive position in existing and new markets, create sustained employment and boost GVA. The scheme also intended to support businesses to reduce wastage and encouraged cost-effective production processes (Welsh European Funding Office, 2016).

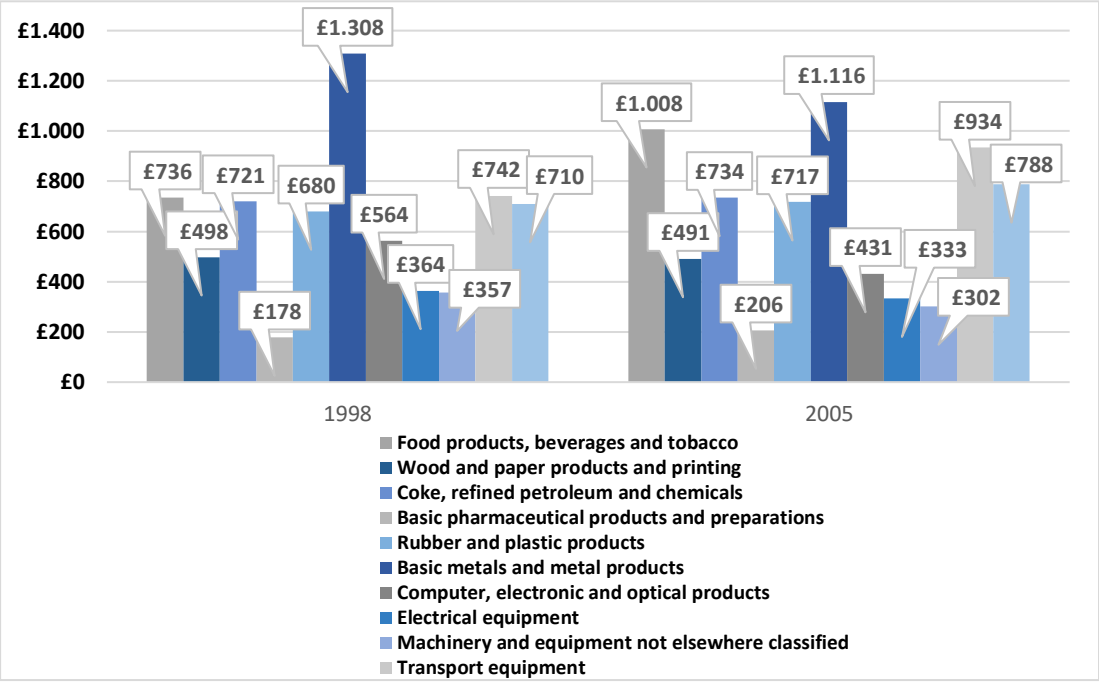

Figure 1. Welsh Manufacturing Labour Productivity GVA comparison (£million) 1998 and 2005.

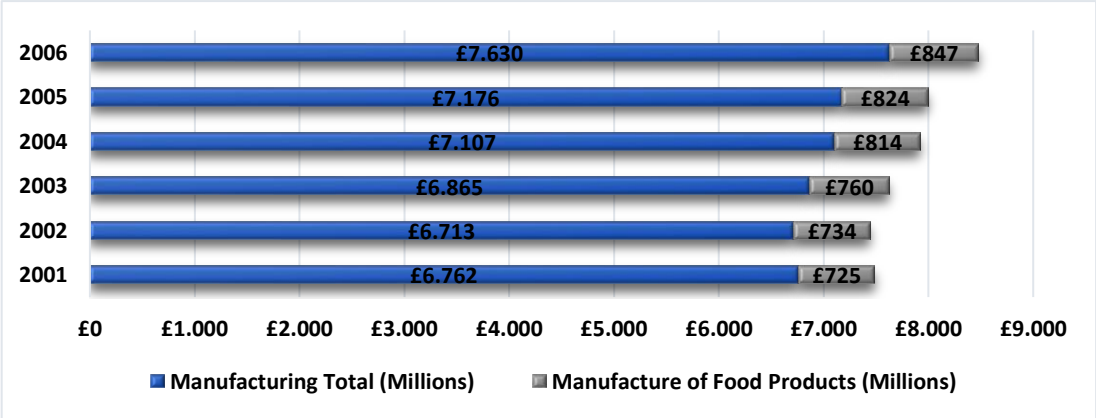

Figure 2. Welsh Manufacturing Labour Productivity Food Products GVA £millions.

