

## Bottom up Policy for Growth: A V-LINC Analysis of West Cork's Agri-food Cluster Ecosystem, with a focus on the Dairy Industry.

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### Abstract

V-LINC, a methodology which identifies, records and analyses the linkages that firms in clusters engage in, is applied to the agri-food sector in West Cork, Ireland. V-LINC was developed in Cork Institute of Technology to enrich academic literature on clusters. It provides visual information on the geographic footprint of cluster ecosystems and measures the business impact of cluster linkages.

According to the Department of Agriculture, Food and the Marine (DAFM, 2014), the agri-food and drink sector is one of Ireland's most important indigenous industries. The sector accounts for 8.8% of employment and comprises 12.3% of Ireland's exports. Bord Bia estimates that in 2013 Ireland exported just below €10 billion of food and beverages. Of this they estimate that dairy products and ingredients accounted for the largest share at 31%. The dairy industry in Ireland is currently facing a period of adjustment with the abolition of milk quotas in April 2015, along with the challenging targets set out in the government's 'Harvest 2020' proposals. Cork is Ireland's leading dairy county, accounting for more than 25% of the total Irish dairy output in 2013 (O'Connor and Keane, 2014). In this context it is important to have a clear understanding of the role that firms play within West Cork's dairy sector.

In these challenging times, it is important that industry players, business support organisations and policy makers understand how the agri-food ecosystem operates both within West Cork as well as its external relationships forged beyond the island, so that collaboratively, they can deliver growth and employment through supportive policy.

**Keywords:** *V-LINC, industry cluster, ecosystem, mapping.*

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### Introduction

This paper applies V-LINC to the agri-food specialisation in West Cork. The paper begins with an explanation of V-LINC, a new method for recording, categorising and measuring the business importance of linkages that cluster firms participate in, along with the facility to show linkages on geographic maps of appropriate scale. Linkages between firms and other organisations are at the heart of how clusters function. Linkages are defined (Hobbs, 2010 p 221) as "relationships that enable exchange of goods, services, personnel, information, ideas, expertise, grants and other supports to business that occur between two or more parties, over a sustained time period." Next, the paper comments on the scale of the agri-food industry in West Cork, along with the rationale for researching its degree of cluster activity. The paper then reviews findings from V-LINC analysis on the linkages of a sample of agri-food firms in West Cork. The analysis includes: the distribution of linkages by category, by geographic scope, and by their business impact as reported by company employees who engage in the linkages. V-LINC maps illustrate the linkages at different geographic scopes. Arising from the analysis a judgement is made about the extent of cluster activity in the West Cork Dairy Sector. The paper closes with recommendations on how to strengthen and support agri-food firms in County Cork.

### V-LINC: Visualisation of Linkages in Networked Clusters

V-LINC<sup>1</sup> is a methodology for identifying, recording and analysing the linkages that firms in clusters engage in. It categorises these linkages, and groups them by geographic scope. Furthermore, V-LINC records the business impact of linkages based on the perceptions of firm personnel who engage in the linkages with other companies and organisations. Data for V-LINC analysis of linkages is collected by structured interviews of company personnel. Likert scale questions are employed to gauge the business impact of individual linkages. V-LINC maps give a visual representation of the relative reliance on local, national, European or global linkages of a company, or when combined, of a cluster (Figure 2). V-LINC facilitates policy development at regional and national levels, through the aggregation of data from a sample of firms. Confidentiality of firms' linkages is maintained throughout.

V-LINC assigns company linkages to one of eight categories (Figure 1). Besides linkages along the supply chain, namely those which provide Inputs and Specialist Services to firms, and Output linkages which provide markets for goods produced, V-LINC adds five other categories of linkages: those with Industry Peers, with Industry Associations, with Research & Development partners, with Training partners and with Government Agencies. The linkage categories in V-LINC derive from Porter's (1990, 1998a and 1998b) discourse on the interactions and relationships of companies in a cluster.

<sup>1</sup> V-LINC is a hybrid methodology for cluster analysis developed by Byrne (2016). Byrne combines the 'Four i Linkage Scale' (Hobbs, 2010), network theory and visualisation techniques to map, trace and visualise cluster ecosystems. The V-LINC methodological framework, linkage categories and business impact bands are defined in Byrne (2016).

V-LINC responses collected through structured interviews combine to reveal the business impact of linkages as recorded by expert company personnel. Likert scale responses convert qualitative judgments into quantitative data which are subject to further analysis. This enables V-LINC users to answer the question: at which geographic level and linkage category do clusters' most valuable linkages occur. Next, the rationale for applying V-LINC to the agri-food sector in West Cork is outlined.



**Figure 1: The Eight V-LINC linkage categories analysed for each firm.**

### The Agri-food Sector in West Cork

The agri-food industry is considered one of Ireland's most important indigenous industries which, employs in the region of 168,300 and exported just under €10 billion of food and beverages last year (DAFM, 2014). A surging global population, combined with dramatic growth in emerging economies such as Brazil, Russia, India and China are having a serious impact on the global marketplace creating new customer audiences demanding "new and diverse food solutions" (DAFM, 2010, p6). In addition to this, a number of emerging global trends are also impacting on the International Food and Beverage Industry including a growth in demand for sustainable food sources providing credible health, and wellness attributes. In response to these trends the DAFM (2010) developed its 'Harvest 2020' strategy in order to ensure the growth and development of a sustainable Irish agri-food sector. In this strategy the Department sets targets to increase the value of primary output of the agri-food sector by €1.5 billion, while increasing value added outputs by €3 billion, and exports to €12 billion.

