

Applications of Green Supply Chain
Management in the U.K. Restaurant Industry

1. Introduction

Green Supply Chain Management (GSCM), which involves incorporating ecological considerations into supply chain management has gained prominence in recent times. Large scale resource depletion, environmental degradation, and climate change has triggered this, with companies across a range of sectors including manufacturing, construction and services now actively engaged in embedding environmental aspects into their design, procurement, manufacturing, packaging and logistics activities (Zhu et al., 2012). While earlier, the focus was primarily on the economic dimension, environmental behaviour/credentials have also become necessary for success now (Ahi and Searcy, 2013). Appropriate green products and processes are consequently being developed, with organisations seeking to exploit the marketing potential of 'green' by targeting environmentally conscious consumers (Schubert et al., 2010).

A key sector from a GSCM perspective is restaurants. Restaurants consume an enormous amount of energy (from the heating, ventilation, air conditioning, refrigeration and lighting that is involved) and water (for washing/cleaning), and also generate significant amounts of waste of plastic, aluminium, paper and glass packaging/tableware, leftover food/ingredients and used cooking oil. This, coupled with the fact that a large number of restaurants are in operation make direct environmental impact from this sector, significant. Restaurants also have an indirect environmental impact which is from upstream via suppliers/farm lands, manufacturers, pesticide residues and animal wastes. Applying GSCM to restaurants therefore provides several benefits including conservation of resources, effective waste management (of large quantities of waste) and sustainable/environmentally friendly food (Namkung and Jang, 2013; Sarkis and Dou, 2017); the benefits are not just in financial terms such as through cost savings and premium pricing (on account of enhanced (environmental) image and development of new environmentally friendly products and services), but also environmental (Achillas, 2018).

Appreciating the role and importance of GSCM, several restaurants across both the developed and developing world have implemented green practices. Some related research has also been done: some researchers have looked at green practices (e.g. Wang et al., 2013 in the Taiwanese restaurant context), while others have looked at both the practices and the drivers and barriers to those practices (e.g. Kasim, 2009 in the Malaysian restaurant context). However, researchers still lament the lack of comprehensive knowledge of this subject

(Kasim and Ismail, 2012; Jackson, 2010). Another lacuna of previous research is that it is mostly set in Asia with only a few studies based out of the Western World.

UK has a large and thriving restaurant sector where small and medium (SM) restaurants dominate, and whose environmental impact therefore is significant: SM restaurants are responsible for 60 per cent of the carbon dioxide emissions and 40 per cent of the commercial waste in the UK (Revell and Blackburn, 2007). However, the nature and the extent to which they implement green practices as also the associated motivations and hindrances are unclear from previous research: only one study (by Revell and Blackburn, 2007) has been done, and which found the primary focus of SM restaurants in the UK to be on quality of food and service rather than on environmental aspects. This gap in knowledge (about green practices implementation as well as drivers and barriers affecting it for small and medium scale restaurants in the UK) therefore needs to be filled up, and which constitutes the focus of our work. Findings from it will be useful to practitioners as they will learn about the variety of different green practices being implemented in restaurants. Similarly, from the policymakers perspective, learnings about drivers and barriers would help them in developing policies/strategies that amplified the role of key drivers and dampened those of key barriers to enable greater green practices implementation.

The rest of the paper is structured as follows. In Section 2, previous literature on GSCM in the restaurant sector including that on green practices, drivers and barriers is discussed, while the research methodology used for the investigation is covered in Section 3. The findings are discussed and analysed in Section 4. Finally, we conclude in Section 5, where the research contribution, limitations and suggestions for further work are covered.

2. Literature Review

2.1 Literature on GSCM in the Restaurant industry

Green Supply Chain Management (GSCM) has emerged as a systematic and integrated approach to tackling environmental concerns across supply chains (Malviya and Kant, 2015). It refers to the application of environmental management principles to the entire set of activities across the whole customer order cycle, including design, procurement, manufacturing and assembly, packaging, logistics, and distribution (Handfield et al., 1997). Seuring (2004) defines GSCM as the managerial integration of material and information flow throughout the supply chain to satisfy the demand of customers for green products and

services produced by green processes. The main goal of GSCM is to ensure efficient, effective and extensive implementation of green practices (or activities/initiatives to reduce environmental footprint) across the different supply chain stages (Perotti et al., 2012) by managing the ‘antecedents,’ i.e. drivers and barriers affecting that implementation (Luthra et al., 2015). Green practices are typically referred to in terms of the supply chain stages where they belong as green design, green procurement, green manufacturing, green packaging and green logistics. These been adapted for restaurants and framed in terms of (their) upstream and downstream activities as green design, green purchasing, green menu design and green cooking (Wang et al., 2013).