The KITE Feasibility Project 2008-2015 was developed to deliver the PMG scheme as a food sector triple-helix (Etzkowitz and Leydesdorff, 2000) intervention, with a structured programme of knowledge transfer support designed to facilitate knowledge transfer to the nation's FDMP SMEs as a key to increasing its competitiveness. It specifically aimed to improve technical compliance and business performance and help reverse the nation's decline of food technologists, as identified by the earlier work of Lloyd and Simmons (2005). It also aimed to meet the food sector's critical need for sustainability through innovation and positively impact employment and enhance food technical, science/safety knowledge in FDMP SMEs (Redmond, 2013). Moreover, it provided additional support for FDMPS to navigate legal compliance in relation to the EU veterinary sanitary and food safety's 2007 passing of 309 relative regulatory European Acts (Bondoc 2016); which resulted in Wales's food safety statutory parallel instruments undergoing 4 new regulations and 2 amendments (Food Standards Agency, 2020).

Whilst there were reported international territorial agri-development triple-helix knowledge transfer schemes for regional food sectors, such as the EU wine support programmes (Europa, 2020); until 2008, the case study area FDMPs were reliant on EU-funded Knowledge Transfer Partnership (KTP) interventions specific to the UK. KTPs are a partnership between industry, universities and graduate placement, where a graduate is placed in a company for a duration between twelve and thirty-six months and costs a circa of £35k contribution per annum for companies

(United Kingdom Government, 2015), which proved to be prohibitive for micro and SME businesses. However, the KITE intervention was developed with unique attractive attributes for SMEs, such as shorter partner durations, as minimal as six months in length; a reduced FDMP SME contribution, and specific tailoring to the technical and upskilling requirement of the individual company. Companies were able to host graduates with specialist product and process knowledge and engage with multiple programmes dependent on need and implementation. The initiative facilitated 43 industry partnerships and coordinated 97 individual delivery interventions ranging in duration from three months to two years.

To understand the key elements of the potential impacts of the cumulative five-year food sector triple-helix intervention on FDMP SMEs' internal activities and to determine where added value occurred within activities, evaluation of the KITE intervention largely focused on measurable tangible outputs, synonymous with economic growth such as increased sales, job creation, waste reduction and new product development (NPD) (Redmond *et al*., 2020). The study also utilised the determinants of Porter's (1985) value chain model as a tool for analysis, as it had the ability to be adapted to specifically address the food and drink sector requirements and had the flexibility to be applied to the uniqueness of each of the SMEs' valuable capabilities that could be leveraged into *"competitive advantage"* (Prajogo *et al*., 2007).

2 Theory

The value chain, according to Noke and Hughes (2010), was a conceptual idea of Porter (1985) which distinguishes *"the processes that a product or service moves through from raw materials/conception to final consumption, and the value that is added or not at each stage to create a compelling or otherwise value proposition".* Porter's (1985) model of the value chain identified aspects of an infrastructure system that were fundamental to competitive strength in the marketplace and that the tying together of the activities in an organisation would create value for the ultimate customer (Svensson, 2003). The framework highlights value-creating primary and support activities of an organisation and is a business approach to the serial process that sees the cost of production exceeded by the value for buyers (Ahenkora, 2012). As such, Porter (1985 in Svensson, 2003) stated *"… the value chain disaggregates a firm into its strategically important activities more cheaply or better than its competitors"* and that this tactical business model day-to-day management has as much importance on the long-term success of a firm as the strategy itself (Rainbird, 2004). However, it is organisational effectiveness and not simply efficiency that is a means of obtaining the competitive advantage of growth. This effectiveness was found when the value chain support activities synergistically combine with linkages and interrelationships of the primary operational activities (Patnaik and Sahoo, 2009).

The value chain differentiates from the supply chain although at times it has been *"used interchangeably with concepts such as the Supply Chain"* (Rainbird, 2004). An example of this perceived interchangeability is where *"the value chain identifies the linkage and interdependencies between (and among) suppliers, buyers, intermediaries and end users"* (Svensson, 2003). However, the argument exists that substantial competitive advantage is from product differentiation and segmented markets via the internal business environment, which is distinctively different from supply chain thinking, more suited to commodities and commodity markets (Hopkins, 2009; Fearne *et al.*, 2012). Furthermore, Fearne *et al.* (2012) acknowledged that Porter and Kramer (2011) focused on the concept that the value chain in today's organisations, now encompassed trends in strategic management and value chain research to include the *"growing interest"* in the investigation and potential incorporation of societal costs and benefits that contribute to long-term advantage (Fearne *et al*., 2012).

