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Visualization of firm linkages in the Chicago ICT cluster

Eoin Byrne[a], John Hobbs[a] and Justin Doran[b]

ABSTRACT

Do industry clusters derive their success from a strong 'local buzz' or from access to 'global pipelines'? This important question is addressed in the context of the Chicago (Illinois, United States) information and communication technology (ICT) cluster, which has shown growth and dynamism and is a significant sector not only in terms of the jobs it creates directly but also by supporting other sectors in Chicago. Cluster mapping and analysis studies have provided industry and policy-makers with instruments to explain the cluster structure and its connection to an economy for over two decades. Visualization of linkages in networks and clusters (V-LINC), a methodology that records, maps and analyses the linkages that firms in clusters engage in, is applied to the ICT sector in Chicago. Visualizing the firm linkages of Chicago ICT firms provides a geographical footprint of the cluster's ecosystem. Through an understanding of the various linkages that firms in a cluster engage in, targeted policy recommendations can be developed to build on strengths and address weaknesses. The visualization of firm linkages has considerable potential to add to cluster analysis by improving how data are portrayed, the dissemination of research and explaining how clusters operate.

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Industry clusters; cluster analysis; cluster mapping; firm linkages; information and communication technology (ICT); Chicago; USA

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The Chicago (Illinois, USA) region's information and communication technology (ICT) sector is globally competitive and has experienced rapid growth in the number of ICT companies of 49.9% since 2006 (WBC, 2015). This paper explores how the sector's ecosystem functions and considers if its cluster network is driven by a strong 'local buzz' or from access to 'global pipelines' (Bathelt, Malmberg, & Maskell, 2004). Our methodology defines clusters following Porter (1998, p. 78) as 'geographic concentrations of interconnected companies and institutions in a particular field'. Storper and Venables (2004) characterize a strong 'local buzz' as an environment where co-located firms interact and cooperate with others for mutual benefit (with an emphasis placed on co-location), whereas 'global pipelines' are defined by Bathelt et al. (2004) as channels through

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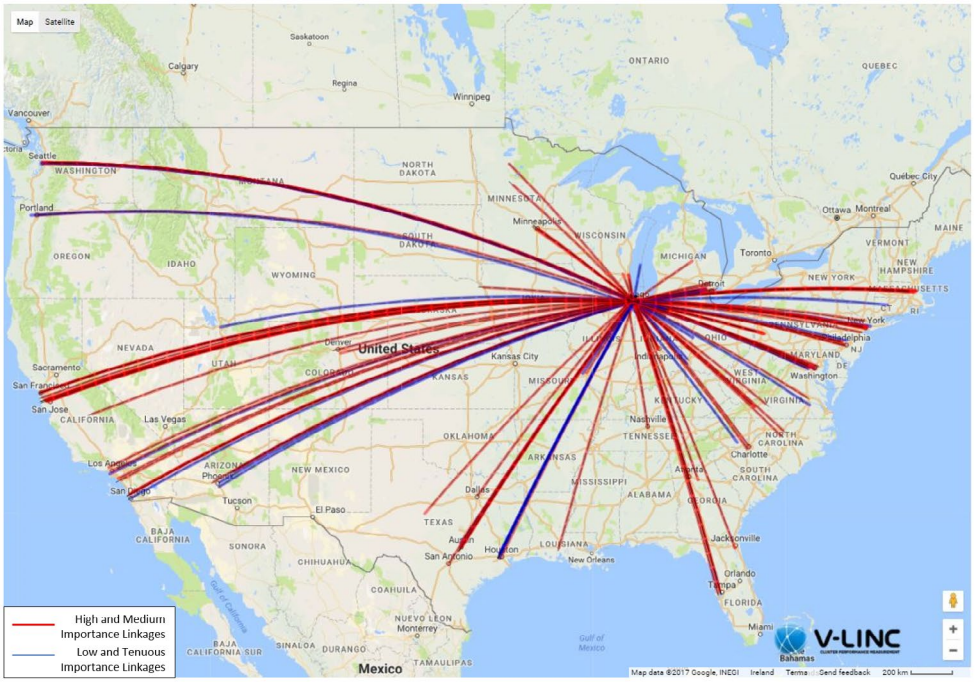


Figure 1. Visualization of linkages in networks and clusters (V-LINC) mapping of Chicago information and communication technology (ICT) linkages at the national (n = 151) geographical scope. Source: Maps Data © 2017 Google.

which new knowledge is acquired through strategic partnerships of interregional and international reach.

Linkages at both the local and global levels are a central characteristic used to define and analyse industry clusters, and form the basis of this analysis (Delgado, Porter, & Stern, 2016; Porter, 1998, 2003). Firm linkage data were collected from a sample of 10 Chicago-based ICT firms during November 2015 using the visualization of linkages in networks and clusters (V-LINC) methodology (see Walsh, Hobbs, Byrne, & Crowley, 2015, for a detailed discussion of this methodology). The V-LINC records, visualizes and analyses the linkages that firms in a cluster engage in to investigate cluster ecosystems. This methodology involves face-to-face interviews to identify (1) every network the firm engages in, (2) the type of network, (3) the geographical location of the network partner, and (4) the importance of the network partner.

V-LINC software was developed to map the ties between interviewed firms and their connections using Google Maps API. Figure 1 presents a V-LINC visualization of the linkages present in the Chicago ICT sector.

Within-state linkages are the most prevalent (local plus state), accounting for roughly 50% of linkages, while a further 44% of linkages occur within the United States (i.e., with partners in other states). In the highly globalized ICT sector, the cluster in Chicago sees only 6% of linkages occur outside the United States. This suggests a strong degree of 'local buzz' in Chicago and across Illinois, and limited engagement outside the United States. The reason for this high number of relatively local linkages may reside in convenience and low cost. Britton (2003) highlights that knowledge spillovers take place through transfers of tacit knowledge that might occur through factors such as interpersonal knowledge flows (Saxenian, 1996), which are more likely to occur locally. Some variation exists regarding the geographical scope of linkages based on linkage type, as detailed in Table 1.

Table 1. Visualization of linkages in networks and clusters (V-LINC) analysis results for the Chicago information and communication technology (ICT) ecosystem by linkage category, geographical scope and importance.

	Industry linkage category								Linkage importance				
Geographical scope	**Government agency**	**Industry association**	**Industry peer**	**Input**	**Output**	**Research and development**	**Specialist service**	**Training**	**T**	**L**	**M**	**H**	**Total linkages (*n*)**
Local	8	26	10	13	42	7	20	5	1	27	63	40	131
State	2	1	5	7	14	4	3	2	0	8	17	13	38
National	3	8	16	32	50	4	31	7	6	26	58	61	151
International	0	0	1	8	7	3	1	1	0	3	11	7	21
Overall	13	35	32	60	113	18	55	15	7	64	149	121	341

Notes: Linkages are categorized into eight linkage categories: government agencies, industry associations, industry peers, inputs, outputs, research and development, specialist services, and training. They are mapped geographically at four geographical scopes: local, state, national and international. Linkage importance is calculated and placed into one of four bands: high (H), medium (M), low (L) and tenuous (T).

The methodology was applied across a variety of sectors, e.g., agri-food, shipbuilding and biopharma. The V-LINC cluster analysis provides data and analysis to inform policy initiatives and strengthen industry clusters. By visualizing cluster linkages, we can improve our understanding of firm networks not only for researchers and academics but also for non-experts. The V-LINC cluster analysis provides detailed, customizable visualizations that make it easier to disseminate research results to non-experts in the cluster field.

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DISCLOSURE STATEMENT

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