



**Evaluating sustainability in the UK fast food supply chain:  
review of dimensions, awareness and practice**

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Review

## Evaluating sustainability in the UK fast food supply chain: review of dimensions, awareness and practice

### ABSTRACT

**Purpose** - This paper aims to investigate the level of concern and practice of sustainability development and also policy failure in the fast food supply chain.

**Design/methodology/approach** - A questionnaire using Likert Scoring recorded variations in current practice and attitudes towards sustainable business. A two-stage Cluster Analysis was conducted to analyse the multi-attribute ordinal data obtained from the questionnaire.

**Findings** - Significant differences were found among clusters of Fast food businesses in terms of their sustainability concern and practice, which is of interest to policy makers, consumers and supply chain partners. Medium-sized fast food dealers emerge with high environmental and social concern, but poor practice; larger retailers and fast food chains appear to have both fair social and environmental awareness and practice; and there is a cluster of small takeaway-specific outlets that have particularly low levels of knowledge of sustainability or sustainable practices. Policy failure is prevalent amongst these businesses and without regulation this represents a possible threat to the sector.

**Research limitations/implications** - Reliance on stated rather than revealed preferences of the study may limit the implications of this analysis but it is a major step forward in understanding what has in the past been a very difficult sector to investigate due to data paucity.

**Practical implications** - Fast food is a sector with a lack of transparency which has attracted little academic attention to date, due to the difficulties of empirical analysis rather than lack of interest in a key food consumption sector. The message for the sector is to monitor its act, across all business types or face regulatory and policy intervention.

**Originality/value** - The research conducts a three-dimensional sustainability analysis of fast food supply chains to investigate the differences and trade-offs between different sustainability dimensions.

**Key Words** – Sustainability, Fast Food, Food Supply Chain, food policy

### 1. Introduction

The focus on business sustainability rather than generic aspects of sustainability has highlighted more attention to sustainability of all sectors including food supply chain. Institute for Sustainability (2011) cited in Thomas et al, 2011 has defined business sustainability as “the increase in productivity and/or reduction of consumed resources without compromising product or service quality, competitiveness, or profitability while helping to save the environment”. The purpose of this paper is to evaluate the business sustainability of fast food supply chain in terms of attitude and practice, as a key sector in food supply chain.

Different research methods have been adopted to help develop different theories of sustainable production and supply chain management to promote efficiency, value and quality (Wiese and Toporowsky, 2013; Seuring, 2011; Kuik et al, 2011; and Dey et al, 2011)

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3 and a wide range of cases have been reviewed, to examine sustainable practice, for example,  
4 in UK public procurement (Walker and Brammer, 2011), in terms of global supply risks  
5 (Christopher et al, 2011), in relation to performance measurement (de Burgos Jiménez and  
6 Céspedes Lorente, 2001), within a legal framework (Hitchcock, 2012) or in specific  
7 commercial sectors (e.g. Daily and Huang, 2001; Jeffers, 2010; Keating et al., 2008; Sarkis,  
8 2001; Spence & Bourlakis, 2009; Svensson and Wagner, 2012).  
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15 However, a gap remains between theory and practice in the relation to the significance,  
16 importance, and application of sustainable practices. Sustainability often attracts criticism of  
17 being more about rhetoric than reality and this may be substantiated when we consider  
18 sectors where consumption decisions are taken with less consideration of wider supply  
19 characteristics.  
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25 Food production and consumption can have both a positive or negative effect on the  
26 environment and much of the analysis of this is well covered in the environmental and  
27 agricultural economics literature, but it can also have an impact on consumer health, social  
28 inclusivity, job satisfaction, animal welfare and a variety of other sustainability indicators  
29 (Wiese and Toporowsky, 2013; Forsman-hugg et al, 2013; and Ilbery, 2005). The  
30 importance of sustainability is substantial, where the values, awareness, mindsets of society  
31 (Cetinkaya, 2011) and business reputation (Poudyal, 2012) play an important role in food  
32 supply chain decision making. As a result, social and environmental sustainability in food  
33 supply chains remains high on the political and economic agenda of the European  
34 Commission and the UK government, and reflects the missions of the International Standard  
35 Organisation (ISO) and World Trade Organisation (WTO) (Wiese and Toporowsky, 2013;  
36 Forsman-hugg et al, 2013; and Maloni and Brown, 2006). However, much of the research  
37 suggests that there is still some way to go throughout the food supply chain to improve its  
38 contribution to this wider sustainability agenda both in order to regain and retain consumer  
39 trust but also to take advantage of the additional opportunities for generating profit that it  
40 offers (Wognum et al, 2011; Svensson and Wagner, 2012).  
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53 This research study aims to investigate the three-dimensional sustainability development in  
54 fast food supply chain with more in - depth analysis of social, environmental and economic  
55 sustainability attitude and practice to discover conflicts and to identify the gap between  
56 practice and literature within fast food supply chain.  
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## 2. The Distinctiveness of the Fast Food Sector

The UK sustainable Development Commission has suggested that a sustainable food supply chain envelops a combination of safety, transparency, localisation, land management, reduced energy consumption, improved social and animal welfare and more efficient resource management (Smith, 2008). In addition, there is widespread agreement between UK policy makers and major retailers that food supply chain sustainability needs to adopt more rigorous and systematic action towards sustainability development (Wiese and Toporowsky, 2013; Jones et al., 2008). However, as a distinct sector, the fast food supply chain has gained less attention in this regard by policy makers, business owners and researchers due to its nature and difficulties in data collection. The distinction between the fast food sector and the food retail sector is due to reasons of structure and the nature of the service provided.

Fast food is defined as the sale of food and drink for immediate consumption either on the premises or in designed eating areas shared with other food service operators or for consumption elsewhere (Market Line, 2012). The fast food sector is growing in importance in terms of volume, number of businesses, complexity and the proportion of food consumption that it supplies. Estimates suggest that in the UK now, 35% of household food expenditure is now spent on 'eating out' (Defra, 2012). It is a low margin-high volume market with a substantial market share of total food consumption. The UK fast food market, for example, had total revenue of more than £5bn from 2.8bn transactions in 2011, at a compound annual growth rate of 1.3% for the period spanning 2007-2011 (Market Line, 2012). Total revenue is expected to increase to £6bn from 2.8bn transactions by 2016, suggesting a slight expected increase in average transaction value (Market Line, 2012).

The majority of businesses within the sector are Small and Medium Sized Enterprises (SMEs) such as restaurants and takeaways with 79.3% of total sector (Market Line, 2012), and their role in sustainable development is considered important since SMEs are manifest and complicated entities within supply networks and in relative terms, are one of the most environmentally polluting business models (Brammer et al, 2012; Miller and Russel, 2011; Jamsa et al., 2011; and Vaaland and Hiede, 2007). SMEs are defined for the purposes of this study using the UK definition as any organisation with less than 250 employees (European Commission, 2003 and Department of Trade and Industry DTI, 2005 cited in Kumar et al., 2009). Fast food sector in the UK consists of independent profit – centered businesses, which attract substantial proportion of Value Added Tax (VAT) on their products.