It was reported that SMEs are *"often casualties of large supply chains, SMEs are frequently relegated to the position of subcontractor where little profit margin exists and opportunity to create value is low"* (Noke and Hughes, 2010). Also, *"they are the lifeblood of modern economies"* (Ghobadian and Gallear, 1996; Noke and Hughes, 2010). Therefore, it is vital for SMEs to identify where value is added or can be created within value chain activities, to determine strategies for competitive advantage.

2.1 Importance of a value chain analysis to food sector SMEs

Porter's (1985) value chain model is considered to be a platform that can facilitate the evaluation of core food and drink manufacturing and processing competencies, to identify the impact of food sector interventions, on FDMP SMEs' long-term competitive advantage.

Within KITE, partner SMEs' primary and support food manufacturing and production activities were specifically linked to the directive of the food sector intervention which was to *"enable SME commercial gain"* (Lloyd, 2008), through the improvement of the SMEs' internal business operations, innovation to include NPD, and increased knowledge and skills for the programme partners, food scientists and technologists (Redmond, 2013).

It has been suggested that an examination of value gained or lost, by industries taking part in the competitive environment is needed (Ahenkora, 2012) and as such, it will be valuable to inform key FDMP stakeholders of where the food sector intervention facilitated adding value or to identify losses to activities of the partner SMEs. Hence the use of a case study analysis of the delivery, transverse over Porter's (1985) value chain model was selected to achieve the aim of this study, which was to undertake a value chain analysis of the KITE FDMP SME partners to identify added value gains for competitive advantage from facilitated knowledge transfer.

3 Design/Methodology/Approach

A multiple case study methodology was designed to capture qualitative and quantitative data (Yin, 2009), as well as project outputs, from a representative sample of the Pan Wales FDMP SMEs, that had partnered with the KITE intervention (n=43). Individual reports and minutes of quarterly local management committee (LMC) meetings (n=274) were analysed using a qualitative approach against the predetermined intervention mechanisms (Welsh Government PMG Funding Application and Business Plan PMG, 2008), see Table 1.

Table 1

Food sector intervention activities

• Product and process innovation including preparatory operations and testing.	• Collation, interpretation and dissemination of market intelligence information.
• Innovation in general management of businesses and supply chain relationships.	• Capacity building/skills development activities focused on delivering market-focused added-value products.
• Collaborative initiatives to enhance efficiency and profitability along the supply chain.	• Improvements in marketing skills.
• Dissemination of environmentally sound best practices	• Branding developmental work to enable food and drink producers to understand the needs of the quality food market and to establish new added-value market opportunities.

A further in-depth understanding of outcomes of the project interventions' activities for potential impact on the food and drink manufacturing sector was obtained from semi-structured in-depth qualitative interviews conducted with relevant SME managers (n=8), the university's technical managers (n=6) and media reports (n=>100), (Redmond, 2015). The qualitative data was then further analysed using a content analysis approach (utilising NVivo v12) according to value chain components. The project's highlight reports underwent a quantitative analysis with data evidenced by key performance indicators and project outputs being assessed against FDMPs value chain primary and support activities.

From the results applicable, a sample of SMEs (n=13) were selected for case study assessment against the value chain activities (Figure 3) to categorise where the delivery interventions impacted on SME partner's primary and secondary FDMP activities to add value for competitive advantage. The SME case study inclusion criteria was based on the appropriate level of partner data available. SME-signed approval was obtained for use of data for research purposes. Case study partners were then grouped according to BRCGS classification (BRCGS Global Standards, 2015). The strategy of using a multiple case study methodology as a framework for the empirical enquiry was selected for its advantage in investigating contemporary events (Yin, 2009). During the assessment, the reliability of the approach was strengthened by the use of triangulated mixed methods (Collis and Hussey, 2009).

4 Findings

In total, n=13 KITE partner SMEs were selected as case studies for value chain examination and analysis. Data from the studies highlighted that the food sector intervention had a value-adding impact on the core competencies of the SME partners. The findings presented below highlight the synergies between the support and primary activities.

In order to finance developments in primary activities, case study SMEs made a combined investment of >£10.m to improve their infrastructures. The SMEs' primary food processing operations, food storage and distribution activity analysis showed that overall 61% invested in equipment, 31% in new premises, and 23% in production flow (Table 2). Investment in transport and trade activities included the purchases of new vehicles and livery that was reported to influence the increased effectiveness of outbound logistics.

