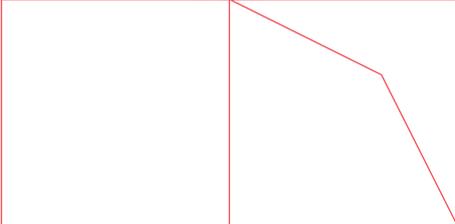
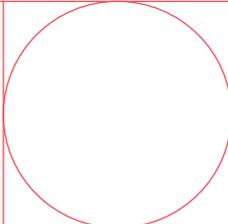
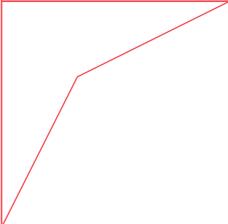


**GREATER
MANCHESTER
INDEPENDENT
PROSPERITY
REVIEW**



**ECOSYSTEM
APPROACH TO
SUPPLY CHAINS**



A technical report for the research on
Innovation & Global Competitiveness

March 2019

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The Bennett Institute for Public Policy at the University of Cambridge seeks to rethink public policy in an era of turbulence and growing inequality. Its research, teaching and policy engagement are guided by the need to devise sustainable solutions to some of the most pressing problems of our time.

The views expressed in this report are those of the authors and, as usual, errors and omissions in this report remain the responsibility of the authors alone.

The Greater Manchester Independent Prosperity Review was commissioned to provide a detailed and rigorous assessment of the current state, and future potential, of Greater Manchester's economy. Ten years on from the path-breaking Manchester Independent Economic Review, it provides a fresh understanding of what needs to be done to improve productivity and drive prosperity across the city region.

Independent of local and national government, the Prosperity Review was carried out under the leadership of a Panel of six experts:

Professor Diane Coyle

Bennett Professor of Public Policy, University of Cambridge, and
Chair of the Greater Manchester Independent Prosperity Review

Stephanie Flanders

Head of Bloomberg Economics

Professor Ed Glaeser

Fred and Eleanor Glimp Professor of Economics, Harvard University

Professor Mariana Mazzucato

Professor in the Economics of Innovation & Public Value and Director of
UCL Institute for Innovation and Public Purpose

Professor Henry Overman

Professor of Economic Geography, London School of Economics, and
Director of the What Works Centre for Local Economic Growth

Darra Singh

Government and Public Sector Lead at Ernst and Young (EY)

The Panel commissioned studies in four areas, providing a thorough and cutting edge analysis of key economic issues affecting the city region:

- Analysis of productivity, taking a deep-dive into labour productivity performance across Greater Manchester (GM), including a granular analysis of the 'long tail' of low-productivity firms and low pay;
- Analysis of education and skills transitions, reviewing the role of the entire education and skills system and how individuals pass through key transitions;
- Exploration of the city region's innovation ecosystems, national and international supply chains and trade linkages; and sources of global competitiveness, building on the 2016 Science and Innovation Audit; and
- Work to review the infrastructure needs of Greater Manchester for raising productivity, including the potential for new approaches to unlock additional investment.

A call for evidence and international comparative analysis, developed in collaboration with the Organisation for European Cooperation and Development (OECD) and European Commission, also supported this work.

All of the Greater Manchester Independent Prosperity Review outputs are available to download at www.gmprosperityreview.co.uk.

This technical report is one of a suite of Greater Manchester Independent Prosperity Review Background Reports.

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1. Introduction and scope

Supply chains are exchanges of information, materials, money, people-power, and capital equipment between firms (Forrester 1958, p 37). The rationale for buying in supplies rather than doing everything in house is fundamental in economics; it was outlined by Adam Smith in *The Wealth of Nations*, “It is the maxim of every prudent master of a family, never to attempt to make at home what it will cost him more to make than to buy...What is prudence in the conduct of every private family, can scarce be folly in that of a great kingdom” (1776, p 22).

In business, a supply chain involves critical strategic and operational decisions determining the success or otherwise of the firm. Over time, as economies have become more sophisticated and technology has enabled greater specialisation, supply chains have grown increasingly important and also increasingly complex. In the context of deploying industrial strategy to improve productivity and living standards, the focus of this work is on the links between firms – with their suppliers upstream and their customers downstream – in conducting their business and their existence in a wider ecosystem.

This review will begin with a general description of the issues in supply chain management, then move to a discussion of how supply chains are in practice shaped by location and by policy. Insights from interviews with Greater Manchester technology businesses are included throughout. A small number of technology firms were interviewed to gain insights into how supply chains operate in this particular part of Manchester’s business ecosystem. We conclude with some reflections on how policy can support firms’ ability to develop and sustain their connectivity to supply chains in ways that can enhance their productivity.