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3 Fast food supply chain was recognized by literature as the flow of material and information  
4 from any industry, which is involved in producing and selling the fast food including food  
5 processors, wholesalers, franchised chains, takeaways and restaurants (Aarnio and  
6 Hamalainen, 2008). Studies have conceptualised and measured takeaway foods in different  
7 ways; most have used measures that reflect the consumption of so-called 'fast foods' such as  
8 hamburgers, pizza, chips and meat pies, which are typically purchased from fast-food  
9 restaurants, snack bars or convenience to be consumed outside the premises of selling food  
10 (Miura et al, 2011). The literature also characterises the fast food supply chain as differing and  
11 being distinct from other parts of the food supply chain including food retailers by being  
12 particularly competitive rather than collaborative in supply, having asymmetric information  
13 exchange both vertically and horizontally, lack of coherence or consistency, fewer clearly  
14 defined supply boundaries and standards, greater reliance on outsourcing, far greater number  
15 of actors, less willing to share information, being decentralised and fragmented rather than  
16 centralised and consolidated, inconsistency and fragmentation in ownership models and lack  
17 of trust, visibility and transparency (Aarnio and Hamalainen, 2008; Richards and Padilla,  
18 2009; Rice et al, 2007; Schroder and McEchern, 2005; Adams, 2008; and Brammer and  
19 Walker, 2011).

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33 Previous studies in sustainability in fast food have focused on calculating the environmental  
34 impact of this sector and did not assess or evaluate the degree of compliance or the nature of  
35 practice towards reducing impact. This gap in research is even more obvious in terms of  
36 assessing fast food sustainability not through a single lens but rather through the  
37 simultaneous three-dimensional view of Economy, Environment and Society (EES), where an  
38 increasing research base in broader food supply chain sustainability is developing (e.g. Jack  
39 et al., 2009; Mollenkopf et al., 2010; Oglethorpe, 2010). The literature has urged that the  
40 sustainability of an industrial process should be evaluated using a set of three-dimensional  
41 (3D) indicators or framework of metrics that represent all three dimensions of sustainability:  
42 economic, environmental, and societal (Martins et al, 2007). This has also been introduced as  
43 the triple bottom line sustainability, which demands that the Company's responsibility be to  
44 stakeholders rather than shareholders (Pham and Thomas, 2012). In response, this study  
45 attempts to evaluate the gaps and differences between consideration and actual practice of the  
46 sustainable operation in fast food supply chain to investigate the level of commitment and  
47 failure in niche market of this sector.  
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### 3. Sustainability and the Fast Food Supply Chain

The complexity of managing and improving any food supply chain including fast food supply chain as an intensive supply network mainly populated with SMEs has already been acknowledged by previous research studies (Nabhani and Shokri, 2009). Fast food has become integrated into society and economies and has also become synonymous with several environmental and nutritional issues in recent years. A passion for eating out, socializing and taste has been offered by researchers as the most important determinants of consumer choice for fast food (Anand, 2011). The fast food supply chain is also mainly constructed in the private sector, which in a more general sense is recognized as having both internal and external enablers and constraints to supply chain sustainability (Walker and Jones, 2012). Although research specific to the sector remains scant, nutritionists, economists and marketing researchers have shown that fast food consumption is likely to be habitual due to its convenience, ready accessibility and relatively lower cost (Richards and Padilia, 2009; Rice et al., 2007; and Aarino and Hamalainen, 2008). Research in the USA on fast food chains has focussed on environmental sustainability to a certain extent (Hamperscht, 2005) but this has focussed mainly only on very large chains rather than taking a wider view incorporating the many smaller enterprises, which are likely to be less brand-conscious or environmentally self-regulated but collectively form a large market share. The large chains may account for a large proportion of production on their own but may not account for a large proportion of environmental impacts because these may be a function of practice rather than size and poor practice appears to be worst in smaller outlets.

The fast food supply chain is complex, including different firms with different sources, policies and cultures and it follows a life cycle with a distributor-centered flow of material and information (see figure 1) that differentiates itself from food retail supply chains typically at the processing/manufacturing stage. It is beyond this stage (see Figure 1) that the debate and analysis around fast food sustainability needs to be concentrated and appropriate sustainability indicators sought. Figure 1 depicts a typical fast food supply chain and life cycle with a number of different firms involved. The complex flow of materials and information is indicated by thin-line arrows (dotted lines for flow of information), while the flow of waste is depicted by thick-line arrows. This figure demonstrates the central role of food distributors and wholesalers in enabling the flow of material and information in the fast food supply network and also in-direct flow of information from customer to suppliers and lack of visibility, which adds more complexity.

The fast food supply chain is typically more complex than the retail supply chain since the latter tends to have a more centralised supply network through the use of their own regional and national distribution centers which enable the implementation of centralised distribution strategies and policies. Due to this complexity and lack of centralisation, it is likely that at different points in the chain and between different types of businesses at similar points in the chain, the importance, prevalence and balance between Economic, Environmental and Social characteristics will vary (Aarino and Hamalainen, 2008; and Martins et al, 2007). The following provides a brief review of literature relating to each, highlighting some key concerns for the fast food sector to support the types of questions this study needed to ask.