2.1.1 Green Design

Green design in the restaurant’s case means their being designed (in a physical sense) to be environmentally sustainable i.e. where less material, energy and water are consumed (Lewis et al., 2005). This requires eco-friendly materials to be used and environmental aspects to be considered during the (restaurant’s) design and construction phases (Alcorn, 2009). As per Bartlett and Howard (2000), green-designed restaurants have natural lighting and ventilation, occupant sensitive controls and stable temperatures, while Jernigan (2012) suggests such restaurants to reuse existing building materials so that the requirement of virgin materials is lower; also to use low volatile organic compound (VOC) sealants, adhesives, paints and carpets. From a performance perspective, Alcorn (2009) note that green-designed restaurants lower resource depletion and show better environmental and economic performance.

2.1.2 Green Purchasing

This refers to restaurants following a sustainable protocol in their choice of supplies and suppliers. For instance, as per the guide on sustainable purchasing for the UK public sector, five principles need to be considered: using local supplies over imports, promoting organic or sustainable purchases, restricting purchases that damage the environment, utilising centralised purchasing systems and inspecting purchases to ensure that their processing has been eco-friendly (Rimington et al., 2006). With regards to local sourcing, it not only helps support the local community/economy but also helps lower vehicle emissions. For it to work effectively though, restaurants need to offer seasonal dishes as per the local produce.

While the criticality of purchasing to restaurants meeting their sustainability objectives is well recognized (Zsidisin and Siferd, 2001), the fact that many of them focus on price, quality and service in purchases rather than eco-friendliness is also noted (Bergstorm et al.,

2005). Researchers (e.g. Chiu and Hsieh, 2016) have suggested supplier development programs on environmental aspects as well as collaboration with suppliers on green-related investments and related risk sharing (e.g. Large and Thomsen, 2011) as the way forward.

2.1.3 Green menu design

Green menu design is offering food on the menu that is processed considering environmental aspects. For example, offering organic dishes that are cultivated using non-toxic fertilizers and pesticides, and without genetic engineering. Also, menus that are designed considering seasonal produce from local supplies (with lower emissions from transportation) (Energy Star, 2007). It can also mean taking away meats as an option as they are known to be more environmentally damaging than the vegetarian alternatives. Offering fish/seafood that is sustainably harvested and free from hazardous pollutants can also be an option (Jeong and Jang, 2010). Designing a green menu though, is not easy as the restaurant has to ensure that the taste, nutrition and look/feel are not compromised in the process.

Given that many restaurants tend to serve specialist ethnic cuisines (e.g. French/Indian/Mexican), an important question is whether some cuisines are more green than others. We came across no study that has done such a comparison. One reason for this could be the challenge of doing so, given that a large number of variables with differential green impacts are involved. For example, even though anecdotally, one may say that Indian cuisine is more green given the greater use of vegetables, the fact that there is more frying and more spices are used may make it less green overall.

2.1.4 Green cooking

Cooking and related activities consume a significant amount of energy such as on food preparation, ventilation, cleaning/dishwashing and refrigeration; improving the energy efficiency of these activities/equipment, referred to as green cooking by some authors, is therefore not only useful in improving environmental performance, but also helps lower energy costs (Energy Star, 2007). Some improvement activities in this regard include cooking with fully loaded oven, or keeping the lids closed on kettles and braising pans during extended use; also, using demand control ventilation for kitchen makeup air units and exhaust hoods and ensuring that the size of hoods is appropriate (ASHRAE, 2003). With regards to used cooking oil, reprocessing it into biodiesel, an environmentally friendly fuel for trucking, heating etc.; in case of in-house reprocessing, using biodiesel to generate (environmentally friendly) electricity for use.