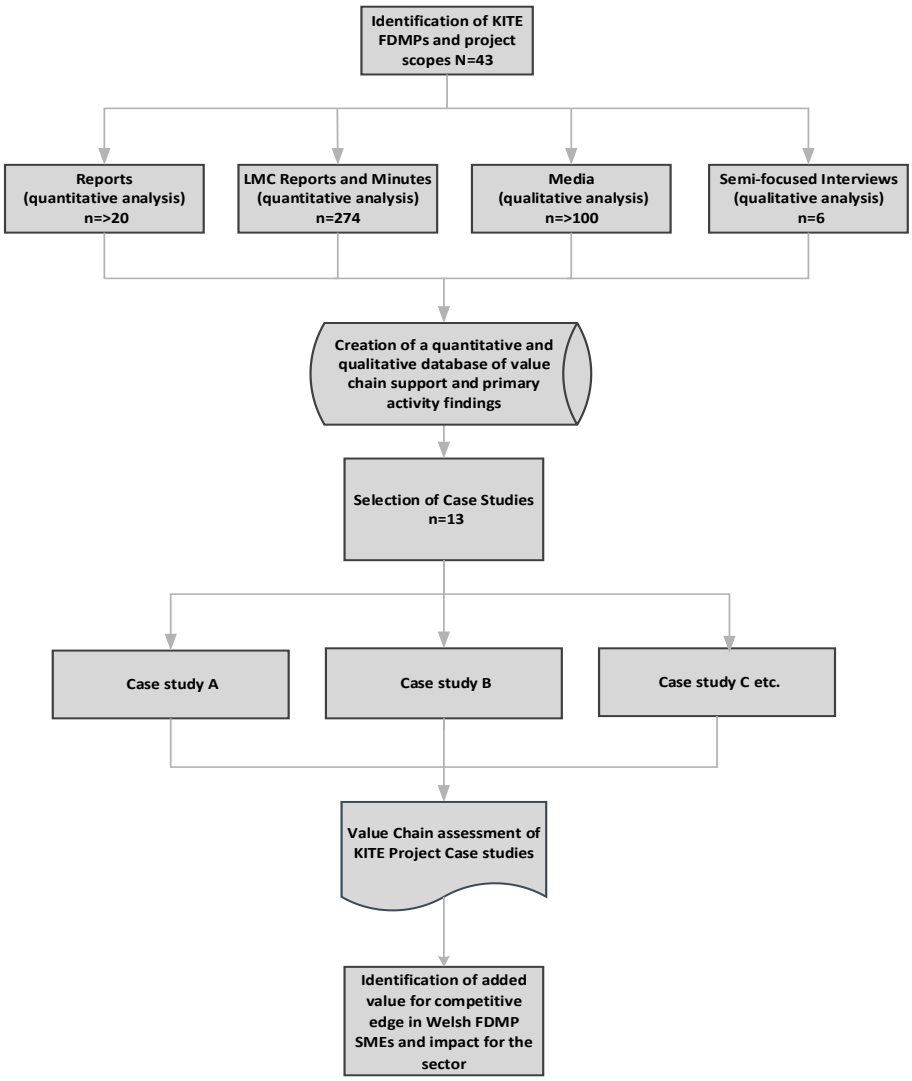

Figure 3. The process to enable case study identification.

Financial investment in research and technology support activity reported developments, in the form of enhanced information technology and information systems, for supplier databases/ordering and stock control systems, was instigated within 40% of the case study SMEs. This then interrelated with new supplier sourcing of local tertiary supply within procurement support activities cumulatively in 31% of the analysed SMEs (Table 3). Also, it reportedly had a direct impact on primary inbound logistics activities by gaining new local supply chains for 39% of SMEs choosing this business model.

The £695k financial match funding investment, made by the case study SMEs to the food sector intervention, provided knowledge transfer to both primary and support activities (Table 4), which realised 31% of the SMEs gaining significant efficiencies in waste reduction, to the cumulative value of £270k. The knowledge transfer of the interventions also aided 78% of SMEs to engage in NPD activity, 84% to achieve BRCGS/Safe and Local Supplier Approved (SALSA) certification, and 76% participation in enabled workforce development. Cumulatively, this increased effectiveness contributed directly to the added value for competitiveness.

Table 2
% Value chain primary activities evidenced in KITE SME partners (n=13 SME case studies).