2. Supply chains and supply chain management

Firms aim to create value for customers in many ways, ranging from timely delivery of an item ordered online, to non-defective components for engine manufacturing, to a comfortable stay in a hotel. A firm's offer of products and services is reliant on a whole ecosystem of buyers and suppliers. To better understand supply chains and supply chain management in Greater Manchester a broad understanding of the current academic and industry discussions will set the context.

Definitions

“Literally thousands of people co-operated to make this pencil. People who don't speak the same language, who practice different religions, who might hate one another if they ever met! When you go down to the store and buy this pencil, you are in effect trading a few minutes of your time for a few seconds of the time of all those thousands of people.”—Milton Friedman (1980)

Supply chains consist of exchanges. Recent literature defines supply chains as, “A set of three or more entities (organizations or individuals) directly involved in the upstream and downstream flows of products, services, finances, and/or information from a source to a customer,” (Mentzer et al. 2001, p 3). Supply chains, also sometimes referred to as distribution channels, simply exist, while supply chain management is an activity that a firm must constantly engage in.

In essence, a supply chain consists of links between firms. “The simplest form of inter-firm co-operation is that of a trading relationship between two or more parties which is stable enough to make demand expectations more reliable and thereby to facilitate production planning,” (Richardson 1972, p 884). Modern business relations are highly complex, involving joint ventures, technical agreements, sub-contracts, marketing arrangements and so on. “So complex and ramified are these arrangements, indeed, that the skills of a genealogist rather than an economist might often seem appropriate for their disentanglement,” (Richardson, p 884). This makes the task of measuring, tracking and engaging with supply chains difficult, and indeed there is scant data available. Many supply chain relationships are considered proprietary.

The Emergence of Supply Chains

As Adam Smith predicted, the growth of the economy has created an increasingly fine-grained division of labour and firm specialisation. Historically, firms like the Ford Motor Company attempted full vertical integration, owning their whole supply chain. While some modern firms are vertically integrated, most focus on maintaining a specific competitive advantage, which is defined as follows: “When two or more firms compete within the same market, one firm possesses a competitive advantage over its rivals when it earns (or has the potential to earn) a persistently higher rate of profit,” (Grant 2010 p 211). In his well-known study, Michael Porter argues that competitive advantage is a function of either reducing customer costs, so maintaining value through cost leadership strategy, or by charging a price premium for providing a unique product or service through a differentiation strategy (Porter 2001, p 74).

Businesses are increasingly relying on their suppliers to reduce costs, improve quality, and develop new processes and products faster than their rivals' vendors can (Liker Choi 2004, p 106). To achieve this, businesses need to develop close partnerships with their suppliers and those they supply to. This creates close-knit networks of firms that can continuously learn, improve, and prosper.

Once a firm has established its competitive advantage and a strategy for maintaining it, one of the most important choices is the “make or buy” decision, much discussed in economics, and at the heart of supply chain management. Operational efficiency post-World War II has been formed by the so-called lean philosophy (Eaton 2013, p 24). An example of this in practice is found in the Jaguar Land Rover plant in Solihull, United Kingdom. Its employees are tasked with adding value to each vehicle. Quality control and test driving are not considered to add direct value, so these activities are outsourced to a company with lower labour costs (Bounds 2013).

The distinction between activities and capabilities is critical. Activities relate to market research, research and development, design, physical production processes, the marketing of goods and so on. Capabilities are made up of the appropriate knowledge, experience and skills to perform such activities. Successful companies will tend to focus their activities on areas of their strongest capabilities.

This distinction is one reason many firms have progressively moved away from vertical integration towards specialisation and supplying from other firms. According to Richard Baldwin and Javier Lopez- Gonzalez, “The revolution started when supply chain trade gained importance between high-tech and low wage nations between 1985 and 1995,” (2013, p 2). The trend toward specialisation and outsourcing has allowed firms to drive costs down through achievement of economies of scale and learning. There are economies of know-how linked to scale and size; essentially the more a firm produces a good, the faster and/or cheaper it becomes for it to produce. The “experience curve” has allowed firms to focus on their competitive advantage, while benefiting from the competitive advantages of other firms through supplier relations.

The Emergence of Supply Chain Management

Supply chain management is ultimately relationship management. They involve co-operative arrangements as opposed to market transactions where, “Buyer and seller accept no obligation with respect to their future conduct... Here there is no continuing association, no give and take, but an isolated act of purchase and sale,” (Richardson p 886). This co-operate versus pure market transaction distinction is not a sharp one, but rather both can apply within the same relationship.