Some authors (e.g. Tran et al., 2016) consider green cooking to be analogous to green manufacturing and take a broader view; according to them, not just energy efficiency, but efficiency in the use of other resources (used in cooking) and related waste management as well as reducing carbon emissions, all constitute a part of green cooking. With regards to efficiency of resources, Lion et al. (2018) consider those of cooking equipment and chefs/employees in the restaurant; hygiene in the restaurant kitchen, and taste and presentation style of cooked food need to be considered when assessing efficiency. On food waste and its management, Tian, et al. (2017) consider the waste incurred in cooking as well as that which is leftover because of the serving size being excessive. Finally, monitoring/managing the gases used in cooking to reduce their wastage/excessive-use, and thereby ensuring healthier kitchen environment, lower carbon emissions and lower costs (Govindan, et al.. 2018).

2.1.5 Green transport/logistics

Green transport refers to minimising consumption of fossil fuels and associated carbon emissions during transportation of inputs/products (which in the UK's case is predominantly via trucks). Key green transportation practices for restaurants include monitoring and collaborating with suppliers to ensure (their) use of fuel efficient vehicles, and alternative (more environmentally friendly) fuels for delivery (Ferne and Sparks, 2014); also sourcing locally to reduce transport distances. On the outbound side for restaurants offering food delivery services to customers, ensuring use of fuel efficient vehicles and bulk deliveries to minimise number of trips. Some authors (e.g. Chan, et al., 2016) consider use of recyclable as well as edible packaging to reduce waste in distribution under green transportation; transport of food waste (to ensure its effective management) is also considered.

2.1.6 Green Packaging

With more and more restaurants offering takeout/and or delivery options for meals which requires packaging (e.g. food containers, cutlery and utensils), packaging's environmental impact has been going up. This is particularly so because of the large availability (and use) of cheap but environmentally unfriendly disposable packaging options. Green packaging's focus is to ensure that the packaging is such that it uses less material (e.g. through better design, alternative material choice), uses more recycled material, avoids hazardous material and can be biodegraded/composted. Many large fast food restaurants such as McDonald's (Bright, 2018) and KFC (Cottom, 2019) are aggressively taking green-packaging-related initiatives

spurred by consumer and government pressure. However, this picture is unclear for small and medium restaurants where little work has been done. For example, Wang et al (2013) discuss green packaging (along with other green practices); however, the restaurants covered in the investigation are mostly large ones.

Overall, there appears to be some understanding of the different green practices used in restaurants. However a comprehensive understanding is missing, and which has also been noted by some authors (e.g. Kasim and Ismail, 2012; Wang et al, 2013). One reason for this is that researchers have mostly focussed on specific green practices: for example, while some have focussed on the downstream segment i.e. those in relation to customers (e.g. Namkung and Jang, 2013), others (e.g. Chiu and Hsieh, 2016) have focussed upstream. A similar gap in knowledge exists from a country perspective: most GSCM studies on restaurants have been Asia focussed rather than the Western world. The situation is particularly acute for UK where only one study (by Revell and Blackburn, 2007) has been done; this study is also more than a decade old, and which noted restaurants to be indifferent about green practices. As such a comprehensive, present day understanding of green practices covering all restaurant operation stages is needed for the UK context.

2.2 Drivers and Barriers of GSCM in the Restaurant Industry

The generic GSCM literature suggests organisations being motivated to implement green practices on account of government regulatory pressure and pressure from consumers, competitors, non-governmental organisations and other stakeholders (Balasubramaniam and Shukla, 2017); they could also be influenced by internal drivers such as business benefits (from implementation) as well as the environmental commitment of business owners/management. On the other hand, the key barriers or impediments to GSCM noted in the generic literature include shortage of green professionals and suppliers, lack of knowledge/awareness of green aspects and high cost of implementation.

Studies on greening of the restaurant sector have highlighted similar drivers and barriers as in the other sectors. For instance, Kasim and Ismail (2012) identified government regulations, competitive advantage and stakeholder demands as the green drivers for restaurants; high cost and lack of information of green practices were highlighted as the green barriers. Chou et al. (2012) and Wang et al (2013) highlight the role of Green Restaurant Association (in America) and Japan Environment Association in encouraging restaurants to go green. Environmental risk reduction and meeting legal requirements were highlighted as the green

drivers by Bonilla- Priego et al (2011), while the same in the cases of Kasim (2009) and Tsai et al. (2010) were noted to be consumer and stakeholder demand. With regards to barriers or challenges/impediments to GSCM implementation, lack of awareness of green practices, lack of knowledge of customer attitudes to green practices and the fear of increased costs have been suggested (Schubert et al., 2010). Namkung and Jang (2013) emphasise lack of clarity on customers perceptions (on green) to be a key barrier.