Primary Activities		**BRCGS categorised Case Studies (n=13)**							
		% of SME cases undertaking activities	Raw red meat, poultry and prepared products BRCGS 1,2,3	Fruit, vegetables and nuts BRCGS 5	Dairy, liquid egg BRCGS 7	Ready-to-eat meals BRCGS 10	Cans and jars BRCGS 11	Bakery BRCGS 14	No activity
Inbound logistics	*Supply chain efficiencies – local suppliers*	39%	8%	8%	-	8%	-	15%	61%
Operations	*New equipment*	61%	15%	8%	8%	15%	-	15%	39%
	New premises	31%	8%	15%	8%	-	-		69%
	Waste reduction	31%	8%	8%	-	8%	-	8%	69%
	Process/ production flow	23%	-	8%	8%	15%	-	-	77%
Outbound logistics	-	47%	15%	8%	8%	8%	8%	-	53%
Marketing and sales	*Promotions/ campaigns/ adverts/ nominations*	40%	8%	8%	8%	8%	8%	-	60%
	New supermarket supply	55%	15%	8%	8%	8%	8%	8%	45%
	Export	23%	-	-	8%	8%	8%	-	77%
	Other new supply	85%	23%	15%	8%	15%	8%	16%	15%
	Increased sales	100%*	23%	15%	8%	15%	8%	31%	0%
Service	*BRCGS, SALSA, etc.*	84%	23%	15%	8%	15%	8%	15%	16%

Table 3
% Value chain support activities evidenced in KITE SME partners (n=13 SME case studies).

Support Activities		**BRCGS categorised Case Studies (n=13)**							
		% of SME cases undertaking activities	Raw red meat, poultry and prepared products BRCGS 1,2,3	Fruit, vegetables and nuts BRCGS 5	Dairy, liquid egg BRCGS 7	Ready-to-eat meals BRCGS 10	Cans and jars BRCGS 11	Bakery BRCGS 14	No activity
Infrastructure	*Investment*	92%♦	15%	15%	8%	15%	8%	31%	8%
	Other accreditations	16%	-	-	-	8%	-	8%	84%
Human resources	*Additional employees*	100%▲	23%	15%	8%	15%	8%	31%	0%
	Workforce development	76%	23%	15%	8%	15%	-	15%	24%
	Staff restructure	32%	8%	8%	8%	8%	-	-	68%
Research& technology development	*New product development*	78%★	8%	8%	8%	15%	8%	31%	22%
	Information Technology	40%	8%	8%	8%	8%	8%	-	60%
Procurement	*New supplier sourcing*	31%	15.%	8%	-	8%	-	-	69%

Key:
** 100% >£103 million & 30.8% >£10 million increased sales; ♦total investment >£10 million; ▲855 additional employees*
★302 new products developed

Table 4
KITE Knowledge Transfer Investment by BRCGS category.

BRCGS Category		Number of Interventions	Combined Months	SME KITE Investment
Raw products of animal or vegetable origin that require cooking prior to consumption (1,2,3)	n=3	14	150	£212,043
Fruit vegetables and nuts (5)	n=2	9	120	£111,267
Processed foods and liquids with pasteurisation or UHT as heat treatment or similar technology (7)	n=1	4	72	£85,600
Processed foods / Ready-to-eat or heat-and-eat foods i.e. heat treatment or segregation and processes that control product safety (10)	n=2	8	72	£109,444
Ambient stable products with pasteurisation or sterilisation as heat treatment (11)	n=1	2	24	£30,667
Ambient stable products not involving sterilisation as heat treatment (14)	n=4	7	84	£110,100
Total	n=13	44	528	£659,120

For case study SME partners, the university's technical and food science/safety support enabled service activity instances, such as the attainment of the BRCGS technical standard certification in n=11 case study SMEs, realising an increase in leading retailer supply by a collective 55%. The interrelationship of the service activity and the research and technology activity NPD (85%) had considerable importance which resulted in 302 products and enabled 23% of the SMEs to export such products to four European countries. Additionally, 48 other new supply routes ranged from known hotel chains, wholesalers, convenience stores, catering and food outlets. This activity was underpinned by 11 facilitated marketing instances of promotions, advertisements (including television), product marketing campaigns and award nominations in 40% of the SMEs. It was evidenced primarily in marketing and sales, where the combined increase in sales (100%) realised £77.5m (Tables 2 and 3).

The food sector intervention also provided the SMEs with access to the university's food and drink technical supervisory team for legality, labelling and academic food science expertise in the areas of bakery, honey, dairy, dietetic and nutrition, coeliac and allergens (Figure 4). Also, the SMEs received an incumbent in the form of a food science placement, affiliated with the university, for the duration of the delivery interventions. The affiliates' responsibilities were to analyse existing industry practices within the industrial partners' premises and implement interventions aimed to improve business operations; embed improvements and the principles of new methodologies to be adopted and undertake a formal evaluation of the said interventions (Redmond, 2013).