According to O'Connor and Keane (2014) Cork is Ireland's leading dairy county, with outputs accounting for in excess of 25% of the total Irish output. This is provided by 4,500 farmers who tend to herds much larger than the national average. Läßle and Hennessey (2012) conducted a regional analysis which suggests that in comparison to other regions, counties in the south (Cork and Waterford) have the greatest expansion capacity in terms of dairy outputs. Bearing this in mind, operators in the Cork agri-food sector will face challenges while working towards the targets set out in 'Harvest 2020'.

This research has been commissioned by the former South West Regional Authority (dissolved with effect from 1<sup>st</sup> June 2014), now the EU projects office of Cork County Council, in cooperation with the West Cork Development Partnership. In this research V-LINC has been applied to a sample of 11 West Cork based agri-food firms with a specialisation in dairy. Thirteen face to face meetings were held with personnel from these companies to gather information in regard to their key relationships. These meetings uncovered 507 firm linkages (Table 1). The term Respondent Firm Group (RFG) relates to the summation of data for the eleven agri-food respondent firms.

### V-LINC Analysis Results: Agri-food West Cork.

Table 1 lists the firms who participated in the research. It provides the percentage of linkages they report in each of the eight linkage categories along with the total number of linkages they engage in. This table allows the researcher to distinguish the total numbers of linkages per category for the cluster being examined.

Table 1 report's that the most frequent linkages are in outputs which account for 26% of linkages reported; followed by inputs (18%) and specialist services (13%). Government agencies are the fourth most frequent linkage category, which is not surprising due to the legislative requirements of the industry; all operators within the agri-food sector must comply with the regulatory bodies. The least frequent linkage categories are training and research and development at 7% and 6% of all linkages, respectively. On closer examination of these results, we can see that the size of the respondent firm plays a part in their engagement with these linkages. Larger operators are more likely to engage in more research and development linkages than their smaller counterparts.

### Linkage categories by geographic Scope:

Porter's cluster concept places strong emphasis on the importance of local inputs and services. "Factor input conditions" form one facet of his diamond of local industrial clustering (Porter, 1998b). However, Markusen (1996, p 8) contends that "the study of industrial districts and networks within them, has generally been confined to smaller firms in particular industries; their link to larger firms and institutions outside the region have been ignored." Therefore it is important to look at the geographic spread of categories, and also the business importance of linkages which occur over different distances.

Table 2 and Figure 2 display the linkages reported at each geographic level for each of the eight linkage categories. Table 2 distinguishes the dominant geographic scope for each category and shows that 73% of output linkages in this study are within the domestic market, this shows that very little exporting occurs and may indicate that operators in West Cork are not focusing much of their efforts on exporting their goods and they may have an overreliance on the domestic market.

Company	Size	GA	IA	IP	IN	OU	RD	SS	TN	Total (n)
Bandon Co-op	LGE	15.1%	9.4%	9.4%	30.2%	13.2%	1.9%	11.3%	9.4%	53
Bandon Vale Fine Cheeses	LGE	14.0%	7.0%	0.0%	27.9%	18.6%	4.7%	27.9%	0.0%	43
Carbery Group	LGE	23.0%	6.8%	10.8%	8.1%	17.6%	14.9%	10.8%	8.1%	74
Carrigaline Farmhouse Cheese	SME	10.5%	13.2%	10.5%	13.2%	26.3%	2.6%	15.8%	7.9%	38
Clona Dairy Products	LGE	6.5%	19.4%	0.0%	25.8%	22.6%	6.5%	16.1%	3.2%	31
Durrus Farmhouse Cheeses	SME	11.4%	11.4%	13.6%	20.5%	20.5%	2.3%	11.4%	9.1%	44
Glenilen Farm	SME	5.0%	6.7%	11.7%	13.3%	33.3%	8.3%	13.3%	8.3%	60
Gubbeen Farmhouse Cheese	SME	7.5%	15.1%	11.3%	13.2%	20.8%	9.4%	9.4%	13.2%	53
McCarthy's Natural Dairy	SME	6.8%	4.5%	0.0%	18.2%	54.5%	2.3%	9.1%	4.5%	44
Milleens Cheese	SME	7.0%	14.0%	18.6%	14.0%	32.6%	2.3%	7.0%	4.7%	43
Toonsbridge Dairy	SME	12.5%	12.5%	0.0%	25.0%	33.3%	0.0%	12.5%	4.2%	24
RFG Average		11.4%	10.3%	8.7%	17.9%	25.8%	5.9%	12.8%	7.1%	32
Total (n)		58	52	44	91	131	30	65	36	507
Most Populous (Rank 1-8)		4	5	6	2	1	8	3	7	