In summary, there is a reasonable generic understanding of green drivers and barriers for restaurants, although some authors (e.g. Jackson, 2010), have highlighted the need for more clarity. The knowledge of UK restaurants from this perspective though, is quite limited. Given the contextual nature of drivers and barriers (for e.g. government green regulations, stakeholder green-related demands and customers green perceptions could differ across locations), transplanting them across geographies is difficult. A separate, comprehensive understanding of green drivers and barriers for the UK restaurants case is therefore needed.

3. Methodology

An explorative approach based on qualitative research methodology was considered. Exploratory research is appropriate where there is a lack of published literature/knowledge (Wilson, 2014); such an approach also gives better insights into a particular topic and helps to set future research directions. Twenty restaurants in UK (who agreed to participate out of the thirty-two contacted) were considered for the investigation. The potential restaurants were first researched to ensure their environmental activeness before being contacted (via telephone in most cases) to set up interview meetings. To avoid cuisine-related biases, care was taken to ensure that a wide variety of different cuisines are considered when making the restaurant choices.

Face-to-face semi-structured interviews were conducted with senior staff at the restaurants (restaurant owners (5 cases), general managers (11 cases) and operations managers (4 cases) to gather information. Semi-structured interviews were considered because they provide flexibility to explore new concepts and allow comparison of responses while avoiding information overload (Weller and Romney, 1988). The interview questions were developed on the basis of the review of the literature on GSCM in restaurants, and were of the ‘what’, ‘how’ and ‘why’ types aimed at understanding green practices, drivers and barriers; the interview protocol used is given in Appendix 1. Interviews were tape recorded and transcribed, and where this was not possible, detailed notes were taken and then directly

transcribed. Secondary data such as annual and environmental reports, official website blogs and newsletters were used to improve understanding.

The interview transcripts were coded using various approaches discussed in the literature and from terminologies used by the interviewees. Quotes which best illustrated a particular situation were chosen to highlight key points. To keep the restaurants anonymous, alphabetical codes (A, B, C.....T) were assigned to individual restaurants. The data drawn from interview transcripts and supporting literature in the case of green practices was further classified into the following sub-categories i.e. green design, green menu design, green purchasing and packaging, green cooking, green transportation, green drivers and green barriers.

4. Findings and Discussion

The Table 1 below gives the overall extent of implementation of green practices (in terms of high medium and low), the nature of green practices implemented, and the green drivers and barriers (as perceived) for each of the twenty restaurants, including the type of cuisine they serve.

Examining Table 1, it is clear that a wide variety of cuisines are covered in the restaurant choices: there is world cuisine, pan Asian cuisine, Indian cuisine and Mexican cuisine (1 restaurant each); also, European cuisine (3 restaurants), Japanese cuisine (3 restaurants), British cuisine (4 restaurants) and generic vegan/vegetarian cuisine (4 restaurants). Such a (wide) selection ensures any biases in GSCM findings with regards to cuisine types is avoided.

Next, looking at the pattern of green practices implementation, we find that only a few restaurants (5 out of 20 or 25%) have implemented these practices across all/most operational areas (spanning green design to green transportation), and covering most environmental aspects (from conserving resources (incl. energy), to maximizing use of recyclable/sustainable/healthful inputs, to minimizing carbon emissions and waste). These restaurants (refer restaurants A, C, M, N and S in the table) are consequently rated as high in terms of green practices implementation. At the other extreme, there are other restaurants (7 out of 20) that have covered only a few environmental aspects in a few operational areas: they have therefore been rated as low. The remaining 8 restaurants with moderate levels of

Table 1: Restaurant-wise summarized findings on green practices, green drivers and barriers