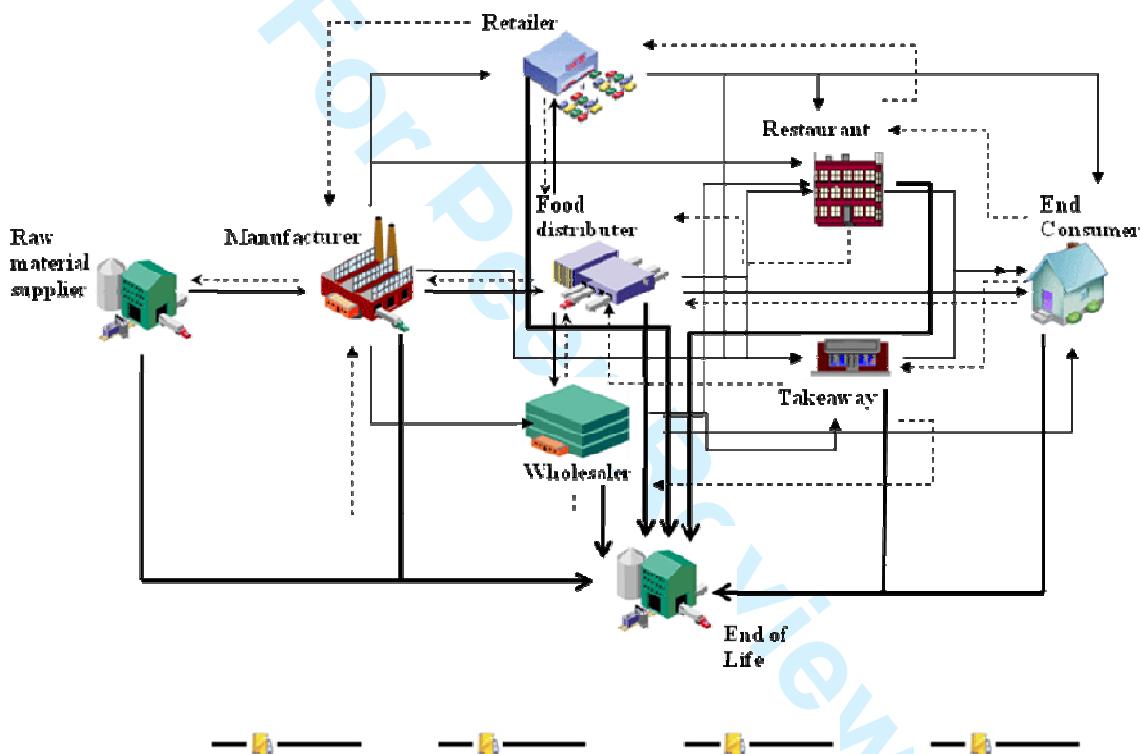


Figure 1 – Integrated fast food supply chain and fast food life cycle

### 3.1 Economic Sustainability

Economic sustainability is a critical factor in any business, which has already been studied by many researchers and in relation to operations management (Pham and Thomas, 2012). There are some specific economic characteristics of the fast food supply chain that characterise its nature as a low-margin, high volume sector. It has price sensitive consumers, uses discount and promotions extensively and there are high levels of competition. Transaction cost, price, promotion, location, franchising and branding are thus common factors that govern the



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3 economic sustainability of fast food supply. Promotional activity has been shown to be an  
4 effective strategy to increase market share and demand for price-conscious consumers;  
5 although a more careful aggregate impact of promotion on society is required (Richards and  
6 Padilia, 2009). Branding and price are two economic strategies that have an important impact  
7 on enhancing the reputation of the fast food industry and increasing consumer loyalty through  
8 more competitiveness (Schroder and McEacher, 2005). The transparency in the  
9 communication of branding values within fast food supply chains is critical, and therefore  
10 fast food businesses need more improvement in this area.  
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18 Many researchers criticise that trade-off considerations among environmental and economic  
19 dimensions plays a significant role in the decision making process for achieving sustainability  
20 in supply chain (Kuik et al, 2011). The win-win aspect of sustainability in which economic  
21 development paths can reduce environmental impact of resources in any supply chain is very  
22 elusive in fast food supply chains, which generates more trade-offs (Quariguasi et al., 2008;  
23 and Carter and Rogers, 2008). This has also been supported by an environmental and  
24 sustainability risk analysis study (Christopher et al, 2011) which indicated that many changes  
25 in cost and competitiveness of food supply chains could be offered by environmental  
26 sustainability. Low profitability and high competition within fast food businesses offer more  
27 financial difficulty, more pressure for workforce and less devotion towards employees, which  
28 will result in greater risk towards ethical responsibility (Maloni and Brown, 2006; and  
29 Keating et al., 2008).  
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### 39 *3.2 Environmental Sustainability*

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41 Regulatory and external pressures tend to have a positive impact on promoting environmental  
42 sustainability for any supply chain (Liu et al., 2012; and Eltayeb et al, 2010) but the  
43 regulatory and policy process can create more challenges for suppliers, especially in relation  
44 to meeting consumer demand for greener products (Hitchcock, 2012) and the implied costs  
45 (Paulraj and De Jong, 2011). Handfield et al (2002) cited in Eltayeb et al (2010) has defined  
46 the green purchasing as an important environmental element of sustainability in any supply  
47 chain with focus on local purchasing, but with significant complications and pressure in  
48 relation to cost of purchased material and consumer demand for greener products. The  
49 essence of global sourcing in any competitive food supply chain including fast food supply  
50 chain to look at cheaper material outside the border has been identified as a key purchasing  
51 issue in this sector (Kumar et al, 2011). However, the formation of a 'green supply chain'  
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3 which lowers environmental risk and raises ecological efficiency has a combined economic  
4 advantage by creating a price margin that raises profit and increasing market share and  
5 competitiveness (Xie and Breen, 2012; Rao and Holt, 2005).  
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8 The food industry has many impacts on the environment in terms of waste disposal,  
9 chemicals, packaging, food miles, Green House Gas (GHG) emissions and energy use  
10 (Gadema and Oglethorpe, 2011; and Maloni and Brown, 2006). However, it is also believed  
11 that the environmental impact of the fast food industry could be more serious due to less  
12 monitoring and control procedures on different factors such as waste, recycling and energy  
13 use. The energy consumed by the sector is a key component, due to the use of different  
14 storage and cooking facilities (Heller and Keoleian, 2003; Zaroni and Zavanella, 2011) but  
15 waste management is also considered important, particularly in the UK, which has the worst  
16 record in the EU on waste management and recycling (Jones et al., 2008; Wei, 2010)  
17 especially in relation to food wastes such as fat, by-products and surplus foods.  
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26 GHG emissions are another environmental element in the fast food supply chain, driven by  
27 the climate change agenda with key impacts arising from transport and logistics operations  
28 (Oglethorpe, 2010; Quariguasi et al, 2008). In food retailing, given consolidation by the  
29 supermarkets, life-cycle analyses are becoming more commonplace to account for carbon  
30 footprints of different products, but this is much more difficult to do in the fast food sector  
31 due to the complexity, fragmentation and dispersion of the operators in the sector. Whilst  
32 localisation has been suggested as an effective strategy to reduce the GHG emission in food  
33 supply chains (Smith, 2008; Ilbery, 2005) this has more recently been contested due to the  
34 economies of scale that can be lost in resource use by localising supply chains (Oglethorpe,  
35 2010; Coley et al., 2011), which has a relevance to fast food since many outlets lack the  
36 economies of scale to achieve such resource efficiencies.  
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46 Overall, it seems that reducing the environmental impact of fast food supply chains is  
47 complex due a wide array of trade-offs between different sustainability indicators, and a lack  
48 of awareness. No particular national statistics about the degree of solid waste produced by  
49 fast food sector in the UK has also been found in literature by authors, while Data Monitor  
50 (2010) and Market Line (2012) publications also failed to provide any information.  
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### 3.3 Social Sustainability

Social practices and performance in operations and the supply chain encompass all management practices that affect how a firm contributes to the development of human potential or protects people from harm (Manning, 2013; Awaysheh and Klassen, 2010). Supply chain social responsibility differs from the more familiar notion of Corporate Social Responsibility and refers to the chain-wide consideration and commitment to achieving social benefits, genuine and legitimate partnership and acknowledgment of different approaches to ethics (Spence and Bourlakis, 2009). The study revealed the complexity in food supply chain where many downstream Companies can only monitor their relationship with their direct supplier(s), but not with the supplier's supplier (Wiese and Toporowsky, 2013; Manning, 2013). Therefore, it is both policy and practice relevant to study social responsibility of fast food supply chains in a wider context from the end consumer back through to manufacturer and raw material supplier. Social sustainability in the fast food supply chain can be considered across six sub-categories: consumer health, transparency, food safety and quality, animal welfare, labour and ethics (Forsman-hugg et al, 2013; Wiese and Toporowsky, 2013; and Maloni and Brown, 2006). Fast food also has the potential to impact directly and visibly on people's well-being and consumer value (Schroder and McEacher, 2005; Van Donk et al., 2008; Aiking and De Boer, 2004) and improvements in nutritional value and dietary intake has already been highlighted by the UK food governing bodies (Schroder and McEacher, 2005; Adams, 2008; and Denyer, 2008).