**Table 1: Distribution of Linkages by Category and by Firm<sup>2</sup>**

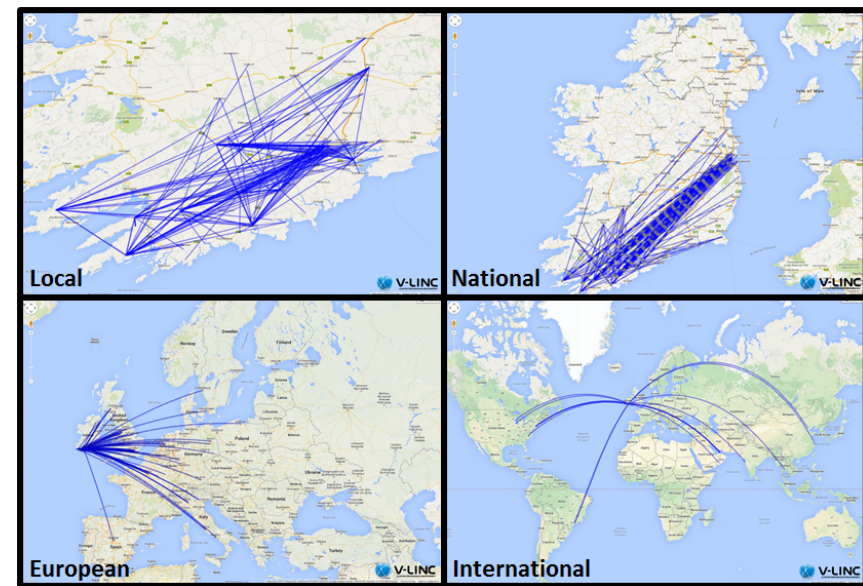
When we examine the linkages of those firms who do export their goods, there are some interesting findings. Only three firms within the RFG do not export their goods. There were a total of 26 output linkages recorded to Europe, 18 of which are to the United Kingdom, which is unsurprising as the UK is our closest partner in trade. The remaining 8 linkages however are concentrated in Western Europe, which may identify an opportunity for the West Cork firms to target those countries in the east of the continent, where shelf life limitations allow for such distances. A total of nine International output linkages were reported for the RFG, however only six of the firms in the respondent group engage in these international links. What is also important to note is that more than 50% of these international linkages are through two companies, which may indicate a lack of access to international channels of distribution for firms in West Cork.

Similarly to the outputs, 73% of Inputs and 82% of Specialist services are sourced in Ireland. Porter (1998b) places great emphasis on linkages to and support from organisations and businesses, within the locality. The word local or locally appears in each element of his diamond of local industrial clustering. If local linkages are critical to the functioning of a cluster, table 2 shows that local linkages make up 46% of all linkages reported in the study, the remaining 54% of linkages being divided between national (33.9%), European (16.6%) and international (3.7%) linkages. The next section presents the business impact values attributed to each individual category.

<sup>2</sup> Note to Table 1: The eight linkage categories are: Government agencies (GA); Industry association (IA); Industry peers (IP); Inputs (IN); Output (OU); Research & development (RD) Specialist service linkages (SS) and Training (TN). Furthermore, the Size of the firm has been categorised into two Small to Medium Enterprise (SME) and Large Enterprise (LGE)

Geographic Scope	Local	National	European	International	Total (n)
Government Agencies	31.0%	60.3%	1.7%	6.9%	58
Industry Association	42.3%	44.2%	11.5%	1.9%	52
Industry Peers	56.8%	25.0%	15.9%	2.3%	44
Inputs	48.4%	24.2%	27.5%	0.0%	91
Outputs	38.2%	35.1%	19.8%	6.9%	131
Research & Development	40.0%	30.0%	20.0%	10.0%	30
Specialist Service	60.0%	21.5%	16.9%	1.5%	65
Training	61.1%	33.3%	5.6%	0.0%	36
Percentage	45.8%	33.9%	16.6%	3.7%	100.0%
Total (n)	232	172	84	19	507

**Table 2: Distribution of Linkage Categories by Geographic Scope**



**Figure 2: West Cork Agri-food Linkages by Geographic Scope.**

The linkage maps in Figure 2 highlight the importance of Dublin to the agri-food firms based in West Cork, where just over 60% of the 172 national linkages are with organisations based in the country's capital Dublin. Across Europe there is a focus on Western Europe in terms of developed connections, whilst internationally the focus is on America and the Far East.

## Business Impact Findings

Tables 3a to 3e show the percentage of linkages (by category) that fall into the business impact bands: High, Medium, Low and Tenuous. The business impact of each linkage category relates the perception of expert respondents involved with these linkages. Table 3a shows the combined business impact results for all linkages, whilst tables 3b to 3e, break the data into local, national, European and international linkages.

In table 3a, it is apparent that research and development (43%) are rated as highest impact, followed by outputs (41%), specialist services (40%) and inputs (39%) with regards to the proportion of linkages in the High impact band. As a company's customers and suppliers are central to the success of the firm this is not surprising. In seven of the eight linkage categories, the majority of linkages are in the top two business impact bands (e.g. high and medium bands); overall 86% of all linkages reported were in these bands.

Category		GA	IA	IP	IN	OU	RD	SS	TN	Total %	Total (n)
<b>Business Impact</b>											
<b>High</b>	<b>30 to 40</b>	31.0%	32.7%	27.3%	38.5%	40.5%	43.3%	40.0%	25.0%	36.1%	183
<b>Medium</b>	<b>20 to 30</b>	48.3%	34.6%	56.8%	56.0%	49.6%	30.0%	53.8%	55.6%	49.5%	251
<b>Low</b>	<b>10 to 20</b>	17.2%	28.8%	13.6%	5.5%	9.9%	26.7%	6.2%	19.4%	13.4%	68
<b>Tenuous</b>	<b>0 to 10</b>	3.4%	3.8%	2.3%	0.0%	0.0%	0.0%	0.0%	0.0%	1.0%	5
<b>Total</b>		58	52	44	91	131	30	65	36	507	507

**Table 3a: Business Impact by Linkage Category**

It is also interesting to assess the business impact accorded to linkages at each geographic scope. Table 3b focuses on the business impact of 232 local linkages, this being the most populous geographic scope. The respondent firm's linkages with local firms and organisations are reported as the most important of all geographic scopes with, 87% of linkages reported in the high or medium business impact bands. 48% of input, 42% of output, 42% of research and development and 36% of specialist service linkages reported locally are in the high impact band. It's important to qualify these results with the fact that 40% of research and development linkages (n12), 60% of specialist services (n39) and 48% of inputs (n=44) are reported at local level, while 38% of outputs (n=50) are local.

