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Opportunities for Sustainable Local Supply Chains: An exploratory study of Welsh Manufacturing Companies

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Abstract

Research has provided evidence for a trend for companies in the USA and Germany to return manufacturing from global suppliers (off-shored) to those based locally (i.e. near-shored) [1]–[4]. Whether this trend is occurring more widely in European companies has yet to be confirmed, but some authors suggest that it is [4]–[7]. This exploratory study investigates to what extent four companies are using local and UK based suppliers and the level of importance they assign to a number of factors when selecting them.

It is found that the 4 manufacturing companies interviewed were all using suppliers of manufactured parts and materials locally (within Wales) and the UK but the extent of this varied between companies. The use of local suppliers varied from less than 5 percent to 25 percent and the use of United Kingdom (UK) suppliers varied from 30 to 100 percent. The four main drivers for using local and UK suppliers were: quality of product, speed of communication, flexibility and accredited quality system. The main challenges were: the ability to offer manufacturing capabilities in very high value and nano technologies, and the availability of events to showcase local and UK suppliers. If Welsh manufacturing industry is to be efficiently supported, knowledge of the existence and extent of re-shoring in the region is vital. Therefore, more research in this area is required.

Keywords: Local, Supply Chains, Sustainable, Manufacturing

1. Introduction

Within the areas of supply chain management and operations management there is a considerable amount of literature that examines the advantages and disadvantages of global versus domestic sourcing and production [1]–[3], [5], [8]. For example, global sourcing practices have been linked to securing products at the earliest possible time and holding inventories until the products are sold to retailers. In a similar context, domestic sourcing is related to the postponement principle. That is, the delay in product differentiation happens nearer to the retailers' selling point.

Recently, both academics and practitioners have been reporting on the trend of re-shoring, also referred to as back-shoring [8]. A large proportion of the academic work analysing and producing definitions for re-shoring has been based around countries such as the USA [1] and Germany [5] as opposed to the United Kingdom where the work has been conducted on behalf of bodies such as the Engineering Employers Federation. As a result of this the patterns and trends in Wales (as a separate entity) have not been studied in as great a level of detail.

During collaborative research with Welsh manufacturing companies, carried out as part of the ASTUTE project, there appeared to be a trend towards the increasing use of local suppliers. Also in Tate [9] it was noted that “The economic downturn, a heightened emphasis on sustainability, and increasing customer expectations for flexibility and improved cost performance drove firms to re-consider the appropriate “shoring” decision.” We therefore wanted to gather data to investigate whether this was indeed the case and if so, what factors were driving their decisions. We also wished to identify any challenges the companies experienced when seeking to use local and UK suppliers.

This paper specifically focuses upon manufacturing companies based in Wales and the opportunities and challenges they experience in selecting, developing and maintaining local suppliers. Whilst there is much research exploring the use of off shore suppliers there is comparatively little research exploring the extent to which companies are using more locally based manufacturing facilities. Three research questions are tackled:

1. To what extent are Welsh manufacturing companies using local and UK suppliers?
2. What are the main drivers behind Welsh manufacturing companies using local and UK suppliers?
3. What are the main challenges associated with increasing the use of local and UK suppliers?

2. Research Method

For this study, the research has been undertaken in the form of semi-structured interviews with four companies (Table 1). These companies are based in South Wales and have manufacturing operations in this area. The qualitative research resulting from these interviews was felt appropriate to the objectives of this study, as there is a need to discover not only the meaning applied to various scenarios and factors by the respondents, but also the significance which is associated with them. Semi-structured interviews are of particular use in an exploratory study [10] such as this, as they allow the interviewer to tailor the context specifically to the organization [11]. Interviews of this kind also allow the interviewee to answer questions "within their own frame of reference" whilst aiming to avoid the interviewer's preconceptions on the topic [12]. In each case, the interview was undertaken with managerial members of the purchasing staff, giving an appropriate view-point on the research objectives of this paper. As part of the interviews, respondents were asked to assign values of importance to a number of factors related to the selection of local and UK suppliers. These factors were in the areas of logistics, production, finance and communication and were identified during collaborative research with Welsh manufacturing companies carried out as part of the ASTUTE project. Nevertheless the majority of these factors have been identified by other authors in the literature on re-shoring decisions, which is reviewed in Table 2. Interviewees were also asked about any particular challenges they had experienced when selecting local and UK suppliers. It has also been necessary to define the various categories of suppliers which are being discussed. The definition of a "local" supplier can be based on a number of factors, be that simple geographical distance, travel time, or ease of access to the supplier [13]. For the purposes of these interviews, a local supplier has been defined as within Wales, with UK and European suppliers based on geographical location. In the study, "offshore" suppliers were defined as those located outside of the European Union. The findings of the interviews have been collated and categorized, providing the information which will form the results.