Transparency in fast food supply chains could be considered more specifically as combining traceability, labelling, and product specification. Information technology has been suggested as an important element to promote both social and economic sustainability through customer – centred enhancement (Jeffers, 2010; Eckerd and Hill, 2012; and Altinzoglou et al, 2012). This is a challenging requirement in the fast food supply chain, which would enrich the quality of information exchange and traceability systems. A good traceability system offers the possibility of effective flow of product and information, quality assurance, food safety and security, and consumer health (Ilbery, 2005; Maloni and Brown, 2006; Hamprescht et al., 2005 and Wognum et al., 2011, Wilson and Clarke, 1998). Information on the origin of food is an important social issue in food supply chains (Wiese and Toporowsky, 2013; Smith, 2008; Ilbery, 2005 and Jack, 2006) but there is little prospect of being able to trace all single fast food products back to their origin, due to the complexity of pre-assembled product and the variation in supply bases and supply contracts.

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3 Food safety is another aspect of social responsibility for all fast food businesses and is of  
4 significant political and consumer relevance in the UK (Jack, 2006) particularly after facing  
5 health and safety challenges including Salmonella in eggs and BSE and Foot & Mouth  
6 diseases affecting the meat chain. There have also been considerable debates about the  
7 relationship between genetically modified (GM) and organic foods and their role in  
8 sustainability both within the media and research communities (Lockie, 2006 and Barling et  
9 al., 1999), which have resulted in consumer confusion regarding the use of these products  
10 (Maloni and Brown, 2006; Lockie, 2006; Barling et al., 1999). Nevertheless, Herrmann and  
11 Rundgren (2006) cited by Lu and Swatman (2009) reported that there are clear standards and  
12 regulations to ensure the maintenance of the quality of organic food and consumer confidence  
13 in and comprehension of these qualities. Using GM and organic foods might be sustainable in  
14 terms of using less pesticide, herbicide or chemicals, but they might not be sustainable in  
15 terms of cost, availability and GHG emissions (Lockie, 2006; Barling et al., 1999; and Roy et  
16 al., 2009). Although, there has been some research projects about the use of organic products  
17 in agro-food supply chain (Lu and Swatman, 2009), but there can hardly be found any  
18 research output about organic fast food supply chain.  
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31 Clear and understandable labeling has proved advantageous to end consumers in the retail  
32 sector in order to inform about the use of biotechnology, nutritional values, animal welfare,  
33 fair trade and the origin of production (Barling et al, 1999; Hoogland et al., 2007; Sibbel,  
34 2007; Smith, 2008). Animal welfare is noted as a characteristic that could be particularly  
35 important to the fast food sector since many of the fast food product ranges are produced  
36 from meat (Schroder and McEacher 2005; Hoogland et al., 2007; Adams, 2008). Labour  
37 standards are also an important dimension of social sustainability, which can be integrated  
38 within supply chain controls (Hamprescht et al, 2005) and given that fast food businesses are  
39 relatively labour-intensive (Data Monitor, 2010) and subject to national and international  
40 labour standards (Mueller and Kliener, 2004), there is a potential trade-off between social  
41 and economic sustainability perspectives. Ethics, linked often to labour use and treatment, is  
42 another important social dimension but which also links with the methods of production that  
43 are used by the fast food sector. For example, the provision of 'Halal' food is very important  
44 in relation to many fast food products and trust in production is vitally important as an ethical  
45 issue in communities and countries with high proportions of Muslim consumers (Bonne and  
46 Verbeke, 2008; and Mohammad and Daud, 2012).  
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#### 4. Methodology

This section aims to provide the method of data collection and data analysis for this piece of work. It is intended to briefly address the type of methodology approach, data collection method, the sampling method, criteria of questions, sources of data and data analysis technique in this section. It was decided to use quantitative data in which both categorical and ranked data are used due to the nature of data collection method. A structured questionnaire was developed in spring 2012 as the result of the literature review (Aarnio and Hamalainen, 2008; Richards and Padilla, 2009; Rice et al, 2007; Schroder and McEchern, 2005; Martins et al, 2007 and Adams, 2008), which pointed to the economic, environmental and social sustainability, but also involved scoping discussions held with stakeholders in food processing, wholesaling and distribution.

Businesses involved in fast food supply chain in local and national scale have been targeted for questionnaire as the sample representative after conducting a pilot scheme for 10 local businesses that include manufacturers, wholesalers, distributors and caterers. The sampling population has been selected as the non-probability samples in which some takeaways, restaurants, food distributors, wholesalers and food processors or manufacturers were nationally targeted. The sampling strategy was the convenient sampling in which contact details of different local and national businesses that could be involved in fast food supply, production, distribution and sales were obtained through an on-line source called "Scores on the doors" website. This on-line source is a valid and reliable database supported by local authorities and therefore all businesses in this source were actively operating in the market. Some local food retailers, fast food takeaways, cafes, restaurants, food processors and distributors in North East of England alongside some takeaways, restaurants, food processors and distributors in North West of England and finally some food processors, restaurants and distributors in Midland of the England have been selected as sample. Then the questionnaire was posted or physically handed in to the businesses to be completed prior to collection or return by post. It first gathered general information about the businesses, including the type and size of the organisations, the position of the respondents in the company and their number of working hours. The second element of the questionnaire was designed to identify the behavioral practices of the respondents in relation to the three dimensions of sustainability. From the literature reviewed above and through the stakeholder discussions, practices which might be relevant to of impact upon any of the three dimensions of sustainability were identified (table 1) and fast food – related businesses were asked to

comment on whether they undertook any of these practices and if so, what impact it had on their business.

### Table 1

Although it is possible that there may be more elements that could affect the sustainability of fast food supply and a more exhaustive list could have been used, it was felt appropriate to use just this set of elements in order to confine the complexity of the questionnaire to a more practical choice set for participants. The third element of questionnaire was the sets of questions to identify the awareness of sustainability factors in relation to 3D sustainability. The questionnaire utilised a five point Likert scale against the attitudinal response or awareness questions presented in third section of questionnaire to enable an ordinal quantitative analysis (Appendix A). These sustainability measures were again selected as the result of reviewing the presented sources in this article by authors, considering that there may be many more measures that could be investigated. Databases of businesses involved in the fast food sector such as “Scores on the Doors” and “Just Eat” were used to make initial contact and each was invited to complete the survey either on-line or through face-to-face interaction. The total target population of businesses drawn from available databases was 570 UK businesses including food manufacturers, wholesalers, distributors, retailers, takeaways, hotels, cafes and fast food chains. The initial invitation to participate in the survey was followed up by reminders at four weeks and a further two weeks, with an eventual 189 useable responses being gathered, although not all of these responses necessarily came from the most senior managers of the businesses, a matter which remains challenging.