Category		GA	IA	IP	IN	OU	RD	SS	TN	Total %	Total (n)
<b>Business Impact</b>											
<b>High</b>	<b>30 to 40</b>	11.1%	36.4%	8.0%	47.7%	42.0%	41.7%	35.9%	27.3%	34.1%	79
<b>Medium</b>	<b>20 to 30</b>	55.6%	36.4%	92.0%	50.0%	50.0%	25.0%	53.8%	50.0%	53.0%	123
<b>Low</b>	<b>10 to 20</b>	22.2%	27.3%	0.0%	2.3%	8.0%	33.3%	10.3%	22.7%	12.1%	28
<b>Tenuous</b>	<b>0 to 10</b>	11.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.9%	2
<b>Total (n)</b>		18	22	25	44	50	12	39	22	232	232

**Table 3b: Business Impact by Linkage Category - Local Linkages**

Table 3c presents business impact of 172 national linkages reported in the study 87% of which are in the top two business impact quartiles. A highlight from the table is that 82% of industry peers, 50% of specialist services and 46% of government agency linkages are recorded in the high impact bands. National industry association linkages have the highest number of linkages within the low and tenuous business impact bands for West Cork firms.

Category		GA	IA	IP	IN	OU	RD	SS	TN	Total %	Total (n)
<b>Business Impact</b>											
<b>High</b>	<b>30 to 40</b>	45.7%	34.8%	81.8%	31.8%	43.5%	33.3%	50.0%	25.0%	42.4%	73
<b>Medium</b>	<b>20 to 30</b>	42.9%	30.4%	18.2%	54.5%	45.7%	55.6%	50.0%	58.3%	44.2%	76
<b>Low</b>	<b>10 to 20</b>	11.4%	26.1%	0.0%	13.6%	10.9%	11.1%	0.0%	16.7%	12.2%	21
<b>Tenuous</b>	<b>0 to 10</b>	0.0%	8.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.2%	2
<b>Total (n)</b>		35	23	11	22	46	9	14	12	172	172

**Table 3c: Business Impact by Linkage Category - National Linkages**

The business impact of 84 EU linkages is displayed in Table 3d, 85% of which are reported to be of high or medium impact. A large proportion of the European linkages are reported across the value chain type linkages, inputs, output and specialist services. Research and development (50%) linkages followed by specialist services (46%) and outputs (39%) are seen as the strongest connections at this geographic scope. Additionally, European industry peers are held in low regard by the respondent firms, with 85% of these linkages found in the low and tenuous bands.

Category		GA	IA	IP	IN	OU	RD	SS	TN	Total %	Total (n)
<b>Business Impact</b>											
<b>High</b>	<b>30 to 40</b>	0.0%	16.7%	14.3%	28.0%	38.5%	50.0%	45.5%	0.0%	32.1%	27
<b>Medium</b>	<b>20 to 30</b>	100%	50.0%	0.0%	68.0%	57.7%	0.0%	54.5%	100%	52.4%	44
<b>Low</b>	<b>10 to 20</b>	0.0%	33.3%	71.4%	4.0%	3.8%	50.0%	0.0%	0.0%	14.3%	12
<b>Tenuous</b>	<b>0 to 10</b>	0.0%	0.0%	14.3%	0.0%	0.0%	0.0%	0.0%	0.0%	1.2%	1
<b>Total (n)</b>		1	6	7	25	26	6	11	2	84	84

**Table 3d: Business Impact by Linkage Category - European Linkages**

Table 3e reports business impact for the 19 international linkages. Almost half of the international linkages are made up by the output category and the majority of these linkages are reported in the high and medium impact band. International links with research and development are viewed as important to the respondent firms, with 100% of these appearing in the High and Medium impact bands.

Category	GA	IA	IP	IN	OU	RD	SS	TN	Total %	Total (n)	
<b>Business Impact</b>											
<b>High</b>	<b>30 to 40</b>	0.0%	0.0%	0.0%	0.0%	22.2%	66.7%	0.0%	0.0%	21.1%	4
<b>Medium</b>	<b>20 to 30</b>	50.0%	0.0%	0.0%	0.0%	44.4%	33.3%	100%	0.0%	42.1%	8
<b>Low</b>	<b>10 to 20</b>	50.0%	100%	100%	0.0%	33.3%	0.0%	0.0%	0.0%	36.8%	7
<b>Tenuous</b>	<b>0 to 10</b>	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0
<b>Total (n)</b>		4	1	1	0	9	3	1	0	19	19

**Table 3e: Business Impact by Linkage Category – International Linkages**

Table 4 reports the number and percentage of linkages reported in each of the business impact bands for each geographic scope, to compare the overall impact of linkages at each geographic scope. Porter (2000) believes ‘once a cluster forms, the whole group of industries becomes mutually supporting. Benefits flow forward, backward, and horizontally,’ therefore, it is important to look closely at the business impact of local linkages. Local and National linkages account for approximately 80% or 402 of the 507 linkages reported, 34.1% (n=79) of Local and 42.4% (n=72) of National are reported as highly significant, a higher proportion than for EU and international scopes. This suggests firms are more likely to engage in linkages which are geographically proximate (within Ireland), and less likely to engage in linkages at further distances (European and international) as these links are not as important to respondents and harder to form and maintain. This is not to suggest that European and International linkages are not important to the RFG, but this is in stark contrast to similar analysis on the Biopharma (Hobbs and Byrne, 2014b) and ICT (Hobbs and Byrne, 2014c) sectors in Cork, where international followed by European, National and then Local linkages are seen as most highly significant to respondent firms.