For example, Apadmi CEO and founder Howard Simms, built a one stop shop for app development by bringing many typically outsourced activities into the firm, yet it still maintains relationships with other firms in Greater Manchester for specific services. For example, he met the design firm he uses at an event and keeps going back to it, as well as, sending his firm’s customers to it. Informal conversations have created multi-million pound spinoffs. Simms described a recent multi-million-pound business created from a pub conversation. All of the Manchester firms interviewed rely on relationships with their suppliers or customers to continue building their networks.

This co-operation does not eliminate market forces, however. A firm, “Can drop a supplier; a sub-contractor can seek another principal; technical agreements have a state term and the conditions on which they may be re-negotiated will depend on how the strengths of the parties change and development; the licensee of today may become (as the Americans have found in Japan) the competitor of tomorrow. Firms form partners for the dance, but when the music stops, they can change them. In these circumstances competition is still at work even if it has changed its mode of operation,” (Richardson p 895-6). Power relations underlie the dynamics between firms and circumstances change quickly. For example, Apple moved from using a single supplier model with Foxconn and broaden their supply chain to include Pegatron, creating competition. This new competitive dynamic has allowed Apple to decrease costs (Dou 2013) and exert more control over the production process.

What makes a successful supply chain?

A functional supply chain requires quality, speed and cost-savings. All are basic to a firm's ability to compete, but for firms to make their supply chain truly successful, they must imbue agility, alignment, and adaptability into them "Agility is repositioning to short-term changes in demand or supply quickly; adaptability is adjusting a supply chain's design to meet structural shifts in markets; and alignment is creating incentives for better performances." Firm level strategies for each range from better information sharing, flexibility in product design, and sharing risks, costs, and gains of improvement activities (Lee 2004, p 1-4). For instance, each of these elements can be found in many fast-fashion companies: Zara relies on short-run local suppliers to produce their more fashionable items and low-cost global suppliers to produce their more stable demand items (Christopher 2000).

Supply Chain Sourcing Strategy

Firms can design their supply chains in numerous ways. Once a firm has made the decision to buy a good or service from outside, its management must decide if it will source from a single supplier or multiple suppliers. There are strategic benefits to both sourcing methods: close relationships can be established with a smaller number of suppliers foster high quality, reliability, short lead times, and cooperative action while a multiple sourcing strategy allows for healthy competition between the suppliers in order to achieve higher quality and lower price. What's more, if a company only deals with one supplier they run the risk of losing touch with costs, innovation, and the ability to ensure that suppliers are operating sustainably (Choi Linton 2011, p 115).

Supplier Relations

The 3 Ts of relations with suppliers are time, transparency and trust. Understanding the time dimension of the supply chain enables everyone in it to know what is going to happen and when confidence is built because of transparency, trust develops between all the firms in the supply chain (Wilding 2003, p 32).

Incentive-related issues often arise in supply chains due to asymmetries of information. When companies cannot observe other firms' actions, they cannot be sure those suppliers are doing their best for the supply network and it is difficult to align interests when one company has information or knowledge that others in the supply chain do not. Incentive systems are hard to design (Narayanan and Raman 2004, p 96-7).

Building a Purchasing Portfolio

Kraljic divides inputs into four categories: strategic, bottleneck, leverage, and noncritical items (1983, p 112). This allows for a firm to analyse each item's profit impact and supply risk.

When considering their supply chain, a company should first begin with an understanding of whether they face steady demand for low margin products or on the contrary products that are highly innovative. These have the potential for higher profit margins but greater risk and hard to manage supply chains. Understanding whether a product is functional or innovative is key.

"Functional products require an efficient process; innovative products, a responsive process" (Fisher 1997, p 109). For example, "Compaq decided to continue producing certain high-variety, short-life-cycle circuits in-house rather than outsource them to a low-cost Asian country because local production gave the company increased flexibility and shorter lead times."

3. Business ecosystems and the importance of place

The general principles outlined so far need to be translated into the specifics of the Greater Manchester Combined Authority and its ten local authorities. For supply chains develop in the context of business ecosystems that are unique to each geographical region or location. Even the individual authorities within GM have highly distinctive industrial networks and comparative advantages¹. With over 2.8 million residents, GM has a strong business community with a great deal of pride. Kerry Sutcliffe, Director of Alliances at Purple WiFi, stresses, “We don't feel we need a London office, we are happy to operate our global business from Manchester, it's a brilliant city to be HQ'd in.” This dynamic was important to each of the businesses interviewed. Each has a direct connection to the Greater Manchester community, ranging from a founder growing up in the region to having studied at one of the universities. Dan Sodergren, CIO of Manchester HR tech company YourFLOCK, explains, “80% of all our sourced services are from Manchester based tech start-ups. We do this as one of our main values is collaboration.” He argues, “For the future worker collaboration will be key. Your network will be your net worth, especially in the local community. So as a company where and who we source from is almost as important as what and when.”