Table 1: Summary of interviews conducted

Company	**Industry Sector**	**Size**
A	Life Science	Medium (>=250 employees)
B	Engineering	Small (>=50 employees)
C	Life Science	Medium (>=250 employees)
D	Life Science	Medium (> = 250 employees)

3. Global versus local suppliers

Since at least the 1980's global sourcing (off-shoring or outsourcing) has been considered as a means for lowering the costs associated with production - through low wages, employment costs and economies of scale, but recent studies are suggesting that companies are finding it less cost effective [1], [4], [14]. The environmental (and hence sustainability) impact of supply chains is distributed throughout the chain including in design, specification and the distribution of the products [15]. As such, transport operations associated with shipping offshored parts will have an environmental impact. Due to the high demand uncertainty characteristic of industries such as electronics manufacturing the holding of speculative inventories that is associated with global sourcing, especially in the form of finished goods, may incur a cost penalty, global sourcing may also result in poor customer service due to slow or lack of replenishment [16]. Domestic sourcing can lower inventory costs and increase customer service by reducing the time-to-serve and improving replenishment rates, but it can incur higher production costs [17]. At the same time, the decision to manufacture closer or further to the headquarter and the customer needs to be continuously reconsidered, as the balance of costs and time to market can change dramatically at very short notice, calling for the re-design of the supply chain and the re-distribution of production activities across the world [18], [19]. Therefore there are a number of important factors that need to be considered when making sourcing decisions. As a result of this it is important to determine the current situation in Wales in order to offer informed advice to companies and the Welsh government.

Within the past five years there have been multiple studies conducted within the UK and internationally examining what is driving companies to re-shore their activities [4]–[7], [20]–[22]. These range from academic studies to those conducted for industrial organisations. Because of their broadly independent nature the survey results gave differing sets and number of factors (ranging from 4 to over 10). The top 5 ranked factors (where available) from each survey were selected, and where necessary these were converted into broader categories. The top 5 results from the aforementioned surveys are presented in Table 2.

Table 2: Ranking of factors influencing re-shoring decisions

Survey	1st Factor	2nd Factor	3rd Factor	4th Factor	5th Factor
[5]	Flexibility	Quality	Coordination costs	Infrastructure	Qualified staff
[4] In	Quality	Flexibility	Coordination effort	Transport costs	Qualified staff
[4] Ext	Quality	Flexibility	Transport costs	Labour costs	Qualified staff
[6]	Quality	Delivery time	Logistics costs	Inventory costs	Risk
[20]	Total manufacturing cost	Quality	IP protection	SC risk	Flexibility
[21]	Transport cost	Quality	Resilience / security	Exchange rate	Overseas wages
[22]	Cost	Quality	Lead times	Delivery performance	
[7]	Wage gap	Technology change	SC security	Transport costs	Quality

4. Results

Extent of use of local and UK suppliers by Welsh manufacturing companies

The interview respondents were from the Life Science and Engineering manufacturing sectors (Table 1) and consisted of 3 medium sized (up to 250 employees) and 1 small sized (up to 50 employees) manufacturing companies. The 3 medium sized companies were all subsidiaries of global companies and used off-shored suppliers for some manufactured parts, but the small sized company did not. All 4 companies had suppliers based in Wales (local) and the UK but the extent of the use varied (Table 3). The use of locally based suppliers varied from less than 5 percent to 25 percent and based in the UK from 30 percent to 100 percent. Obviously different companies and industrial sectors require a variety of manufacturing capabilities and this may account for the variation in results.

All 4 companies said they would like to increase the number of suppliers located within Wales and the UK. This is in agreement with Thomas and Barton [23], who acknowledged that factors such as logistics and total acquisition costs associated with the use of suppliers located offshore [23] have led to companies seeking to increase their use of locally based suppliers.

Table 3: Company size and percentage of suppliers located in Wales and the UK.

