



Redistributed Manufacturing for the Resilient, Sustainable City Enabling New Value Streams in Community Based Manufacturing

18th May 2016, Cardiff Business School

Present:

Introduction

This meeting was hosted by Cardiff Business School under the aegis of the Redistributed Manufacturing for the Resilient, Sustainable City (RDM|RSC) network. After Professor Mohamed Naim of Cardiff University had welcomed attendees, Professor Chris McMahon of the University of Bristol explained the background to the network, saying that it was one of 6 in the UK exploring the potential of redistributed manufacturing – digitally enabled manufacturing and manufacturing at a smaller scale that allowed the location of manufacturing to be varied. The RDM|RSC network is examining the issues using the city region as the focus of study, and especially exploring issues of sustainability and resilience. Professor Naim then introduced the plans for the day, explaining that study of cities is particularly apposite given the current £1.2 billion investment in the Cardiff City Region. He outlined the *modus operandi* for the day, and introduced the first topic which was 'the size and shape of manufacturing in city regions'.

What is the size and shape of manufacturing in City Regions?

The first speaker in this session was Ann Beynon of the Cardiff City Region Board. She emphasised that she was taking a business/corporate perspective, asking what is the link between manufacturing and economic productivity? She gave figures for manufacturing as a proportion of economic activity in different parts of the country. Wales exports more than it imports. Exports include power generating machining equipment, petroleum products and iron and steel. Underpinning the future is the future of the steel industry - small firms e.g a manufacturer of radiators in Newport - need to buy steel locally because of currency and transportation issues.

Business does not exist without financial growth. Corporates drive markets. Universities can give small firms an innovation edge. An example is Epituro, a spin-off company from Cardiff University which is a key player in the BT supply chain, providing analytics of network performance.

There is a need of innovative business models. In order to build solid relationships, the senior management has to be involved and businesses can bring in market knowledge and opportunity for gatherings. Smart cities have the right platforms for carrying data, analysing data, infrastructure and traffic data. This data organisation and accessibility have come from a regional government procurement. Examples of already smart cities: Chicago and Barcelona. Bristol, Cardiff and Swansea are not on the same page. It is very important to realise that smart cities have businesses that are based on the fact of being smart cities and it is critical to realise at the government level that smart cities allow businesses to grow.

We should not overlook innovation in old markets - e.g. innovation in metal coatings. Innovation should not just be seen as 'new' technology, but improvement of legacy technology as well.

Local authorities need to ensure investments in the region are easy. E.g. planning and regulations can be extremely time consuming, so why not set up a dedicated 'customer service' team in the Council to navigate this space for investors?

The second speaker in this session was John Bradford, CEO of High Tech Bristol + Bath CIC. This organisation mainly deals with companies in the aerospace supply chain, with a lot of organisations involved in metal-working.

John noted that aerospace supply chains in the west of England are often very spread out – not just in Filton - and artisanal, depending very much on relationships and trust. SMEs are often very traditional (they 'build to print' and are not up to date in terms of communication infrastructure (still using fax)). Some SMEs are happy to have a consistent trade, and are not considering future growth.

3D printing was to be rolling out everywhere but it hasn't happened. Certification, audit trails and qualification are issues. In aerospace 3d printing is being applied in very specific places. There is a big distinction between hobbyists and professionals.

Re-Distributed manufacturing requires small volume, which is good for the aerospace sector. However the aerospace sector is very traditional. There may be a limited capacity of small businesses to absorb change. Awareness of the value of innovation is an issue (many are not interested) and innovation has to be put into practice (some serial innovators never get to execution). Innovation is potentially high risk – especially if it is away from core business - but must be part of a wider manufacturing ecosystem.

Distributed design has really taken off. The Bristol region is strong in design, and has strong manufacturing connections.

The third speaker in the session was Anthony Soroka of Cardiff Business School. He described work he had done to examine manufacturing in the Cardiff capital Region. In particular, he has used QuiScores as a parameter to analyse the health of 1976 businesses around Cardiff.

In Cardiff only the chemical sector is completely above (including deviation interval) the threshold QuiScore of 40. A company of wearing apparel is fully (mean and deviation values) lower than 40. However the firm has been working with this parameter value remaining active in business. It appears therefore that although the QuiScore can give indication of the health of some businesses, it can be completing misleading if not analysed in combination with the history of a business. Interestingly, chemical companies when they start to have QuiScore below the 40 threshold can face a brutal destiny with quick closure.

QuiScores give an overview of the health of businesses but it needs to be counterbalanced with the history and the characteristics of a particular sector. Ultimately there is a lot of data missing, especially for small businesses.