Geographic Scope	L	N	EU	INT	Total	
<b>Business Impact</b>						
<b>High</b>	<b>30 to 40</b>	34.1%	42.4%	32.1%	21.1%	183
<b>Medium</b>	<b>20 to 30</b>	53.0%	44.2%	52.4%	42.1%	251
<b>Low</b>	<b>10 to 20</b>	12.1%	12.2%	14.3%	36.8%	68
<b>Tenuous</b>	<b>0 to 10</b>	0.9%	1.2%	1.2%	-	5
<b>Percentage</b>		45.8%	33.9%	16.6%	3.7%	100.0%
<b>Total (n)</b>		232	172	84	19	507

**Table 4: Business Impact by Geographic Scope of Linkages**

### Key Connectors

Figure 3 and table 5 illustrate the key connectors in the West Cork agri-food sector. The key connectors, identified by the V-LINC software, are those organisations who connect the cluster. They are identified through the number of linkages they have with respondent firms whilst the importance of those linkages to respondents is reported.



**Figure 3: Key Connectors West Cork Agri-food Sector.**

Key Connector	Teagasc	DAFM	UCC	WCDP	Bord Bia	FSAI	
High	>30 to 40	38%	50%	36%	40%	60%	33.3%
Medium	>20 to 30	38%	50%	36%	40%	20%	55.6%
Low	>10 to 20	16%	-	28%	20%	20%	11.1%
Tenuous	>0 to 10	8%	-	-	-	-	-
<b>Total (n)</b>	<b>13</b>	<b>12</b>	<b>11</b>	<b>10</b>	<b>10</b>	<b>9</b>	
Linkage Category	5 RD, 4 GA, 3 TN, 1 IP	11 GA, 1 TN	5 TN, 4 RD, 1 SS, 1 OU	8 IA, 1 GA, 1 TN	9 GA, 1 RD	7 GA, 1 RD, 1 TN	

**Table 5: Business Impact of Key Connectors Cork SME Agri-food Sector.**

In terms of the key connectors identified in the West Cork agri-food sector, there are strong linkages to Government agencies, research and development and industry associations. Three well-connected government agencies identified are the Department of Agriculture, Food and Marine (DAFM), Bord Bia and the Food Safety Authority of Ireland (FSAI). DAFM is recorded as most beneficial to respondent firms as 100% of linkages to the department were reported in the High and Medium bands. Whilst Bord Bia are deemed to be very significant also, 20% of the linkages with this agency were reported to be of low impact to the firms. The majority of respondent linkages with the FSAI are deemed to be very significant to the firms, with almost 90% appearing in the High and Medium bands. These strong connections exist with these government agencies as the DAFM and the Food Safety Authority are responsible for regulation within the agri-food industry, while Bord Bia is a support organisation, responsible for the development of indigenous businesses and the promotion of Ireland as a supplier of high quality produce.

Although research and development linkages reported by the respondent firm group were the least frequent linkage category to occur, those who did report such linkages had strong connections to Teagasc and University College Cork (UCC). These two bodies are the key institutes in the field of research and they work collaboratively on a number of activities, particularly in the dairy sector. Approximately 75% of linkages with Teagasc, and 72% of linkages with UCC are viewed as significant to the firms in the West Cork agri-food sector. The Industry Association identified as a Key Connector for the respondents was the West Cork Development Partnership where 80% of linkages reported appear in the High and Medium business impact bands.

### **Does an ICT Cluster in Cork exist?**

Comparing West Cork agri-food sector with the industry cluster model is useful. It is strikingly apparent that the firms in West Cork have a heavy reliance on the local region for input factors such as raw ingredients, materials or capital (Table 2). Likewise in regard to demand conditions, these firms serve sophisticated and demanding customers, with the V-LINC findings showing empirically that these customers are predominantly local and national. Cluster theory is subtle on the question of reliance on export sales. A high and stable proportion of exports are positive for clustering, however, an over-reliance on the domestic market (Table 2) may represent a lack of focus on the potential of the European and international markets or alternatively a lack of access to them. In Ireland's case future pursuit of global markets is essential to drive growth and development as the domestic market is small when compared with its European and international counterparts and the abolition of milk quotas in April 2015 coupled with the dairy expansion will lead to over-supply in the domestic market.

A third determinant of Porter's (1998b) Competitive Diamond of Local Clustering refers to firm strategy and rivalry: there should be vigorous competition but also cooperation among local rivals. While a large portion of dairy firms surveyed in West Cork do compete directly with each other, there is also a large degree of co-operation, displayed in examples such as the development of CAIS – the Association of Irish Farmhouse Cheesemakers, which was established in the 1980's by a number of Cheesemakers, supported by the National Dairy Council. Porter (1998a) notes that industry peer linkages with other companies within the same sector are key drivers of a cluster in regard to innovation and economic growth, as they provide competitive pressure for firms to be innovative and creative. Table 2 reports that almost 36 industry peers are recorded at local and national levels respectively, suggesting that this element is strong in West Cork presently.

With regard to the fourth determinant, of Porter's model: related and supporting industries, the picture in West Cork's Dairy specialisation show strong connections locally. Only in one linkage category are the largest proportion of linkages outside the local scope and this is in Government Agencies, where the largest share, unsurprisingly occur on a national level, with Ireland's centralised government located in Dublin.

This research brings the authors to the conclusion that solid foundations required for an agri-food cluster are in place in West Cork. The targets set out by the DAFM (2010) in 'Harvest 2020', to increase Ireland's share of the global marketplace in terms of food and beverage, and the need to position the country as a sustainable source of premium foods bring many opportunities but also great challenges for the individual firms operating within the sector. It is important to note that the dairy industry in West Cork consists of a wide variety of operators, ranging from the individual farmers operating traditional farming models, to farmers who have diversified their operation and not only produce milk but are involved in production of secondary goods such as cheese and yoghurts, to the larger firms and co-operatives who have much greater production capacity and greater resources as a collective.