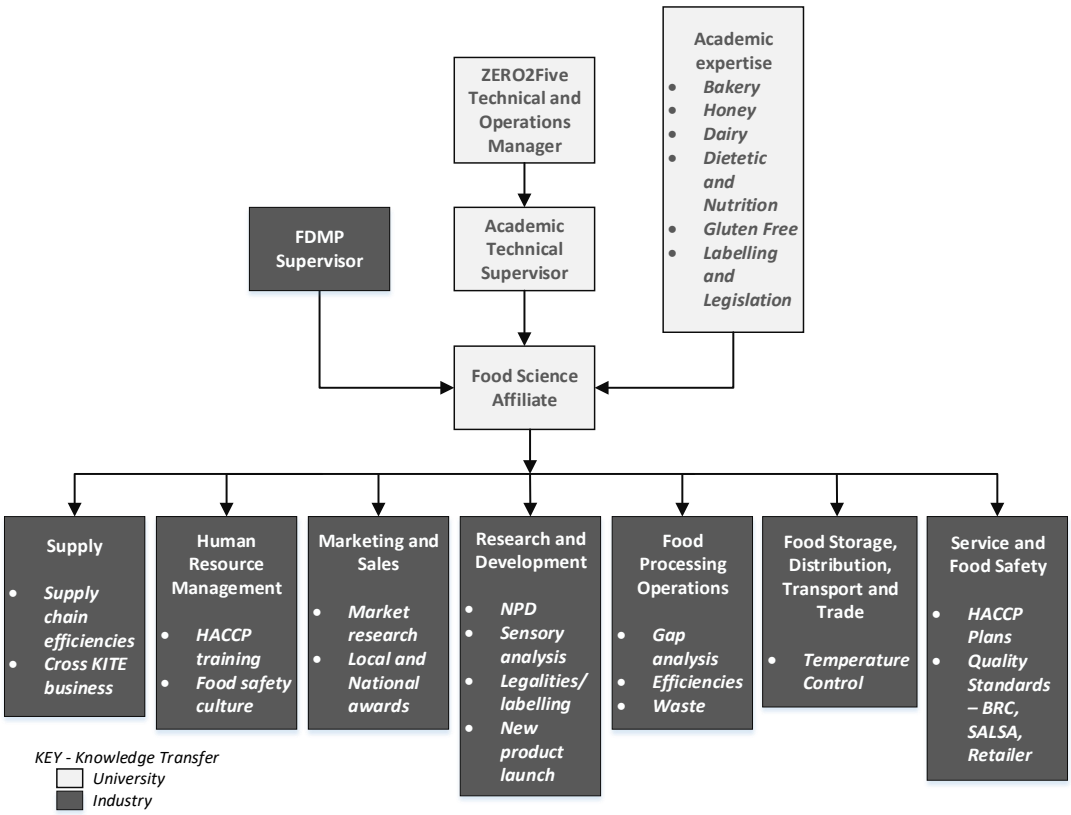

Figure 4. KITE Affiliate knowledge transfer flow.

The individual SMEs added value to the primary and support activities as evidenced in the n=13 delivery intervention in-depth case studies, as presented in Tables 2 and 3. Cumulatively, the impact of this added value transposed over the value chain model can be seen in Figure 5.