The concept of geographical specialisation dates at least to Alfred Marshall's famous analysis in 1890, and has been taken up more recently by scholars and also policy makers, who aim to create successful industrial clusters such as Tech City in London to the Northern Italian clothing centres. ‘Cluster’ policies are based on the notion of agglomeration economies, the idea that firms will be more successful if close to each other, with benefits including reduced transport costs (Glaser 2010, p 1) but also the ability to exchange know-how, an important aspect in an increasingly knowledge-based and technology-intensive economy. Agglomeration effects can be powerful, but the policy interventions used to try to create them can be counterproductive.

According to the Brookings Institute's Rethinking Cluster Initiatives report, “Regional economies grow and decline based on their ability to specialize in high-value industries and then evolve those specialisations over time. The practice of cluster-based economic development aims to capture the economic advantages that accrue for firms when they cluster together in place.” (McDearman 2018).

According to the Brookings report, agglomeration helps firms be more productive through three mechanisms; sharing tailored facilities, infrastructure and suppliers; matching workers' productivity through deep labour markets; and learning through dense, knowledge-rich environments that facilitate knowledge exchange and innovation between interdependent firms.

The value and importance of talented people being close together is a recurring theme in the interviews. Al Mackin, the CEO and Founder of Formisimo, says Manchester has, “always been a city full of the skills that a start-up would need. A great history of PR companies, agencies, and a good pool of account managers.” Formisimo launched five years ago to help companies improve their online forms. The firm does relatively little business within GM, but is located in Manchester for access to talent. Talent is extremely mobile in Manchester; the movement of people has important implications for any business ecosystem.

There is considerable debate between those that believe specialisation, agglomeration, and clustering determines local economic growth and those that believe that diversity is the key to growth. Jane Jacobs, the writer and activist who famously fought against the large-scale

¹ See Mealy, P and Coyle, D, Economic Complexity Analysis, Greater Manchester Independent Prosperity Review, 2019

and destructive development practices of the 1960s said, “If density and diversity give life, the life they breed is disorderly.”

The distinction may be overdone in any local economy of any size. Both clustering and diversity played out in early Silicon Valley. In the early days of Silicon Valley, “The tech start-ups were small and... the aspiring geniuses spent a lot of time with people in other firms, looking at what the competition was doing, occasionally cooperating and conspiring. Start-up failures spurred the need to look around and outside. Then, as now, the rates of failure were high; only about 7 percent of start-ups last for more than two years in America,” (Best 2018, p 149). These obstacles, uncertainties and complex relationships challenge firms to innovate. Each firm interviewed for this review agreed that a business can open and be run from a founder’s bedroom, but that being able to interact in physical locations with competitors and their supplier’s drives innovation.

The design, proximity and numerous other place-based factors determine how connected firms are with each other. Darwin wrote of the, “Constant tendency... in the economy of nature” toward the divergence in the character of species, a divergence that is most pronounced in any ‘small area’ where species come into “the closest competition,” (quoted in Best 2018, p 56). Successful firms located in their regions strive to develop competitive advantage based on distinctive production capabilities and productive structures that cannot be purchased or easily imitated as individual firms focus on their own core capabilities and on their network for complementary capabilities, (ibid p 69).

This dynamic is at work in Greater Manchester. Trafford Park is located a few miles from the city centre. As the world’s first-planned industrial park, it has historically been diverse. While the city centre was a focused factory on producing textiles, in the early years Trafford Park had an array of businesses ranging from steel, biscuits, oil works and cars. During wartime, it became a key site for producing and maintaining Britain’s war machine. Trafford Park went through a deep period of decline until the Trafford Park Urban Development Corporation formed in the late 1980s and, through a mix of advocacy and government funding, turned the site around to a current level of approximately 35,000 employees (Herron 2015).

Interest in Trafford Park remains high with its advantage of access to numerous other cross-sector businesses. One of the main reasons for its surge in popularity has been the benefit of the physical proximity to other businesses that Trafford Park offers its occupants. “There is real face-to-face opportunity in Trafford Park,” says Gavin Payne, managing director of Manchester Printers. The variety of industries in close proximity means, “We see a lot of loyalty between the people here, which has had a really positive effect.”