Discussion Session 1

The attendees broke into four discussion groups to discuss a series of questions

- *What value does community based manufacturing (CBM) provide and to whom?*
- *What value is created by being part of a community of makers/manufacturers?*
- *Do policy makers capture enough data from the maker community?*
- *How could we capture and measure value streams in CBM?*

The outcomes of the group discussion are listed below.

Discussion Group 1 (reporter Paul O'Dowd)

- What is local?
- What is community based?
 - Workshops rather than factories (KMCW, Fablab, etc).

- What is the significant demographic at 'maker space' venues? 50 and above?
 - What about at CIC, shared workshops (more commercial enterprises?)
 - What about at SME's?
 - Community Interest vs Manufactured Goods
 - Placing new value in the former, skills before product
- Surprising that there is so little info on SME's and manufacturing (no directory)
 - Manufacturing in the city needs sign-posting (not literally, but in terms of awareness and perception)
- What is the sense of value in a 'place' (locality)?
- The economy is a cruel master, hard to do a CIC?
- SME's don't want to market themselves, small customers are time costly.
 - Could this be made possible if there was economic relief provided, incentives?
- Aerospace:
 - Prices/costs are completely driven down, they are exploiting SME's and their competition – how long can this last?
 - Should they be held accountable for moving manufacturing abroad?
- (Re)Manufacturing
 - Reclamation, reconditioning: most people prefer to buy new. (why?)
 - Alternative business models:
 - Subscription based or licensing to keep material-ownership in the hands of the distributor.
 - Could autonomous cars fit this well?
 - Product Service System? Buying product service, rather than product
 - How much servicing goes into Fablabs, Makerspaces, etc, if we assume that the equipment is not used professionally?
 - Are the people attracted to makerspaces also of the culture/mindset of make-do-and-mend? What about the rest of the city demographic?
 - Re-manufacturing has serious cost implications
 - Finding material
 - Reconditioning material
 - Possible risk to equipment due to foreign materials in substrate material (e.g., nails in wood)
 - The automobile industry has a strong current system of reconditioning and servicing a product (the car)
 - What is the expected longevity of a new car?
 - How much part-exchange will occur on a car in it's life time?
 - What is the current infrastructure of car servicing, can this be mapped and studied?
 - Most of the serviceable parts are coming from abroad
 - Could these be made locally?
 - How do we create a social imperative to buy local products?
 - How did the house hold recycling scheme come in so quickly and effectively? Households now separate their own waste.
- Governments
 - They have a responsibility to communicate, to create social imperative, and to raise awareness of topics
 - Do successful initiatives stop? Someone asked why we don't hear about continuing success stories.
 - Bristol Pound: designed to foster a local economy and to keep things local

- Doesn't scale? Wouldn't work nationally, we already have a national currency. Does national currency keep spending national-local?
- Why do we preferentially import?
 - You can get reliable quantities from abroad
 - Imported goods are also reliable
 - These statements were made in reference to Sweden, and it was suggested that Swedes have a very 'organised' culture, and that the UK does not – and this is why we move to import rather than local.
- Lack of Entrepreneurs
 - British culture: people are raised to 'earn money' not 'make money', which has an implicit ceiling.
 - People are not predisposed to innovate – a nation of service providers?
 - The economy and government is responsible for giving people the ability to take risk in business start-ups
 - Austerity, spending our way out – how does this relate to risk taking and innovation?
 - Where are our 'problem solver' people. Why are there so few J Dyson's?
- On Policy:
 - SIC are misrepresentative, how can policy be created on this data?
 - Diversity in business not captured
 - Should SIC be periodically audited?
 - Post Codes can be confusing, one person was aggrieved at how an entire rural area came under one post-code, so they always get couriers at their door.
 - Regions should not wait for a national policy, and instead set their own initiatives within the rules/bounds of national governance.
- On Costs:
 - If we want a mosaic of business / manufacturing, we need to create more support in capital costs
- On Waste:
 - Who owns it?
 - What waste policy exists?
 - Failure of the WEEE directive – big corporates pay to have waste disposed of, but the process is not managed at all. So recycling is not happening – a paper exercise.
 - Is this a generational problem? Millennials are buying less but things of higher value.

Discussion Group 2 (reporter Rachel Freeman)

How significant is the value of CBM? If large, need to make it more important.

Slaughterhouse blood and fat disposal. Small company can make use of their waste, but need information. Capturing data – some organisations too small to work with? Should local government invest in companies? Soap maker is using the lard from the slaughterhouse. Higher value from materials.