* Refers to extent of green practices implementation in high, medium, low terms

Restaurant (cuisine) and Impl. Extent*	Green design	Green menu design	Green purchasing and green packaging	Green cooking	Green transportation	Green drivers	Green barriers
A (Wholly organic pub) <i>High</i>	Only second hand furniture used	All dishes are organic	Sourcing from family-run organic farm; Separate sustainable fish sourcing policy	Bread & pickles made in-house; Food waste used to create electricity via anaerobic digester	-	Organisation commitment, local community, government regulations	Cost of inputs, supplier commitment
B (Casual Indian dining) <i>Low</i>	-	-	Quality preferred vis-à-vis eco-friendliness	Normal waste management; no special attention to carbon emissions	Fuel efficient mobikes used for deliveries	Government regulations	Cost of inputs, lack of knowledge
C (Modern European eatery) <i>High</i>	Hydroelectric (renewable) energy provider used	No bottled mineral water; No beef and chicken dishes; Quality rather than organic label focus	Ethical suppliers & suppliers with green credentials used; local sourcing; sustainable fish supplies used	Energy efficient induction cookers used; ozone rather than chemicals used in dishwasher; energy & waste reduction focus	-	Local community, customer demands	Cost of inputs, supplier commitment
D (European breakfast and lunch) <i>Medium</i>	Energy efficient lighting	No bottled mineral water; most dishes organic and all meat free range	Biodegradable packaging used; focus on suppliers that can supply organic and free range produce	Waste is recycled	-	Organisation commitment, Competitive advantage	Cost of inputs, lack of knowledge
E (Japanese sushi chain) <i>Medium</i>	-	Environmentally unfriendly fishes like Bluefin tuna and eel not on menu	Biodegradable packaging, sustainable bamboo chopsticks; key vegetable purchases from UK	Leftover oil recycled into biodiesel	-	Government regulations, Competitive advantage	Cost of inputs, supplier commitment
F (Seasonal British dishes) <i>Low</i>	Small onsite farm shop for sustainable eating	-	Select sustainable farms used for meat and fish sourcing	Bread made in-house	Livestock bred & slaughtered in one farm to minimize transportation	Local community, competitive advantage	Cost of inputs, supplier commitment
G (Mostly vegetarian dishes) <i>Medium</i>	Concern about energy savings	Eco-friendly menu; predominantly vegetarian options	Selective organic vegetables and free range meat suppliers	State of the art energy monitor in kitchen; emphasis on sustainable waste management	-	Organisation commitment, local community, regulations	Cost of inputs, lack of knowledge

Restaurant (cuisine) and Impl. Extent*	Green design	Green menu design	Green purchasing and green packaging	Green cooking	Green transportation	Green drivers	Green barriers
H (Eatery with world flavours) <i>Low</i>	-	-	Sourcing from mostly local suppliers	Pickles, jams & chutneys made in house; only seasonal ingredients used (to minimize waste)	Hand or bicycle deliveries as suppliers nearby	Organisation commitment, reduce cost, competitive advantage	Cost of inputs
I (Traditional British pub food) <i>Medium</i>	Actively raise awareness of deforestation, sustainability	No bottled mineral water (to minimize waste)	Sourcing from sustainable fish suppliers only; own beehive on roof top for honey supply	Recycle all waste	-	Government regulations, local community	Cost of inputs
J (Pan Asian dishes) <i>Low</i>	Energy efficient lighting	-	Focus on suppliers that can provide more variety of products	-	Fuel efficiency motorcycles used for deliveries	Government regulations	Cost of inputs, lack of knowledge
K (Vegan dishes) <i>Medium</i>	Reclaimed wood & coffee bean sack furniture	Only vegan and organic recipes; focus on a healthy optimum diet	Only sustainable ingredients purchased	No cleaning products used, use of low-energy, low-waste cooking methods preferred	-	Stakeholders, reduce cost, local community	Cost of inputs
L (Vegetarian dishes) <i>Low</i>	-	Only organic recipes	Focus on sourcing local produce as much as possible	-	-	Stakeholders, customer demand	Cost of inputs
M (Vegetarian dishes) <i>High</i>	Maximum natural lighting; max usage of recycled & organic material	Purified tap water (to reduce plastic bottle usage); organic recipes; customers able to specify dish sizes (so less waste)	Local sourcing; suppliers providing organic produce preferred; used packages returned to suppliers for reuse	All waste recycled; local youths trained to become eco-friendly chefs	Pick up and deliveries in biodiesel car	Stakeholders, local community, government regulations	Cost of inputs, lack of knowledge
N (Mexican mini chain) <i>High</i>	Carbon neutral rating; Building made more energy efficient; motion sensor lights, recycled material used	-	Chillies in sauces and chutneys grown in select UK farms (to minimise imports); Sustainable fish sourcing	Heat from fridges and freezers reused to heat hot water (to minimise burning additional gas). Used oil taken away and processed into biofuel	Suppliers manage the deliveries with fuel efficient vehicles	Organisation commitment, local community, government regulations	Cost of inputs