The ordinal quantitative data was initially analysed descriptively to illustrate differences between different groups of businesses across the different sustainability dimensions in order to compare the result within and between each sector. This analysis was also carried out to identify the level of importance of each sustainability element by considering some key measures of each element for different fast food stakeholders (see appendix A). These sustainability elements were extracted as the result of presented literature review in previous section and also observation in some businesses from each category (manufacturer, distributor, takeaway...) as sample and discussion with their owners. The sample businesses for observation were selected nationally and researchers have physically travelled to these

businesses for observation and discussion. This was followed by a two-stage cluster analysis that generated typological relationships across the data taking into account multivariate responses between business type and attitudinal response. Two-stage clustering is essentially a data reduction and classification technique, which places observations into clusters based on a nearness criterion. The purpose of this was to see if any significantly distinct clusters emerged that could be used to target policy towards those areas where market failure may be occurring or to identify typical practices in particular sustainability dimensions that would be of use to sustainability practitioners or consumers.

## 5. Result and discussion

### 5.1 Descriptive analysis

The 189 useable responses reflect a participation rate of 33% of the total targeted businesses. This sample of responses was distributed as 5% manufacturers, 5% wholesalers, 20% retailers, 9% hotels, 13% restaurants, 30% takeaways, 10% cafes and 8% fast food chains. The majority of respondents were businesses with under 50 employees, 42% having less than 10 employees (Mainly restaurants, cafes, takeaways) and 50% having between 10 and 50 employees (Mainly food processors, restaurants, food retailers and distributors), which leaves just 8% of respondents with between 50 and 250 employees (food retailers and food processors). Although this reflects a large number of what might be termed micro businesses, this distribution is quite representative of the fast food sector as many businesses are very small retail outlets with the vast majority having less than 50 employees (Data Monitor, 2010).

The Cronbach's alpha model for reliability analysis and inter-item covariance was applied to investigate the reliability of data and their coefficient correlation with each other in each cluster due to small population size and high varieties of businesses in this sector. The result of analysis found that the alpha value for all three sustainability elements (see Appendix A) was more than 0.7 and therefore collected data were considered as reliable.

The initial results of the Likert score analysis for individual measures of each sustainability dimension indicated that Social sustainability was the most important element for businesses involved in fast food with an average score of 5.5 (out of 7) followed by economic sustainability with score of 5.21 and environmental sustainability with score of 5.11. However, these scores were not significantly different ( $p > 0.05$ ) and we could not indicate



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3 any specific sustainability dimension as the most concerning element for businesses involved  
4 in the fast food supply chain. This is not unsurprising given an ordinal (discrete) scale was  
5 used (as opposed to cardinal/continuous) so a multivariate technique to provide a more  
6 pattern-based analysis was required to enable the wider variety and range of EES dimensions  
7 to be considered. This was conducted through a two-stage cluster analysis data, with the  
8 number of clusters being unrestrained and selecting Schwarz's Bayesian Criterion.  
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### 13 14 15 *5.2 Cluster Analysis*

16 The analysis treated the objective data from the companies relating to their practices (section  
17 2 of the questionnaire) as categorical discrete variables and data relating to their attitudes on  
18 the Likert scale (section 3 of the questionnaire presented in appendix A) as ordinal random  
19 variables. Three statistically unique clusters emerged indicating statistically significant  
20 differences between the systemic behavioural and attitudinal responses of the sample.  
21 Although the discussion and characterisation of the Clusters below provides more insight into  
22 their make-up and reasons for standing alone as distinct 'typologies', a significant factor in  
23 determining the difference between the clusters appeared to be size by number of employees.  
24 Cluster 1 included mainly businesses with less than 50 employees (88%), cluster two was  
25 formed of businesses between 10 and 50 employees (85%) and cluster three consisted of  
26 businesses with less than 10 employees (90%). Beyond this, however, the clusters  
27 represented quite different mixes of business type. Figure 2 depicts the percentage of  
28 different business types within each cluster.  
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39 Cluster 1, with 36% of total respondents had a broad mixture of all businesses involved in  
40 fast food supply although it was more dominated by restaurants and fast food takeaways  
41 (54% of the distribution within this cluster). Cluster 2, with 34% of total respondents  
42 consists of mainly retailers and chains with between 10 and 50 employees (79% of the  
43 distribution within this cluster), and Cluster 3, with 30% of respondents was formed of  
44 mainly fast food takeaways with less than 10 employees (86% of the distribution within this  
45 cluster).  
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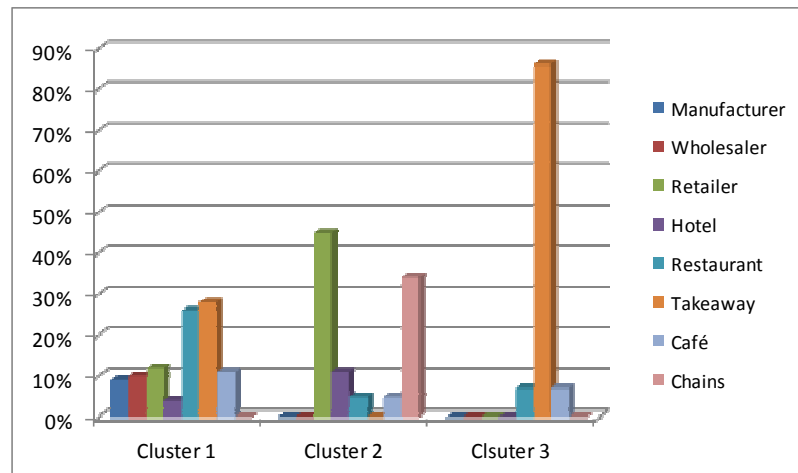


Figure 2 - Distribution of business type groups within each cluster

The results of any cluster analysis indicate different importance levels of descriptive elements (e.g. sustainability related practicing elements) and individual elements of each sustainability dimension (sustainability awareness measures in Appendix A). The output identifies how important each of these different elements actually are in the formation (and separation) of the clusters themselves by allocating an importance 'score' to each ranging from 1 (most important) to zero (not important). It was decided to assess any element with an importance score of more than 0.25 but to ignore elements with weaker levels of importance to ensure the effectiveness of the results and provide more validity and verification in the analysis. The following outlines the profile of each cluster, identifying their key characteristics across the three dimensions of sustainability using these most important factors.

*Cluster 1 – Medium fast food businesses with high environmental concern, moderate social concern, but low practice*

The businesses within this cluster present a fair amount of environmental and social concern and awareness but their evident practices do not reflect their concern, resulting in mixed messages and potentially misleading marketing. It was observed that 85% of respondents in this cluster did not practice any form of traceability system or achieve ISO9000 certification to ensure consumer safety and efficiency. In reference to environmental practices, 62% of these respondents had no regular check on their equipment and vehicles as measures to reduce energy use or GHG emissions. The majority of respondents (67%) tended to use local suppliers and they tended to receive frequent deliveries each week rather than larger single deliveries.