People are doing things in silos. Innovation often happens in smaller companies. Small companies don't have the skills to pitch their services to large companies, don't have the right connections.

Skill problems. Management skills are missing. Struggle to make ends meet for companies. Businesses will fail. Business Wales offers support. Community Business Wales is dealing

with social enterprises. Small family businesses are surviving. Community shareholdings. Not much opportunity for job experience for young people.

Some jobs local people won't do (e.g. butchery, meat packing). Skills are lost for traditional manufacturing. People are used to being on benefits? Not enough flexible working possible.

CBM brings increased employment. E.g. people working at a water treatment plant have a sense of pride. Social aspect, economic benefit. Social exclusion is a problem. Charity looking after elder disabled people – they do the task of separating plastic and paper in recycling. They have a job.

Furniture recycling social enterprise. Good mix. Crafting rely on quality. Self standing businesses. Super crafter, WRAP, making things from 2nd hand clothes. Some companies don't care much about the community, more technology focused. Prized highly when customised. Ford made their suppliers move to a local campus.

CBM has to benefit local community. Example company that was closed to giving information to the community and caused pollution, negative perception, secretive. No local people in the factory. Sometimes locals don't have a good attitude, need a culture shift.

Data on CBM: Challenges are about waste, data, SIC code misrepresentation. Actors are policy makers, suppliers. Large manufacturers have to provide guarantees, certification. CBM doesn't have to do that. Policy implications.

Local policy for local job seekers. Sustaining jobs, more value. Engaging with companies that are not being seen. Providing support.

Discussion Group 3 (reporter Silvia Beretta)

What do we understand as community-based manufacturing?

What is manufacturing? Do we include design, intra-cycle forms of manufacturing? Who do we define as manufactures? Sometimes it is every difficult, for example do we consider cafés and other places where food is prepared as manufacturer or retailers?

Manufactures have to make something that is physical.

What does it mean 'community based'? Community means:

- Local source
- People gathering and working
- Local supply chain. All based for purely commercial reasons
- Social enterprises: re-manufacture, refurbish, resell

Community based manufacturing should provide fit-for-purpose products with appropriate warranties. In re-manufacturing it would be useful if re-manufactured were local and hence be available and reactive for the products they offer.

If you are making something for yourself is community-based manufacturing? Probably not, manufacturing for trading has different requirements.

Big corporations such as Sony are not community based but the companies supply Sony can be.

Size could be a factor for defining community-based manufacturing. However you can be community based and trade worldwide.

In Germany 50% renewable energy is achieved through a community-based approach. In Denmark is 90% and in UK little by comparison.

What value does community-based manufacturing provide and to whom?

Maker-community seems such a clear term than community based manufacturing.

Community based manufacturing promotes:

- Exposure to market
- Local entrepreneurship
- Education in manufacturing

The textile quarter in Bristol is possible because a number of companies have been buying and sharing the equipment.

Value in B&B design is the space and the networks with colleagues and educational providers.

Manufacturing in Hong Kong is mainly formed of small groups, small companies but very dynamics. Similarly to London.

Values of community based manufacturing are:

- Customisation
- Education
- Customer satisfaction
- Skills
- Exposure to market
- Entrepreneurship
- Distinctiveness of products
- Accessibility to the right channels
- Self-sufficiency
- Society integration

Small businesses do not necessarily aspire to become mass producers. Small businesses can be more agile and produce bespoke products if they remain local.

An example of distinctiveness of products between mass produced and local produced is craft beer VS mass produced beers

Fablabs include not only 3D printing technologies but also have laser cutters, CNC and vacuum foaming.

A diversified society creates market requirements and the proliferation of skills.

What value is created by being part of a community of makers/manufacturers?

Replied in question 1

Do policy makers capture enough data from the maker community?

They do not capture enough information, especially for micro companies. Data are not available or maybe they are but not publically.

Newport city council collaborates with start-ups, hence data should be there. Not necessarily quantitatively, but surely qualitatively.

Policy makers seek impact but this cannot be done immediately by the maker community.

There is nowadays a string focus on data collection but instead there should be more focus on direct communication, talking directly to manufacturers. We should know what and who is there, which networks they rely on and not only on data.

Suggestions:

- people involvement instead of indirect surveys
- issues of trust
- data about manufactures are firstly qualitative. There should be less push on impact though numerical reasoning
- Data collection from the public government in order to justify expenditures. Evidence based policies instead of only impact based policies
- big economics transformation happen through people or bubbles

How could we capture and measure value streams in community-based manufacturing?