Restaurant (cuisine) and Impl. Extent*	Green design	Green menu design	Green purchasing and green packaging	Green cooking	Green transportation	Green drivers	Green barriers
O (Japanese sushi chain) <i>Low</i>	Front side covered with glass to maximize natural lighting	-	-	-	-	Government regulations	Cost of inputs
P (British steak house) <i>Low</i>	-	Free range meat and vegetarian option offered	All eggs, dairy and meat are free range and from sustainable British farms	-	Suppliers manage deliveries with fuel efficient vehicles	Stakeholder, local community	Cost of inputs, lack of knowledge
Q (Bar cum restaurant serving European dishes) <i>Medium</i>	Cross ventilation system and LED lights; rain water harvested for hydrating herb garden	Dishes as per seasonality	Quality first but within that preference for local ingredients, beers, spirits, beef and coffee. Some inconsistency in local supply (a problem)	Eco-friendly products used for cleaning and washing; all waste recycled; focus on efficiency	-	Stakeholders, reduce cost, local community, customers	Cost of inputs, supplier commitment
R (Simple fish dishes) <i>Medium</i>	-	Mostly organic fish recipes	Sustainable fish and biodegradable products purchased; 90% of purchases local	Root-to-fruit (waste minimising) cooking strategy used; Emphasis on recycling all waste	Suppliers manage deliveries with fuel efficient vehicles	Stakeholders, reduce cost, competitive advantage	Cost of inputs
S (Staff canteen for breakfast, lunch) <i>High</i>	Solar energy used to power the whole facility	Dynamic menu as per vegetable supplies from suppliers (focus on what is freshly available)	Significant efforts to develop network of local, sustainable suppliers; dairy and meat from one sustainable farm	Nose-to-tail cooking strategy used for meat (to minimize waste and for economic pricing)	-	Stakeholder, government regulations, competitive advantage	Cost of inputs, supplier commitment
T (Japanese restaurant) <i>Medium</i>	Unable to have sustainable design due to building constraints (though keen)	-	Farmed salmon & yellow (not blue) fin tuna sourced as more sustainable; meat sourced locally; local vegetables more expensive; recyclable containers, bags	Focuses on recycling of all waste	Supplier manage the deliveries with fuel efficient vehicles	Government regulations	Cost of inputs, supplier commitment

implementation in terms of operational areas and environmental aspects covered are rated as medium. Many of these low and medium rated restaurants though, did highlight the need to implement environmental practices in the missing areas so as to have a more comprehensive implementation. This is captured in the words of one Restaurant Manager as: *“When talking about sustainability, it’s not just about the final dish. It’s the whole back story”*.

Analysing the green practice implementation ratings vis-à-vis cuisine type for restaurants in Table 1, no pattern can be seen. For example, the high rated restaurants are seen to serve different kinds of cuisines. Similarly, restaurants serving the same cuisine are not all rated high or low but have a mix of ratings; for example, two Japanese restaurants are rated medium and one low; similarly, among the four vegan/vegetarian restaurants, one is rated high, two medium and one low. What this shows is that we cannot associate a particular cuisine type with a particular level of green practices implementation.

With regards to green practices implementation in different operational areas, we see green purchasing and green cooking being the focus for most restaurants. This is not surprising for green cooking given that it provides not just environmental but also significant economic benefits. On the other hand green purchasing is generally more expensive; its extensive implementation therefore comes as a surprise (although, as we can see from the table, the implementation is superficial in many cases). Finally, green transportation can be seen to be considered by only a few restaurants. This is logical given that transportation, and especially on the inbound side, is generally managed by the supplier, where small and medium restaurants of the kind considered have limited influence/bargaining power.