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3 Approximately half of these respondents considered excessive food waste and sewage as an  
4 important environmental issue in their businesses and they also acknowledged animal welfare  
5 as an important environmental and social element. But, they had mixed opinions towards  
6 selling organic products in their business due to the cost of organically produced inputs.  
7 They did not consider biotechnology as a social threat for fast food consumers and they were  
8 not inclined to use fair-trade raw material in their business or provide information through  
9 websites or labeling to be more transparent to their consumers. However, the participants in  
10 this cluster have fully acknowledged the importance of staff training and staff motivation in  
11 their business to support the social welfare of their own employees.  
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20 Given this cluster is dominated by restaurants and fast food takeaways, this misleading  
21 behavior where attitude is not matched by activity is potentially harmful to consumers who  
22 might be drawn in by rhetoric but sustainable outcomes are not achieved. Whilst there was  
23 no evidence of legislation or regulation being flouted, a clear policy message here might be to  
24 be aware of trading standards claims where environmental improvement is claimed but not  
25 achieved. Although this sort of 'green-washing' is not uncommon and often harmless, if it  
26 led to advertised practices not being followed, regulation may need to be introduced to  
27 prevent consumers being misled.  
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35 *Cluster 2 – Retailers and fast food chains with fair social and environmental awareness and*  
36 *practice*  
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38 The output for this cluster indicated strong social and environmental awareness and practice  
39 and was dominated by retailers selling fast food and also fast food chains, 90% of whom  
40 sourced their materials from national suppliers. In contrast to Cluster 1, 90% of the  
41 respondents in this cluster practiced traceability systems with 77% of them being ISO9000  
42 certified and 90% of respondents undertook regular equipment and vehicle checks.  
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48 In terms of environmental sustainability concerns and awareness, the respondents within this  
49 cluster did not consider excessive food waste as an important issue, but they were supportive  
50 of selling organic ranges and using organic raw materials. This again reflects a key  
51 difference with Cluster 1 businesses that were focussed on waste and cost whilst Cluster 2  
52 focussed more on activities with added value and high margins.  
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58 In relation to social sustainability, the majority of respondents believed that increased  
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3 security in fast food supply networks was important for consumer safety and they were also  
4 concerned about animal welfare, using biotechnology in food production and processing and  
5 were also supportive of using fair-trade raw materials in their operations if possible. The  
6 respondents in this cluster have also been practicing and were fully aware of the importance  
7 of labeling and using information management systems for more transparency towards  
8 consumer safety. Staff training and staff motivation were also considered as high priority for  
9 these businesses ensuring social benefits to employees. In relation to economic  
10 sustainability, the respondents were concerned about the effect of branding and also increased  
11 security within fast food supply networks as important factors governing the economic  
12 success of their business.  
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21 Clearly, from a market and policy perspective, the types of businesses in Cluster 2 are  
22 probably the most effective to target in order to deliver sustainable development policy in the  
23 sector. Although they were on average actually smaller than the businesses in Cluster 1, they  
24 are not as small as those in Cluster 3 and since the majority of businesses are popular fast  
25 food outlets (retailers and chains) they are likely to have relatively high footfall and thus  
26 generate a large sustainability footprint.  
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33 *Cluster 3 – Small fast food takeaways with minimum sustainability knowledge and relaxed*  
34 *approach*  
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36 This cluster generally had poor levels of knowledge and practice on all sustainability  
37 dimensions and included mainly small takeaways with less than 10 employees. They have  
38 not been practicing any traceability nor participating in ISO 9000 or other systems to ensure  
39 consumer safety or process efficiency. 93% of respondents in this cluster had no regular  
40 monitoring or checking procedures for their storage facilities, cooking equipment or vehicles  
41 to reduce environmental impact and the majority of all participants used frequent, small-scale  
42 local supplies. They did not consider excessive food waste and sewage as an environmental  
43 threat but they did acknowledge the importance of using organic raw material in their  
44 operations for certain products. However, interestingly they had a high concerns about using  
45 biotechnology in any fast food raw materials, but this might imply ignorance about the issue  
46 rather than a founded argument, which might be supported by the fact that they were also not  
47 aware of role of information management practices such as websites or labeling schemes, or  
48 that they were important elements to promote transparency for end consumers. The members  
49 of the Cluster also showed little regard for suppliers, noting security of the supply network as  
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3 unimportant although they did acknowledge that branding could have impact on the  
4 economic success of their business.  
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## 8 **6. Conclusion, Policy Messages and Future Works**

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10 The results of the cluster analysis suggests that whilst there are some mixed messages around  
11 the behavior and practical approaches taken in respect of the three different dimensions of  
12 sustainability in fast food supply chains and there probably remains significant confusion  
13 about how to achieve sustainability goals, there are some key differences between business  
14 types in this sector. Fast food takeaways, especially small Independents, have the lowest  
15 level of knowledge and demonstrate the least practice to promote sustainability. This is a  
16 worrying message as they are the dominant type of business in the fast food sector, and the  
17 least approached part of fast food supply chain to be targeted by research studies. More  
18 worrying is the fact that consumer safety and transparency were not selected as important  
19 elements to the businesses throughout the cluster analysis whilst they are the key issues that  
20 appear to have emerged in the academic literature and amongst policy makers who have been  
21 trying to promote the level of awareness for these social values in our society.  
22 Encouragingly, retailers who sell fast food to end consumers (prepared foods, sandwiches,  
23 pastries etc.) do not tend to differentiate their practices from their other food categories.  
24 Levels of social and environmental awareness and responsible practice are fair but it could  
25 also be a concern for policy makers and researchers focussed on corporate social  
26 responsibility within the retail industry that it appears that retailers are also yet to attempt to  
27 reduce levels of waste from their fast food brands and categories.  
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41 Fast food chains (as opposed to Independents) were also in the same category as retailers in  
42 terms of sustainability concern and practice, whilst their operation and nature of their service  
43 is closer to the fast food takeaways. It is apparent that fast food businesses are more  
44 concerned about social sustainability in spite of the many difficulties and complexities in  
45 their supply chains. Perhaps less surprising, the best practice emerged from those with the  
46 most to lose – the retailers and large chains. However, the size of the businesses involved  
47 varied considerably, so policy cannot simply target larger or smaller businesses but the nature  
48 of their products, their location and their means of distribution are important factors to  
49 consider. The study has revealed a substantial gap between opinion and stated practice but  
50 this reflects the fact that the level of attention, monitoring and enforcement of local  
51 authorities and policy makers towards sustainable practice in fast food supply chains has been  
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3 unevenly distributed. The big difference between small fast food outlets and restaurants  
4 compared to bigger fast food chains and retailers in both practice and awareness supports this  
5 argument that there is a need for more enforcement from policy makers and local authorities  
6 and more research engagement to promote sustainability in fast food supply chains through  
7 more attention to these small businesses, which although small, account for a large proportion  
8 of consumption and thus environmental, social or economic impact.  
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14 Where consumers at retail outlets and large fast food chains exhibit preferences for an  
15 element of sustainability in the products and services they demand, this is recognised by the  
16 supplier and a corresponding adjustment in production/supply practice is made, thus there is  
17 no market failure. With the smaller independent businesses, which are manifest and pervasive  
18 in the economy, due to fewer or weaker consumption signals for an element of sustainability  
19 in the products and services they provide, no adjustment is made to supply practice even  
20 though that supply practice still creates environmental and social externalities. Thus, the  
21 market does not adjust to correct market failure and only regulatory compliance is likely to  
22 create welfare improvements.  
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31 This article thus contributes to the developing literature on 'green' or 'socially responsible'  
32 food supply chains by focusing on one of the most critical and complicated procurement and  
33 supply networks and which has been notoriously difficult to penetrate or to mine data from.  
34 The article points to possible requirements for tighter regulation of environmental  
35 externalities from the sector, also invoking mechanisms for rewarding the social benefits  
36 already derived due to the nature and the size of the businesses. A greater knowledge and  
37 awareness of sustainability expectations in the sector is required, which might be harnessed  
38 through a more collaborative rather than competitive supply network but this will require  
39 substantial improvements in transparency, trust, information exchange and training.  
40 However, the food retail sector has undertaken a similar journey over the past two decades  
41 where the level of sophistication of sustainable practice has changed considerably and where  
42 sustainability concerns are now understood throughout the supply chain, so it is quite possible  
43 for the fast food chain to follow suit.  
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54 Increased research activity is clearly still needed in relation to the on-going development of  
55 the fast food sector and its contribution to the three dimensions of sustainable development,  
56 in particular focusing on the role that improved collaboration and cross-functionality can  
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offer. However the significant role of fast food supply chains in overall food sustainability is clearly increasingly important, not only to both academia and policy makers, but also to the sector itself. Poor practice and disregard for sustainability anywhere in the sector can influence the resilience and consumer confidence in the whole sector. A lack of transparency, numerous trade-offs and social and environmental ignorance from businesses involved in this supply chain increase the need of more research activities and a greater understanding. It is evident from this research that failure in regulatory compliance is occurring in the sector with lack of transparency in actual practice to develop the three - dimensional sustainability within some parts of the fast food supply chain. This suggests that some form of regulatory intervention is inevitable. In the same way that food hygiene and HACCP standards became mandatory, the same may soon be necessary for sustainable compliance in the fast food sector and this research goes some way to explain where the key problems are and how, or at whom, policy might be best targeted.