The overall agri-food sector is so diverse, with MNCs and co-ops having the scale to compete on a global level, the authors believe that focus is required to drive the growth of SME's related to specialty food production. These firms face scaling challenges with the abolition of milk quotas and need the supports of a cluster organisation in order to take the opportunity to grow significantly.

DJEI (2014, p.20) have set a target to build globally competitive clusters "combining strong Irish owned and foreign firm activity, sub-supply, research and supportive regulation etc., and specifically implement a more intensive and systematic approach to develop dynamic national sector strategies, and including the appointment of a sector specific Cluster Development Team to drive the initiative across the system." The authors believe that a thorough understanding of the V-LINC results of the agri-food ecosystem in West Cork can identify policy actions to strengthen and support the sector through these challenges; these are outlined in the next section.

## Policy Recommendations

Having reviewed the policies adopted in previous reports (DAFM, 2010, O'Connor and Keane, 2014, DAF, 2003, Cork Chamber 2014), this section includes a number of recommendations, actionable at a County level, to aid the development of the agri-food sector in County Cork.

### 1. Support the development of a cluster organisation with responsibility for the Agri-food sector in County Cork.

The development of an Agri-food sector cluster in County Cork would align with the cluster policy set out by the Department of Jobs, Employment and Innovation (DJEI, 2014, p.20).

ICN (2014) suggest that a cluster organisation can have a significant influence on strengthening collaboration in a cluster, through implementation of effective innovation policy. Figure 4 and Table 3b, show scope for a cluster organisation to support interactions and collaborations between firms in the agri-food sector. Ten out of the 22 industry association linkages reported were with WCDP. Eight industry association linkages reported business impact results in the high band, four of these were with WCDP.

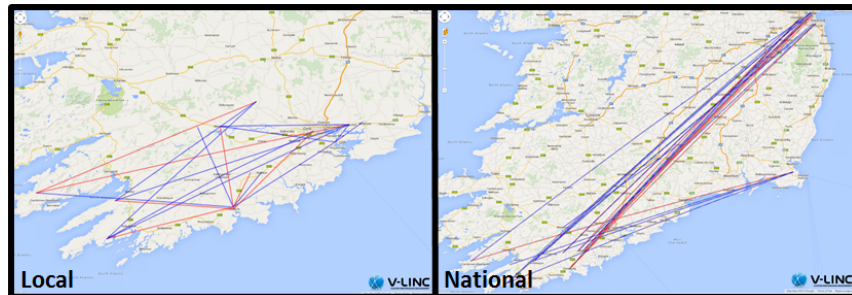


Figure 4<sup>3</sup>: Local and National Industry Association linkages in West Cork Agri-food.

The need for a cluster organisation stems from the requirements of the firms working within the agri-food sector but also compliments the strategy for the sector as set out in the DAFM's (2010) 'Harvest 2020'. In this study SME respondents noted that government regulations are stringent and do not allow for any flexibility for producers within the industry. A cluster organisation would provide a voice for Cork SME's in relation to changes within legislation and strategies, by lobbying for their shared interests.

<sup>3</sup> Note to Figure 4: The red lines are industry association linkages reported in the High business impact band (>30 to 40), the blue lines indicate linkages in the Medium, Low and Tenuous bands.

Furthermore, mentoring may also be another benefit provided by a cluster organisation to SME's when dealing with larger supermarket chains who dominate the consumer end of the marketplace. It may also provide the means to solve common problems, for example to create a system of shared services such as the creation of a more efficient and collaborative courier/delivery service for businesses in remote locations.

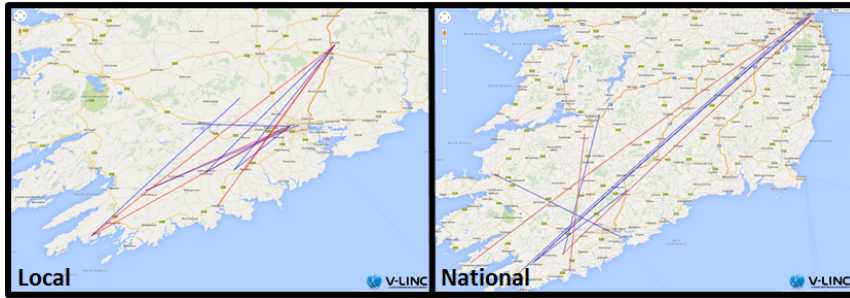
While Industry peer linkages are shown to be an important element of the agri-food ecosystem, a noteworthy finding relates to such linkages being difficult for Start-ups to make (Table 1). In the context of the abolition of milk quotas and the expansion plans of firms associated with same, it is important to ensure that new and expanding enterprises have the opportunity to be successful. Local supports are vital in this regard and need to be in place, to facilitate opportunities for the creation of links with industry peers and business supports. Whilst training linkages are infrequent amongst firms within the agri-food sector in West Cork, with only 36 training linkages identified by the respondents (Table 2). Respondents identified the need for business management and staff development training as a priority for firms, something which could be addressed and coordinated by a cluster organisation through specific training programmes aligned with members' needs.

With the move from the linear economy to the circular economy, tremendous potential currently exists to transform agricultural waste to resource. There is in effect here, an almost completely untapped extremely high value spin off sector. Developing this waste to resource economy will have major benefits both socially, economically and environmentally for the region. The development of a cluster organisation for the agri-food sector could provide the modus to encourage growth and development of this sector.