Suggestions:

- knock on doors and meet the manufacturers
- map places periodically and more quickly
- identify pools
- define what value is
- -more equality over the whole national territory and not only in some already well established and wealthy regions
- encouraging new businesses
- provide new business models

Discussion Group 4 (reporter Michael Ryan)

What value does community-based manufacturing provide and to whom?

- Value to: employees
 - Income
 - Local employment
 - Low commuting
 - More community active
- More inclusive employment (vs eg. financial services)
- Sustains local supply chains (evidence?)
- Improved flexibility
- More diverse industrial ecology
- What are our aspirations?
 - Economic and social good

What value is created by being part of a community of makers/manufacturers?

- Industry feeds back into local community (sponsorship etc)
 - Evidence?

Do policy makers capture enough data from the maker community?

- Is policy process suitable?
- Lack of visibility in supply chain
- Skills
- Access to capital
- Attitudes to start-ups
 - Culture change (regional / national)
- Link between communities and academia
 - Finding and developing mechanisms
 - Connecting with people not already engaged
 - Value to company?
 - Trade associations (micro?)
- Do SME mechanisms exist in community manufacturing
- Local reuse/recycling
 - Circular economy locally
 - Energy diversity

How could we capture and measure value streams in community-based manufacturing?

Key challenges

- 1 Determining policy for RDM within our region
 - Key purpose – longevity of employment
(education / training, balanced with community needs)
 [Understanding what measures add value and then this implies...]
- 2 Developing metrics beyond financial measures: social, environmental etc.
- 3 Engagement of “hidden” industry
 - Providing support, assisting development

Transition pathways: How can redistributed manufacturing be enabled and enhance the resilience and sustainability of city regions?

The afternoon session addressed in particular issues of resilience and sustainability. To understand issues of resilience it is necessary to gain a good understanding of what is actually happening in a region. This was the subject of the first presentation in this session, by Jude Sherry of the University of Bath. Jude has undertaken a ‘Maker Walk’ around BS3, a region in South Bristol with a traditional manufacturing focus (especially in tobacco goods and packaging, which have now declined). A good deal of manufacturing still exists in the area, in trading estates, but also hidden in residential areas, as a result of the growth of the city wrapping around old factory spaces. Much is small scale, low tech (relatively), providing to local people, run by local people. Conventional database search has limitations owing to problems of the voluntary nature of much data collection, IPR issues and so on, and therefore Jude has studied the area by physically walking around, asking at manufacturing sites what is made and how. She has had support of the M-shed city museum and other bodies in the area. Data have been recorded using an Open Data Kit, and mapped onto on-line maps of the area. One of the surprising things she found was that manufacturing sites were much less noisy and otherwise intrusive than is often considered.

Very important to resilience and sustainability is food and drink manufacture, and this was the subject of the first talk in this session, by David Morris of the Welsh Government. David noted that activities are driven by the ‘Well-being of Future Generations (Wales) Act’ which is providing a guiding hand for long-term decision-making in Wales. It has seven goals

- A prosperous Wales
- A resilient Wales
- A healthier Wales
- A more equal Wales
- A Wales of cohesive communities

- A Wales of vibrant culture and thriving Welsh language
- A globally responsible Wales

Food manufacture can deliver on a number of these and can be a real vector for sustainability in rural Wales, working for the long term and an integrated approach.

The food and drink supply chain employs 222000 people, 22000 in food manufacture, 53000 in agriculture. The target is to increase sales/turnover by 30% by 2020 from a baseline of \$5.2billion to £7billion per annum. They are 2 years ahead of target in working towards this. In the sector micro-businesses comprise about 90% of businesses and 50% of jobs. There is a very good start-up and survival rate for businesses. But the spend on R&D is low at £4 million. Exports at £320million are 2% of GB total. Most importers of Welsh food are in the EU and leaving the Europe could heavily damage the Welsh economy. Dairy and eggs represent 48% of the exports, followed by cereals. Customer loyalty is no longer a feature and there is a high pressure from food discounters on food and drinks manufacturers. There is a lot of government work on the quality mark, branding, food names, traceability and provenance.