Summing up the key findings from the interviews:

- Each firm has a strong business and personal connection to Greater Manchester. There is a clear sense that each value being a “Northern” business, partly because of the ethos it conveys, and partly because of the presence in GM of the talent pool essential to compete in high value knowledge markets.
- Interviewees commented that business is changing radically with technology and globalization, yet still relies on relationships. Each firm remarked that although a great deal of their business could in theory be done from a garage, in practice the importance of business relationships meant personal contact was important.

- Most firms interviewed do not supply or sell to other Greater Manchester-based companies. There is a sense, from the interviews and also workshop events, that there is not a clear central place for businesses to meet and network. Some commented that the city has geographic and business silos, for example Media City firms not having a reason to interact with firms in the Northern Quarter.
- Talent, cost of business, lack of venture capital, and weaknesses in infrastructure were the constraints consistently mentioned. Every firm interviewed mentioned the lack of start-up funding, in contrast to London.

Case studies

Boston, Massachusetts (Best 2018)

In 1985, Boston's microcomputer industry was vertically integrated with "design concentrated in a single company rather than an open product architecture," (Best 2018, p 67). The customer could not mix and match their products. Massachusetts were integrated at an enterprise level, while Silicon Valley was integrated at a regional level. One company would open and with it unlock a vast array of avenues for other new entrants to exploit. This results in a never ending systemic process of creation, closure and renewal of niche opportunities (p 70).

Uganda (Kaplan et al. 2018)

Carana, a global economic development firm, created a project to bring small maize farmers into the regional supply chain in Uganda. It required a large investment of time and resources, including "deep engagement with multiple players, including Nile Breweries, grain traders, and the farmers themselves. It involved multiple investments in new assets and capabilities for the traders and farmers, "including the creation of maize demonstration plots to showcase good agricultural practices and proper postharvest handling techniques. An offtake agreement with Nile Breweries facilitated farmers' access to credit and attracted input suppliers that could help farmers finance the purchase of improved seeds, equipment, and fertilizers along with access to irrigation and pest-and fugees-control solutions." The supply chain included 27,000 farmers, more than half female, and median crop yields had risen by 65%. These results were possible because Carana had a large-scale vision and was able to engage stakeholders across sectors in change making.

Germany (Best 2018)

The *Mittelstand*, a population of small- and medium-sized, largely family owned business enterprises, is a business model that predates German national unification in the nineteenth century and has persisted through the political revolutions of the twentieth-century Germany up to the present. In 2010, more than three million small and mid-sized enterprises, companies with fewer than 500 employees and annual sales of less than €50 million, together employed over 70 percent of German workers and contributed to roughly half of the country's GDP.

Context and history matters, Germany's *Mittelstand* philosophy is based on family control and small company habits with heavy investments in talent. Germany is a country more based on tinkering than entrepreneurship. "In the U.S., the focus is on entrepreneurship—it's important to be a businessman and self-employed," said Volker Witteberg, Professor of Applied Sciences. "Germany is a tinkering country, where you found a company once you've made an invention. *Mittelstand* is about products, not so much about the people behind them" (Randow and Kirchfeld 2010).

4. Conclusions: implications for policy

Although often ignored in conventional economic analysis of regional or local growth dynamics, supply chains and supply chain management are critical to economic success. Seemingly messy and complicated supply chain connectivity creates spinoffs, innovations and ultimately prosperity and higher wages. By understanding the key components of supply chain management, Greater Manchester can intentionally build an ecosystem of tight-knit buyers and suppliers. This review has described the rationale for focusing on supply chain relationships and offered some insight from interviews into the GM business ecosystem. The absence of firm-level data on supply chains is a real constraint on the analysis, and it might be desirable to explore these in greater detail for a few key sectors. However, some policy conclusions do emerge:

- There should be a focus on “horizontal” economic policies creating the environment for businesses to thrive in a serendipitous manner. Clustering and “vertical” policies carry greater risk and the evidence from elsewhere is that they can be counter-productive.
- There is a specific barrier to the GM tech sector in the form of an absence of start up or venture capital, which itself often depends on personal relationships and access to networks. In the UK these are located mainly in London. Given the number of start-ups in GM, this may be a co-ordination failure policy could address.
- Some types of GM businesses could benefit from the creation of opportunities for face-to-face networking; the interviews suggest this might increase the density of the ecosystem within GM.
- Constraints that business cited include access to a skilled pool of talent and infrastructure shortcomings such as heavily trafficked roads and both intracity and intercity rail links

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