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3 **Appendix A**

4 **Third Element of the questionnaire – Questions about awareness and attitudinal**  
5 **approach of sustainability measures within fast food related businesses**  
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NO	Sustainability Awareness Measures	SA	A	N	D	SD
1	Quality of food is important as a social responsibility in fast food industry					
2	Genetically Modified Foods can endanger the society					
3	Origin of materials in any fast food must be displayed in labelling					
4	Halal Foods are an important part of maintaining social values in fast food industry					
5	Food Safety, obesity and Consumer Health is important as a social responsibility for any fast food industry					
6	Fast food businesses don't trust their suppliers or competitors to share social and economical values					
7	Ethics and moral values are part of social and environmental responsibility in any fast food business					
8	Labelling is an important social value for fast food businesses					
9	Every fast food related business must be able to respond to customer requirements about any food or product					
10	Providing product specification and nutritional values is a social responsibility for any food industry					
11	Price war and competition in food industry would have negative impact on society and environment					
12	Environmental friendly products or foods are not cost effective to sell					
13	Excessive security in global food shipments can increase the cost of food					
14	Cheaper brands of foods and raw material can endanger the society and environment					
15	Cheaper frozen foods and tinned products are more dangerous than fresh foods and products to society and environment					
16	Being more responsive to your customer is less costly and less environmentally friendly					
17	Food packaging is important for social responsibility					
18	Food packaging is not environmentally friendly					
19	Animal well-fare is important for you when running your business					
20	The delivery efficiency and scheduling is important for environment					
21	You will sell organic foods to your customers even if they are in high prices					
22	Environmental friendly products or foods are not cost effective to sell					
23	Regular equipment and vehicle maintenance and check is environmentally important					
24	Regular Staff Training and also quality staff treatment is socially critical					

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For Peer Review



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Practices in Fast Food Sector	Sustainability Dimension
Recycling	Environmental
Traceability System	Social
E-Business	Social and Economic
Equipment Efficiency Check	Environmental and Social
Vehicle Maintenance & Safety Check	Environmental & Social
Full Regulated Labelling	Social
Private Branding	Economic
Rout Planner	Environmental
ISO 9000	Social and Economic
ISO14000	Environmental
Sourcing location	Environmental
Healthy Options	Social
Special Offers and Promotions	Social and Economic
Staff Training	Social