Company	Sector	Size	Percentage of suppliers based locally	Percentage of suppliers based in UK
A	Life Science	Medium	9	46
B	Engineering	Small	25	100
C	Life Science	Medium	5	30
D	Life Science	Medium	< 5	35

Importance rankings to ascertain main drivers for the use of local and UK suppliers

The importance scores assigned to each supplier selection factor collected during the interviews were combined to yield a total which varied from 17 to 40 (40 being the maximum achievable). The resultant ranking of importance of factors for local suppliers is shown in Table 4 and that for UK suppliers is shown in Table 5. The results for importance ranking for local suppliers were very similar to those for UK suppliers implying that the companies did not perceive them to be very different. The only exception was that of transport times which were ranked as slightly more important when considering UK suppliers (score 22, rank 8) than for local suppliers (score 17, rank 12).

Table 4: Ranking of importance of supplier selection factors for local (L) based suppliers.

Rank	Supplier selection factor	Total Score	Area
1	Quality of supplied product	40	Production
2	Speed of response to phone calls	33	Communication
2	Speed of response to emails	33	Communication
2	Accredited Quality System	33	Production
3	Flexibility	30	Production
4	Capacity to take on additional work	29	Production
4	Time taken to provide quotes	29	Communication
5	Number of processes offered	27	Production
6	Lead time to complete new orders	26	Production
7	Transport costs	23	Logistics
8	No need for agent	22	Financial
9	Auditing costs (e.g.travel)	20	Financial
10	Quality of website	19	Communication
11	Reduction of carbon footprint	18	Logistics
12	Transport times	17	Logistics
12	Lack of website	17	Communication

Table 5: Ranking of importance of supplier selection factors for United Kingdom based suppliers.

Rank	Supplier selection factor	Total Score	Area
1	Quality of supplied product	40	Production
2	Speed of response to phone calls	33	Communication
2	Speed of response to emails	33	Communication
2	Accredited Quality System	33	Production
3	Flexibility	30	Production
4	Capacity to take on additional work	29	Production
4	Time taken to provide quotes	29	Communication
5	Number of processes offered	27	Production
6	Lead time to complete new orders	26	Production
7	Transport costs	23	Logistics
8	No need for agent	22	Financial
8	Transport times	22	Logistics
9	Auditing costs (e.g. travel)	20	Financial
10	Quality of website	19	Communication
11	Reduction of carbon footprint	18	Logistics
12	Lack of website	17	Communication

Production Factors

Production factors scored highly in the importance rankings, compared to the financial and logistical factors investigated. Quality of supplied product was the most important factor for all 4 companies for local and UK based suppliers. In fact, all the interviewees gave it a maximum score of 10. Some authors have reported lack of or variation in quality of supplied parts as an issue when using offshore suppliers (for example, [3], [5]). Supply of substandard manufactured parts can cause production delays and additional shipping costs to return or exchange the goods. These are examples of hidden costs of manufacturing parts offshore, as discussed by Song et al. [24]. Therefore, these results indicate that quality of product is one of the main drivers for Welsh companies using local and UK based suppliers. This is in agreement with other studies [4], [5], [20]–[22] which ranked it first or second in factors influencing re-shoring decisions (Table 2). A 2014 study by PwC [7], however, only ranked quality as fifth in factors influencing re-shoring decisions.

Possession of an accredited quality system was ranked as equal second. Accredited quality systems did not specifically feature in the studies summarised in Table 2 and so this result requires further investigation. Global companies, such as A, C and D in this study, may have purchasing policies that restrict or exclude the use of suppliers that lack accredited quality systems. Therefore, local and UK suppliers who do not have quality systems may be at a competitive disadvantage if they wish to attract work from such companies.

Flexibility was ranked as third and therefore also appears to be a driver. Of the studies in Table 2, Kinkel and Maloca [5] cite lack of flexibility as the primary reason for manufacturing being re-shored, Kinkel [4] found it to be the second most important factor and Janssen et al. [25] ranked it as fifth. Nevertheless, flexibility did not feature in other studies in [6], [7], [21], [22]. Capacity to take on additional work scored almost as highly as flexibility, which is understandable as the two are closely linked. The remaining production factors of number of processes offered and lead time to complete new orders were only ranked as of medium importance (fifth and sixth respectively).

Communication Factors

The two communication factors of speed of response to phone calls and emails had a high rank of importance with the interviewees (equal second) reflecting the fact that companies often need to convey changes or needs to suppliers at short notice or obtain updates of progress on orders. Communication factors did not specifically feature in the studies in Table 2. However, delays in communication and language difficulties have been documented as a disadvantage of using off-shored suppliers (Tang and Tomlin [26], Biswas [27]). In the opinion of Biswas [27] “Cultural differences, geographic distance and language barriers can directly affect the quality and ease of interaction between client and vendor”. Therefore offering a good quality, quick communication response is another main driver favouring the use of local and UK suppliers (especially over suppliers based several time zones away). The time taken for a supplier to provide quotes was ranked equal fourth, indicating it is seen as of moderate importance, but the two other communication factors of quality or lack of a website were of low importance.