### 2. Prioritise the facilitation of research and development linkages between firms and with academia.

The authors recommend that there is a need to assist firms operating in the agri-food sector in County Cork, to innovate and develop through increased R&D activity not only with academia and research institutions, but also through collaborations with private industry.

R&D linkages were the least frequent linkage category reported throughout the study, with 30 linkages reported. There is a tendency for the larger more established firms to engage in R&D linkages than their smaller and more recently established counterparts e.g. 37% of R&D linkages were reported by one respondent firm. However, it is equally important to note that those firms who do engage in R&D activity perceive these linkages to be beneficial to the firms: 43% of R&D linkages are rated highly significant (Table 3a). The majority of R&D linkages reported are with academia (23% with HEIs) and various research institutions (Figure 3). Critically no R&D linkages exist with private firms and this needs to be addressed.



**Figure 5<sup>4</sup>: Local and National Research & Development linkages in West Cork Agri-food.**

An example of a best practice European co-operation project programme is that used in Clusterland located in Upper Austria. Co-operation projects have been used by the region since 1998 and have proven to be an effective and efficient method for SMEs to strategically differentiate themselves (TMG, 2014). To be eligible for government funding, a minimum of three companies participate in the project and at least one of those should be an SME. Results from Clusterland (2014) show that: 77% of firms continue to co-operate after projects end; 89% of the projects either would not have been realised without subsidies, or would have had significantly lower expectations. Firms discover that pooling competencies enable firms to overcome barriers, such as limited funding, lack of management resources and technological competencies. Such programmes train SMEs to undertake R&D projects at national and European levels.

Enterprise Ireland provide a wide range of funding for indigenous firms based on different research needs; including €5,000 innovation vouchers, R&D funding for in-house projects with collaboration bonuses for company to company collaboration and innovation partnerships, which are aimed at larger collaborative projects between firms and research teams in higher education. The reality is that aside from innovation vouchers, the V-LINC results show very little of these supports being utilised. According to DAFM (2013, p 4) “Irish enterprise has invested in research but at a very low level (BERD 0.65%). Food Harvest 2020 states that industry must double their investment in RDI by 2020 in order to meet the growth targets”. An increase in research activity is essential to “enhance the competitive advantage of the food industry, support the realisation of Food Harvest 2020 targets and positively contribute to a safe, sustainable and healthy food supply for the benefit of the population”(DAFM, 2013, p 4).

The Clusterland model applied by a cluster organisation in County Cork may be the conduit for realising more B2B market focused connections and opening connections with Europe for the agri-food sector.

<sup>4</sup> Note to Figure 5: The red lines are Research & Development linkages reported in the High business impact band (>30 to 40), the blue lines indicate linkages in the Medium, Low and Tenuous bands.

### 3. Facilitate and support market development for the Agri-food sector in County Cork.

Assist the agri-food sector in County Cork to establish beneficial linkages with distribution channels, enabling greater access to European and international markets.



**Figure 6: European and International Output linkages in West Cork Agri-food.**

The V-LINC analysis shows that there is an over-reliance on the local and national market for firms within the West Cork agri-food sector, with 73% of output linkages being consumed on the island of Ireland. While the majority of firms do export to Europe, the majority of activity here is focused on the United Kingdom (Figure 6). Six of the eleven respondent firms export to the international market.

The abolition of the milk quotas due to occur in April 2015 and the targets set out in ‘Harvest 2020’ (DAFM, 2010), the dairy sector is due to rapidly expand, which will result in an over-supply for the domestic market unless firms within the agri-food sector can internationalise. Further supports are required here. Bord Bia does offer some supports to firms exporting in the food industry e.g. trade fairs, marketing fellowships and market advice. They also operate the ‘Origin Green’ programme to brand Irish agri-food as a sustainable, environmentally friendly and reliable source of food, whilst a support to industry this is not sufficient support for the planned large expansion after the abolition of milk quotas.

Another note of caution relates to the ‘Fuschia brand’ ([www.westcorkaplaceapart.com](http://www.westcorkaplaceapart.com)) operated by the WCDP, when interviewed, respondents worried about how applicable this brand was to agri-food, believing that it takes away from their ‘own brand’ strengths and messages. Whilst respondents felt that the ‘Fuschia brand’ was a positive for drawing tourists into the region (for hotels and tourist services), respondents felt it detracted from their own brand message.



A common difficulty experienced by member SME's reported throughout the interview process was the lack of an efficient distribution network for firms operating in West Cork. WCDP (2014) have conducted in-depth research in this area, they would be perfectly positioned to provide inputs on an effective solution in this regard. The researchers suggest that a scale up programme for firms within the County Cork agri-food sector would be of huge benefit to those involved, encouraging operators to view their businesses differently, become more efficient in their processes and increase their competitiveness and international scope.

### Closing Remarks

This paper has described and applied the V-LINC methodology for identifying and analysing the linkages that agri-food firms in West Cork engage in. If Ireland and County Cork are to sustain the success of the agri-food sector through growth and expansion in the global marketplace, change is required to address the opportunities identified in this research.

The analysis of the agri-food sector in West Cork shows evidence of fledgling research, development and innovation linkages. Faced with the challenges and opportunities brought about by the abolition of milk quotas in April 2015, Ireland needs to strategically strengthen and expand the agri-food sector. To do so it is imperative that Ireland's agri-food firms are linked more vigorously with international markets, from output, innovation and consumer preference perspectives. Internationalisation based on solid national and regional supports are imperative in this regard.