The final presentation in the afternoon session was from Yingli Wang of Cardiff Business School, who spoke on 'e-platforms for community-based manufacturing'. She described a number of web-based approaches that offer an opportunity for a different business model, including:

- Etsy (www.etsy.com), which originated in the US and is a peer-to-peer e-commerce website focused on handmade items. It has 13 product categories and charges \$0.20/item for listing and 3.5% of sales.
- Ebay
- Taobao Villages, under the Chinese Internet giant Alibaba Group. A Taobao Village is as a village in which a number of households run online stores – for clothing, furniture, shoes etc. Based on an original village that ended up recruiting the population to manufacture goods. Growth was realised through e-commerce. Taobao is now a classifier for a type of business. 90% of revenue through e-commerce exports (?). % of village employed in enterprise. A model for 'local manufacturing' – in the extreme? Look up web article "An Introduction to Taobao Villages"
- Alibaba, Aliexpress: A market place for all the Chinese manufacturers. Also matches designers / designs to manufacturers. Negotiations happen online, not an auction?
- The social enterprise model such as Vision21 in Cardiff.

Discussion Session 2

The workshop discussion questions in the second discussion session are as follows:

- *What is the role of government in supporting CBM?*
- *What is the role of all stakeholders?*
- *What are the logistics and public transport requirements for CBM?*
- *What e-infrastructure is required?*

Discussion Group 1 (reporter Paul O'Dowd)

- Infrastructure:
 - Lack of quality – ensuring product matches description. Someone mentioned that from their experience, half of goods bought in China are returned because they do not match description. Both defective or simply misrepresented (e.g., wrong colour).
 - Is this a symptom of cheap shipping and logistics? Where is the business risk / pressure?
 - Can this be curated in a way similar to seller-reviews on EBay, a 'Publically Assessed Standard'?
 - Changes to infrastructure require competency in technologies

- Infrastructure isn't a quick or easy solution
- Changes in context/scope change the problem
 - Cities have an existing infrastructure, which can be hard to change. E.g., railway gauge, tunnels, etc., won't accommodate larger train carriages.
 - Rural areas have poor infrastructure (broadband) – so are we discussing city/urban infrastructure or regional?
- E-commerce for a region:
 - Hard to beat something like ebay, because ebay has a large number of visits which is what you want when auctioning. A local ebay would implicitly have less visitors.
 - There are new apps to sell second hand within collection distance:
 - https://play.google.com/store/apps/details?id=com.ecg.close5&hl=en_GB
 - <https://play.google.com/store/apps/details?id=com.offerup&hl=en>
 - <https://play.google.com/store/apps/details?id=com.wallapop&hl=en>
- Distribution networks
 - Royal Mail was/is a centralised distribution scheme
 - Can city wide distribution be made more efficient with hubs?
 - Can you have an Uber or Deliveroo distribution service? Auction / Just In Time? This exists already – cycle couriers?
 - Could public transport be used for city wide distribution? E.g, retrofit carriage onto buses?
 - The train network has become cost-prohibitive for transporting goods since it was privatised. There is a chain of costs to pay, because network rail is leased etc.
- Cost of living could become a problem for the local workforce
- Need research to define the type and success of community based manufacture.
 - What aspects are competitive?
 - What aspects add value?
 - How are non-monetary values realised? E.g., skills and follow-on employment of workforce
- Does landfill contain higher deposits of metals than the natural land? Is this a viable resource?

Discussion Group 2 (reporter Rachel Freeman)

Information. People are too busy. Identify needs, raising awareness, direct financial support.

Businesses can find help easily. Too many initiatives? Food manufacturers need purpose-built premises. Food business parks might help. Tried a scheme funding food tech graduates. Very successful. 100 new products developed.

People don't know where Wales is, outside the UK. Other UK countries are better at promoting themselves. Fishing community are not good at collaborating on Welsh branding. Welsh fish is shipped to Spain and then sold packaged as Spanish.

Discussion Group 3

No record

Discussion Group 4 (Reporter Michael Ryan)

“Prosperity without growth” or “Growth without bounds”?

Networks: organic/organised

E-platforms – Which one? A confusion of options

E-platform – implications of logistics: Sustainability of transport / returns

Benchmarking

Policy/environment more conducive in some places – culture

What is success?

Correct scale of policy (local / national)

■ = Challenges

■ = Key actors

Ease + Reliability

match making → directory?

WASTE

How To Fu
CHANGE

IMPORTING ↔ !importing

POLICY

+ GOVERNANCE

capital
tax.

NEW VALUE

VALUE PERCEPTION.

SKILLS

more resilient?

Earning
vs.
Making
Money.

and community?

Problem?
VAT
Threshold

COMMUNITY
vs.

DATA.

HMRC

ECONOMY
+
DISTRIBUTION

MANUFACTURING

GOODS

SUPPLIERS
& MAKING CHANGE

SIC
misrepresentation

PROFIT DRIVEN
vs.
COMMUNITY

create
social
imperative

anonymising
data.

availability
access
transparency

labour
charges.