Table 1 – Some investigated sustainability practices in fast food supply chain

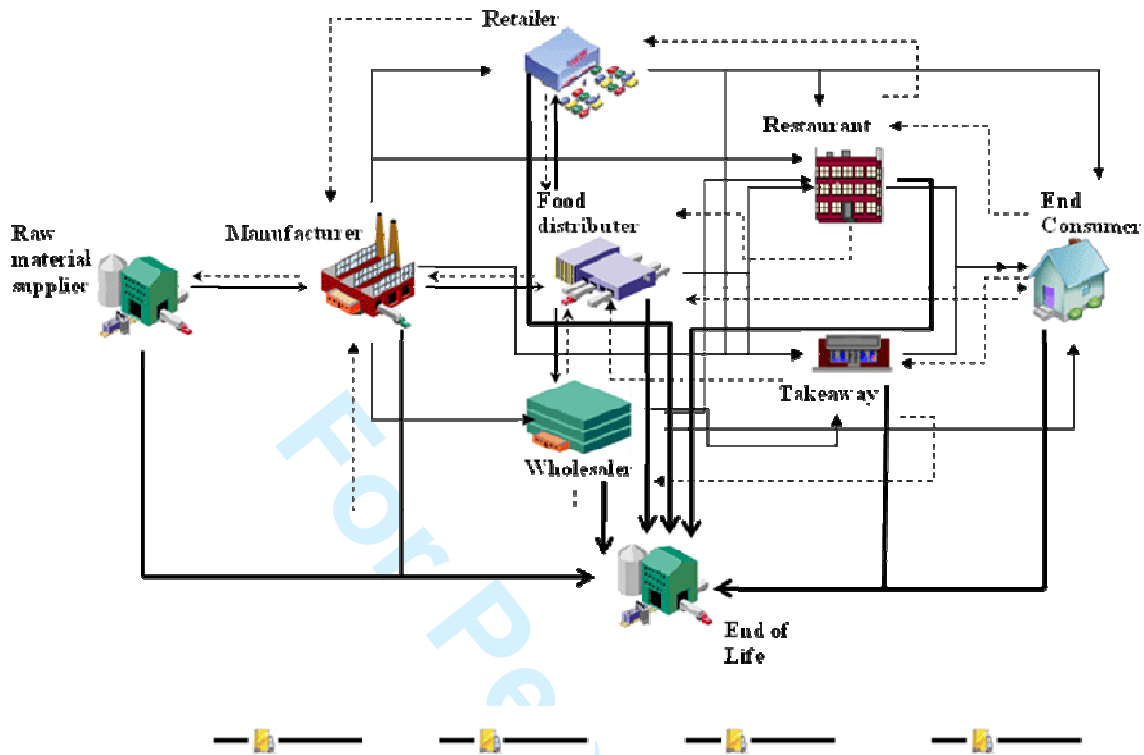


Figure 1- Integrated fast Food SC and fast food life cycle

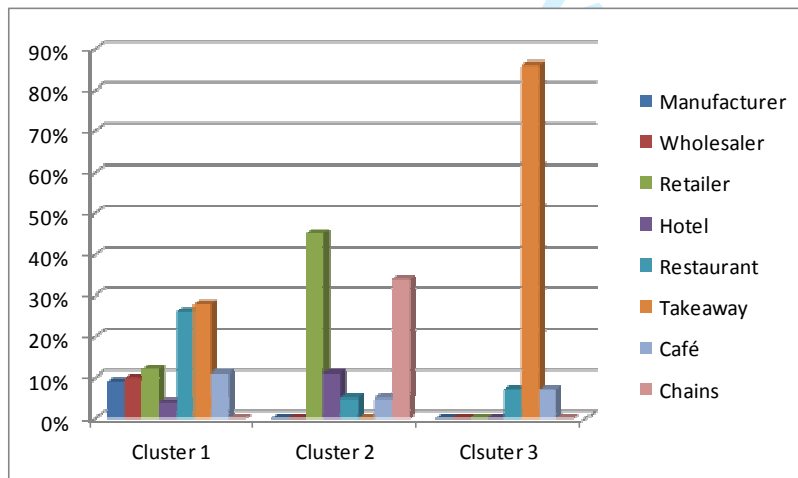


Figure 2 - Distribution of business type groups within each cluster

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For Peer Review

**Response to reviewer 1:**

Dear reviewer,

The second review provided has identified some more useful input into our paper and provided insightful comment. As a consequence, we have made required changes to the paper. The following sections refer to each specific review point in turn, explaining where and how we have amended the paper. We think the paper is now a much stronger piece and we hope it deals with the reviewer's comments in a satisfactory manner at this point.

**1. Explain figure 1 more. There is no analysis of this figure**

The description and explanation of figure 1 has been added to the second paragraph of the page 5 from line 6 to 12.

**2. At the start of your methodology section please explain what you intend to do in the work. It seems to dive in to the section without an explanation as to what the objective is**

Some explanation about the methodology and what we intended to do has been added to the first paragraph of page 11 (under methodology section) from line 1 to 4.

**3. Page 18 - explain why the issue of obesity is in here since it further supports the issue that this paper is not really designed for inclusion in JMTM. If the focus of the paper is sustainability then there is a need to focus on this issue. The issue of obesity, whilst a small one, detracts from the issue of sustainability and throws the paper towards a food / social type paper.**

The issue of "Obesity" has now been taken off the paper. Authors agree with the reviewer that this issue may hinder the focus of the paper which is an operational approach towards the sustainability in food supply chain. Although, authors appreciate the reviewer's comment, but the issue of Obesity has been added there as one of the key current social sustainability (corporate social responsibility) issues in food supply chain, which could be addressed in more food safety related articles rather than sustainability and supply chain focused articles.

**2. Relationship to Literature and Previous Work:** Does the paper demonstrate an adequate understanding of the relevant literature and previous work in the field? Does it cite appropriate and up to date literature sources? Is any significant work ignored?: The authors have inserted additional JMTM references but these are primarily based around sustainability.

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5 **It would be good to provide more food supply chain references from JMTM since this is**  
6 **a focus of the paper. In so doing it would give greater credence to the appropriateness of**  
7 **the paper to this journal.**  
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9  
10 Authors have taken the reviewer's comments on board and have added more articles related  
11 to food supply chain from JMTM as below:  
12

13 The article from Lu and Swatman, which was a food supply chain – related paper had already  
14 been cited once in original version, but has been cited again in the same paragraph.  
15

16 \*1- Kumar et al (2011) - Lines 8-11 of the third paragraph in page 7  
17

18 \*2- Nabhani and Shokri (2009) – First three lines of first paragraph in page 5  
19

20 3- Lu and Swatman (2009) – Last three lines of the first paragraph in page 9  
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22 \*In fact two more food supply chain – focused articles have been cited from JMTM, which  
23 were found relevant to this paper.  
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26 Therefore, authors managed to find and cite both food supply chain and food sustainability –  
27 focused papers from JMTM.  
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### 31 **Response to reviewer 2:** 32

33 The authors appreciate the reviewer's comments for rejecting this paper due to lack of  
34 relevance to the JMTM. However, authors are delighted that editor has given them chance to  
35 revise the paper based on both reviewers' comments. Authors have also demonstrated some  
36 similar papers about food sustainability and food supply chain that were published in JMTM  
37 before (please, see feedback to first reviewer as above). The comment of the second reviewer  
38 has identified a few points. As a consequence, authors have made required changes and  
39 provided feedback to the reviewer. The following sections refer to each specific review point  
40 in turn, explaining where and how we have amended the paper. We think the paper is now a  
41 much stronger piece and we hope it deals with the reviewer's comments in a satisfactory  
42 manner at this point.  
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49 **<b>3. Methodology and Approach: </b>Is the paper's argument built on an**  
50 **appropriate base of theory, concepts, or other ideas? Has the research or equivalent**  
51 **intellectual work on which the paper is based been well designed? Are the methods**  
52 **employed appropriate?: Methodology is somewhat okay, however the validity of the**  
53 **finding is still questionable, since the survey instrument is not fully described or fully**  
54 **disclosed.**  
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2  
3 Authors have taken this comment on board and have amended first paragraph of  
4 methodology (page 11) to add more visibility in methodology section for better  
5 understanding and more validity. However, although authors appreciate the points made by  
6 the reviewer about lack of enough description for survey instrument, but they believe that  
7 second paragraph of page 11, first paragraph of page 12, table 1 and also Appendix A will  
8 now have plenty information about rationale behind selecting the survey strategy, data  
9 collection methods, source of data, structure of the questionnaire and some more details about  
10 constructs and elements of the questionnaire. Authors appreciate the understanding that  
11 limited wordings for the publication would not let them to provide lots of details in  
12 methodology including the survey.  
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19 **<b>6. Quality of Communication: </b> Does the paper clearly express its case,  
20 measured against the technical language of the field and the expected knowledge of the  
21 journal's readership? Has attention been paid to the clarity of expression and  
22 readability, such as sentence structure, jargon use, acronyms, etc. Is the length of the  
23 paper appropriate for the work it presents?: Still this manuscript has a few issues- fail  
24 to define the abbreviations on the first instance and using the phrasal verbs in academic  
25 writing et cetera.  
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27**

28 Authors have reviewed the paper and it appears that there is no abbreviation without  
29 description in first instance based on best of their knowledge in the new version. The paper  
30 has also been reviewed once more to ensure about avoiding using phrasal verbs. However,  
31 authors acknowledge that there might be some missed out words within the text in relation to  
32 phrasal verbs and would appreciate the reviewer's understanding for possible help to give any  
33 example for further clarification.  
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