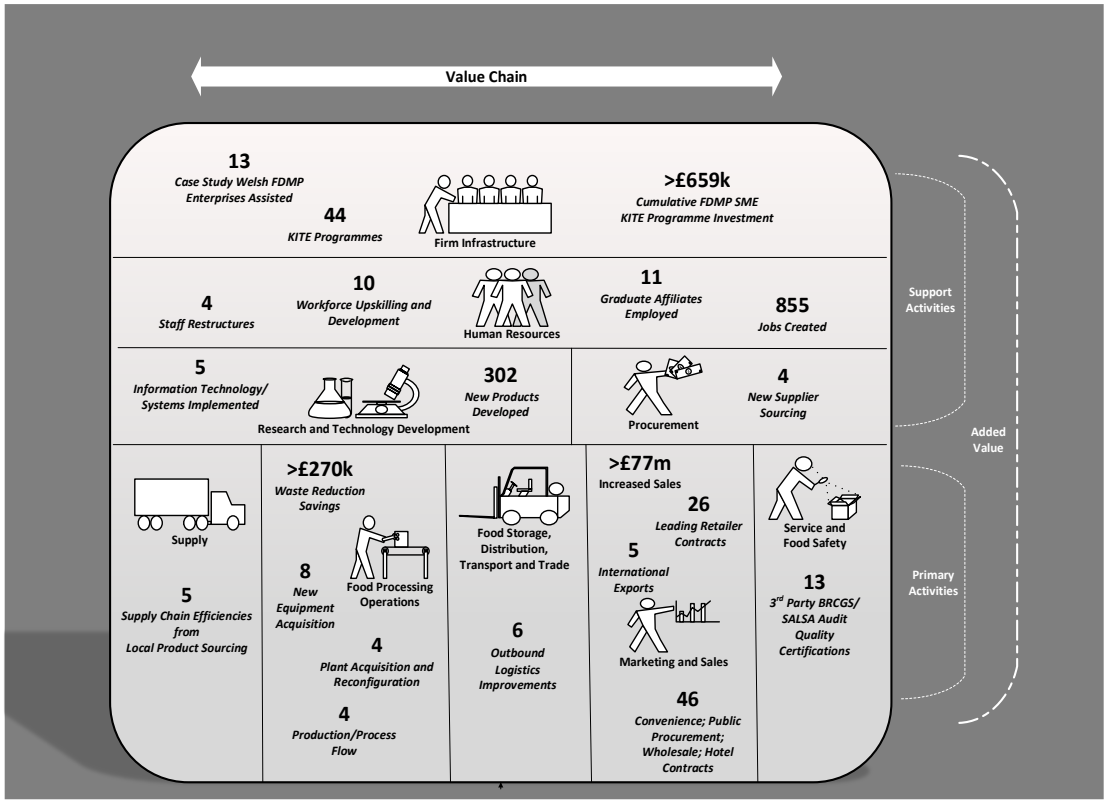

Figure 5. FDMP SME value chain summary analysis of KITE project facilitated impact.

5 Discussion

From a value chain analysis perspective, the case study delivery interventions impacted the food and drink sector by facilitating evidenced added value for competitive advantage for FDMP SMEs, in alignment with the strategic aims of the PMG scheme. Moreover, the study highlighted that the strategically placed knowledge transfer of an affiliate, technical supervisor and university academic experts, produced tangible results. The results highlighted a positive contribution to the nation's food manufacturing labour productivity GVA, where in 2008 it stood at £872m and by the close of KITE in 2015 had reached £1,109m (Office for National Statistics, 2022).

Key findings indicated that the food sector intervention had facilitated synergies between each of the primary and support activities of the case study SMEs' value chains, adding value to food and drink manufacturing and processing (Figure 7). The reported infrastructure investments (>£659k) by partner SMEs in primary activities in all case studies cumulatively lowered production costs, a concept corroborated by Azar *et al*. (1999), and the resulting increased efficiencies in operational processes, packaging, logistics and distribution contributed to labour productivity GVA for the industry sector. GVA impacts were also attributable to the food sector intervention's effectiveness in engaging SMEs to gain BRCGS and other food safety certifications which developed supply to food service outlets, caterers and domestic and national wholesalers. The evidence of certified risk management in relation to food products' quality and safety positively answered the fundamental food safety concerns of European institutions and structures (Bondoc, 2016). Furthermore, case study findings indicated that those SMEs who achieved 3rd party certification, such as BRCGS, gained an advantage in obtaining major retail and public procurement contracts (BRCGS, 2015), indicative of where food safety standards were deemed as being a key dimension of competitiveness (Abdirahman and Sauvée, 2012). This creation of an increased competitive position in existing and new market orientation, for example, the export market, ultimately led to growth and sustainability for long-term business survival, a concept ratified by Azar *et al*. (1999).

Other quality management certifications, aligned with additional government policy objectives, for example, achieving Protected Geographical Indication (PGI) status was reported to have economic importance for national

food sector sustainability (Francis *et al.,* 2015; Welsh Food and Drink Strategic Plan 2008-2013), by the strengthened identity of regional Food and Drink, with raised consumer trust in safe sustainable food, business growth and retained employment (Hybu Cig Cymru, 2020). The Soil Association certifications gained by SMEs for organic products also added identity value for business and allowed for more production outputs to access new markets (Agri-food partnership, 2005; Second Organic Action Plan for Wales 2005-2010).

The case study delivery interventions reportedly impacted adding value to products where the costs of inbound logistics and procurement were reduced in parts by using local producers as an alternative inward supply. Whilst this was an added value for the FDMPs in themselves, the initiative also had a positive effect on the additional added value that it gave to the local suppliers and cross-delivery intervention business SMEs. Additionally, local procurement resulted in supply chain efficiencies from reduced road miles, in alignment with regional policy to achieve a sustainable low-carbon economy (Welsh Government, 2009).