Logistical Factors

The results revealed that the companies interviewed did not rank the three logistical factors investigated, particularly transport costs and times as being of high importance when considering both local and UK suppliers. This may be because they assume that transport costs and times with a local or UK supplier will be within acceptable levels and not cause unnecessary delays. Thomas and Barton [23] consider logistical issues to be a driver for companies utilising locally based suppliers. In the studies in Table 2, four out of seven ranked transport and logistical costs in the top 5 factors influencing re-shoring decisions [4], [6], [7], [21].

Reduction of carbon footprint had a low score, indicating that this is not a main driver for companies using locally based suppliers, despite Mueller et al. [28] finding a “growing concern regarding environmental issues”. Carter and Dresner [29] found there is customer demand for products with a reduced carbon footprint and so this may become an important factor in the future.

Financial Factors

The two financial factors investigated of requirements to use an agent and auditing costs had low importance ranking for both local and UK suppliers (eighth and ninth respectively). The use of agents was included as their use in areas such as the Far East can create additional costs and communication issues. However, the interviews revealed that two of the companies had policies of not employing agents either for near-shored or off-shored suppliers and so this was not seen as a main driver. The difference between the travel costs required to audit near-shored and off-shored suppliers was also not given a high importance ranking. This is in agreement with the studies in Table 2, where auditing and agent costs did not appear in the top five factors.

Challenges associated with increasing the use of local and UK suppliers

The qualitative data collected from the semi-structured interviews was analysed to identify any challenges which the companies associated with selecting new local and UK suppliers in Table 6.

Table 6: Challenges associated with the use of local and UK suppliers

Company	Requirement for additional capabilities	Opportunities for engagement with potential new suppliers
A	✓	✓
B		✓
C	✓	✓
D	✓	✓

Requirement for additional capabilities

Although company B had managed to source near-shored suppliers for all the capabilities it required, companies A, C and D had not. They commented that they needed near-shored suppliers to add new capabilities to keep pace with advances in technology and are subsequently required for the manufacture of the latest products. Two areas of capabilities mentioned in particular were high value manufacturing such as optoelectronics and nano technologies. Thomas and Barton [23], found that lack of capability was an issue when selecting local suppliers. This may be due to some manufacturing capabilities and skills being lost to a region following a period of off-shoring. In a study of re-shoring amongst German manufacturing companies Kinkel [4] asserts that it is difficult to restore “product and process competences” once they have been outsourced for a number of years and that developing manufacturing capabilities in new technologies for “the next generation products” is more straightforward. Knowledge of demand for manufacturing capabilities in a region such as Wales is crucial to government so

they can provide support to industry. It is therefore important to ascertain whether there is a trend to re-shore manufacturing to Wales and the UK in order to plan what capabilities will be required.

Opportunities for engagement with potential new suppliers
All the companies said that they would welcome additional opportunities to engage with potential new near-shored suppliers. This was because they felt they lacked knowledge of what suppliers were available locally and what they offered. Local events showcasing suppliers and their capabilities would assist them in identifying new manufacturing partners. Company C commented that there were local supplier events held in Ireland but not in Wales. It therefore appears that there is an opportunity for government to become involved in organising such events.

5. Conclusions

This exploratory study of 4 Welsh companies revealed that all 4 manufacturing companies interviewed were using suppliers of manufactured parts and materials locally (within Wales) and the UK but the extent of this varied between companies. The use of local suppliers varied from less than 5 percent to 25 percent and the use of United Kingdom (UK) suppliers varied from 30 to 100 percent.

The four main drivers for using local and UK suppliers were: quality of product, speed of communication, flexibility and accredited quality system. Quality being of major importance is in agreement with other investigators [4], [5], [20]–[22]. Reduction of carbon footprint was not seen as main driver for the use of near-shored suppliers.

The main challenges were: acquiring manufacturing capabilities in very high value and nano technologies, and creating opportunities to engage with local and UK suppliers. .
Ensuring that Wales has sufficient manufacturing capabilities and capacity to meet future demands is seen as vital to the long term future of the sector.

6. Further work

This was an exploratory study of 4 Welsh companies and a wider study is planned to gather additional data to see if these results are representative of Welsh manufacturing firms as a whole.

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