Future research may analyse other market segments within the specialty food production market to assess their requirement for a cluster organisation e.g. meat/poultry, prepared foods, preservatives and seafood. Another consideration is the long term funding model for the proposed cluster organisation, in other European regions public financing is made available for supporting a cluster organisation in its foundation and first 2-3 years of existence (ECO, 2013; Hobbs and Byrne, 2014a; Byrne, 2016). Longer term a cluster organisation has to look towards a model of self-financing or a mixture of public and private financing through the provision of activities and services to members. The CBER (2014) note that "Cluster managers are under increased pressure to generate revenue away from the regional government purse. This brings many challenges, particularly where there is not a critical mass of companies. Moving from 100% public funding requires significant planning to maintain core cluster services and avoid competition with commercial providers within the community."

### References

- Byrne, E. (2016), 'Incorporating network theory and visualisation in cluster analysis: A hybrid methodology applied to European ICT clusters,' PhD Thesis, Cork Institute of Technology.
- CEBR (2014), 'Cluster Management Special Interest Group: Self-financing for cluster managers,' Council of European BioRegions, 10 December. Available online @ [www.cebr.net](http://www.cebr.net).
- Cork Chamber (2014), 'Cork's Agri-Food & Drinks Opportunities', Available online @ <http://www.corkchamber.ie>.
- Clusterland (2014) 'Cluster & Network Cooperation Projects', Accessed on 17th of August, Available online @ <http://www.clusterland.at>.
- DAF (2003), 'Strategic Development Plan for the Irish Dairy Processing Sector,' Department of Agriculture and Food on behalf of Enterprise Ireland, Irish Co-operative Organisation Society, Irish Dairy Industries Association of IBEC, Available online @ <https://www.agriculture.gov.ie>.
- DAFM (2010), 'Food Harvest 2020 – A Vision for Irish Agri-food and Fisheries,' Department of Agriculture, Food and the Marine, July. Available online @ <http://www.agriculture.gov.ie>.
- DAFM (2013), 'Food Research Ireland - Meeting the needs of Ireland's food sector to 2020 through research and innovation,' Department of Agriculture, Food and the Marine, Available online @ <http://www.agriculture.gov.ie>.
- DAFM (2014), 'Fact Sheet on Irish Agriculture,' Department of Agriculture, Food and the Marine, October. Available online @ <http://www.agriculture.gov.ie>.
- DJEI (2014), 'Policy Statement on Foreign Direct Investment in Ireland,' published by Department of Jobs, Enterprise and Innovation, 30th July Available online @ <http://www.enterprise.gov.ie>.
- EC (2002), 'Final report of the expert group on enterprise clusters and networks', Technical report, European Commission: Enterprise Directorate General, Brussels.
- ECO (2013), 'European Cluster Excellence Scoreboard: Pilot Version,' European Cluster Observatory, on behalf of the Enterprise and Industry DG of the European Commission. September, Available online @ [www.emergingindustries.eu](http://www.emergingindustries.eu).
- Hobbs, J. (2010), 'A Framework for the Analysis of Spatial Specialisations,' PhD thesis, Cork Institute of Technology, Cork.
- Hobbs, J., and Byrne, E., (2014a), 'Cluster Organisation and Finance,' Presented to Cork County Council Cluster Development & Collaboration Workshop, October 10th, Bord Iascaigh Mhara (BIM) Seafood Development Centre, Clonakilty, Cork.
- Hobbs, J., and Byrne, E., (2014b), Visualisation of Linkages in Networked Clusters (V-LINC): Analysis of the Biopharma Cluster Ecosystem in Cork, Ireland. Presented at The Competitiveness Institutes' Annual Conference (TCI), November 10th to 13th, Monterrey, Nuevo Leon, Mexico - [www.slideshare.net/TCI-BioPharma](http://www.slideshare.net/TCI-BioPharma).
- Hobbs, J., and Byrne, E., (2014c), A Comparative Analysis of the ICT Cluster Ecosystems in Cork, Ireland and Belfast, Northern Ireland, using the V-LINC methodology. Presented at The Competitiveness Institutes' Annual Conference (TCI), November 10th to 13th, Monterrey, Nuevo Leon, Mexico - [www.slideshare.net/TCI-ICT](http://www.slideshare.net/TCI-ICT).
- ICN (2014), 'Why Clusters,' International Cleantech Network, Accessed on 10th August, Available online @ <http://internationalcleantechnetwork.com/clusters>.
- Läpple, D., and Hennesey, T. (2014), 'The capacity to expand milk production in Ireland following the removal of milk quotas,' Irish Journal of Agricultural and Food Research 51: 1–11. Available online @ <http://www.teagasc.ie>.
- Markusen, A. (1996), 'Sticky places in slippery space: A typology of industrial districts', Economic Geography 72(3).
- O'Connor, D., and Keane M. (2014), 'Future Expansion of the Dairy Industry in Cork: Economic Benefits and Infrastructural Requirements.' Report prepared for Cork County Council. Available online @ <http://mathematics.cit.ie>.

- Porter, M. E. (1990), *'The Competitive Advantage of Nations,'* New York, Free Press.
- Porter, M. E. (1998a), *'Clusters and the new economics of competition,'* Harvard Business Review 6, 77–90.
- Porter, M. E. (1998b), *'On Competition,'* Harvard Business School Press.
- Porter, M. E. (2000), *'The Oxford Handbook of Economic Geography,'* Oxford University Press.
- TMG (2014), *'Strategic Programmes in Upper Austria,'* The TMG Group - Upper Austria's Business Agency. Available online @ [http://www.tmg.at/1003\\_ENG\\_HTML.php](http://www.tmg.at/1003_ENG_HTML.php).
- WCDP (2014), *'Review of Distribution Opportunities for West Cork Producers,'* available online @ <http://www.wcdp.ie/publications/feasibility-studies>.