Within the case study delivery interventions, widespread innovation occurred in the form of NPD, reportedly important for survival and sustained competitive advantage (Cormican and O'Sullivan, 2004; Di Benedetto *et al.*, 2003; Song and Parry, 1997; De Brentani, 1989; Cassia *et al.* 2012). Furthermore, packaging development added value for the FDMPs aided by knowledge transfer of leading academics in food science and labelling. SME FDMPs reported that this knowledge transfer reduced costs such as packaging consultancy fees, material and distribution expense and enabled innovative, legalised products to gain competitive advantage from supply to domestic; national and international markets, again strengthening labour productivity GVA. FDMPs recounted realised cost-effective production processes with added value from reductions in production waste, purchasing volumes, inbound/outbound logistics storage and packaging, waste removal and carbon footprint, aligning with the sustainable development principle of the regional policy (Welsh Government, 2009).

The food sector intervention's objectives relating to retaining food science graduates in Wales and addressing the lack of technical knowledge and skills gaps, particularly within primary food and drink processing (Ellis *et al*., 2020), saw 11 affiliates obtaining permanent job positions following knowledge transfer placements in 13 case studies, during/post project implementation. The analysis highlighted that 11 of the case study FDMP SMEs, primarily in the southern valleys and rural areas, created 855 additional new jobs across various value chain activities, that ultimately helped to tackle poverty and unemployment in those communities as per the regional policy principle for a strong, healthy and just society (Welsh Government, 2009). Also, as part of the objective to create sustained employment, the food sector intervention increased the SMEs' HR asset value through knowledge transfer in upskilling of existing technical staff food safety/hygiene certifications and influencing food safety culture change (Redmond, 2013). This knowledge continued to be of tangible benefit after the delivery interventions concluded.

Finally, FDMP SME MDs were reported as responding positively to the added value benefit of the food sector intervention across internal value chains. An example of one such benefit was a reduction in prohibitive costs associated with the challenge of engaging independent food consultancies to provide necessary technical and food science/safety support, which constrained profit margins (Lloyd, 2015).

The small study sample, n=13, allowed an in-depth insight into the workings of Welsh FDMP SMEs and how they gained a competitive edge in the marketplace. No comparable data from a control group not receiving a delivery intervention was available for analysis. Furthermore, at the end of the food sector intervention programme, Food Innovation Wales (2015) indicated that challenges for the nation's food sector SMEs still existed, where only 8% had reached a sales turnover of £1m-£5m and only 6% a sales turnover of £5m or more (Food Innovation Wales, 2015).

Data analysis and interpretation need to be considered with caution when considering smaller SMEs because many of the value chain primary and secondary activities are often combined with no distinct segregation. In the study, the n=13 FDMP SMEs selected for the case study assessment were considered reliable in having separate primary and secondary activities.

6 Conclusion

There is a wide selection of literature available that advocates the use of Porter's (1985) value chain model as a tool for evaluating an organisation's internal primary and support activities to identify where value is added for competitiveness. This paper shows how its practical application, enabled the identification of where a government-funded food sector intervention impacted the case study FDMP SMEs' core competency synergies. The novel application of the model evidenced the interventions' impact on increasing the efficiency and effectiveness of food manufacturing and processing operations.

Initiatives designed to encompass synergistic knowledge transfer across FDMP SME's primary and support activities, rather than a single standalone activity intervention, provided SMEs with wider opportunities to add value to their core competencies. The main driver of adding value via the university's array of academic and technical expertise

was the use of graduate placement in the business. The resultant knowledge transfer not only facilitated food sector FMDPs' ability to increase sales turnover; but acted as a catalyst for workforce development, the creation of new production and technical jobs across activities and the reversal of skills migration from Wales, by employing graduates and suitably qualified technologists.

Analysis of the data highlighted that FDMP SMEs who participate in university-led government funded triple-helix initiatives, increased their ability to enable both their own and economic growth. Growth indices in this instance were benchmarked as increased sales and increased/retained jobs. Furthermore, evidence highlights that government funded triple-helix knowledge transfer initiatives for the food sector, known for having small profit margins, developed with an SME affordable match funded cost contribution, resulted in an uptake of SME partnerships wanting to achieve a competitive advantage.

The findings from this study can be used to inform future food sector policy developments as to which FDMP intervention activities have the most impact for gaining competitive advantage and subsequent company and economy growth. The study provides multiple scopes for further research and can be replicated to analyse other, including future, domestic and international triple-helix knowledge transfer schemes. Additionally, the determinants of this case study analysis will be further developed to establish key questions for an international food sector study. Such key questions will identify and inform regional policy stakeholders of FDMP SMEs' requirements for food safety; technical compliance/upskilling knowledge transfer facilitation, to add value for competitive advantage and retain pace with European legislation applicable to veterinary sanity and food safety, determined by Bondoc (2016), as presenting a permanent challenge.

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