We now look at the findings (with reference to Table 1) on green practices implementation within each operational area separately.

4.1 Findings on green practices

4.1.1 Green design

Most restaurants were found to have not considered infrastructural alterations to convert their facility into a green one. Uncertainty about returns from related investments was highlighted as a factor, with the (large) investments itself being a deterrent in some cases. However, many restaurants have considered energy-related options such as natural and low energy (LED) lighting, and which was because they provided economic benefits also. Some were found to have gone even further and using renewable energy (such as solar and hydroelectric)

sources/suppliers; natural ventilation for energy savings is also being used selectively. With regards to other resources and their conservation, one restaurant was found to have considered rainwater harvesting (for water), with a couple others emphasising wood conservation through use of second hand/recycled-material furniture. Overall, we find a lack of uniformity in the nature of green design practices implemented. Also, an important factor in green designing, as pointed out by some respondents, was that the attractiveness/ambience (of the restaurant) should not get compromised in the process.

4.1.2 Green menu design

Green menus (although to varying degrees) was observed in two-thirds of the restaurants investigated. Many of these restaurants were found to offer organic dishes, and predominantly vegetarian ones. This was partly in response to (health conscious) customers' demands and partly to environmental concerns on the part of the restaurants. The fact that relevant (environmentally friendly) organic and free-range ingredients could be locally sourced to support this was also a factor. In some cases, the vegetarian menu choice was found to be driven by cost factors also (with chicken and beef options being more expensive to cook). The strong vegetarian focus of some restaurants can be gauged by the response of one Restaurant manager, as per whom: *"We always look at vegetables, not as a garnish, but as the core of a dish"*.

Another feature observed for many restaurants, and entirely for environmental reasons, was offering tap water rather than the bottled one (so that associated plastic/glass waste could be reduced). Some other waste reduction options, that were observed for a few restaurants, include offering choice in terms of dish size, and having a dynamic menu as per what was freshly available.

4.1.3 Green purchasing and green packaging

Almost all the investigated restaurants were found to follow environmental principles in purchasing. Most were found to source organic and free range vegetables, eggs, meat and fish, though in some cases this was partly driven by customer demands also. In the meat and fish's case this (sustainable purchasing) was also indirectly influenced by government regulations. The preference of most restaurants was also found to be for local sourcing as it yielded both environmental benefits (lesser emissions) and economic ones (lower transport costs). However, this is not at the cost of quality, taste or other commercial considerations.

With regards to packaging and customer (carry home) containers and boxes, purchases of only the biodegradable and recyclable kinds are allowed by some restaurants. Finally, some of the large restaurants were found to be vertically integrated in select areas: for example, growing some of their vegetable requirements themselves or maintaining their own bee-hives for honey; they also spend time and effort in developing and managing supplier networks.

4.1.4 Green cooking

All the different environmental aspects such as minimising use of resources inc. energy, reducing waste and maximizing waste recycling, and reducing use of hazardous substances were found to be considered by the restaurants in their (green) cooking practices, although to varying degrees. Customer and commercial considerations (besides environmental ones) were found to be important for implementing some of the practices.

Many restaurants were found to be making/cooking certain products such as breads, jams, pickles and chutneys in-house rather than sourcing them from outside. The reasoning given was that this not only provided better quality (fresher, tastier and as per customer requirements) and cost efficiency, but also made the products more environmentally friendly as less transportation and storage is involved. Energy saving cooking, both through choice of related equipment as well as their use, was also found to be popular among restaurants (due to economic as well as environmental reasons). Energy efficient induction cooking hobs (which only use power when the pot sits on the hob), energy monitors, reusing heat from fridge/freezers to heat water are some of the approaches being used. On waste, both waste reduction and waste recycling was observed in many restaurants, and which is driven partly by environmental commitment and partly by waste/environmental regulations. While root-to-fruit and nose-to-tail cooking strategies are being used by some (to ensure the entire plant/vegetable/animal/fish is used), some others are using seasonal ingredients to minimize waste. On waste recycling, used oil is recycled to biofuel (via third party), with most organisations focused on recycling other wastes also. Finally, some of the restaurants were found to use more eco-friendly chemicals, or avoid chemicals altogether (by using ozone) for cleaning. Here again, it is difficult to say whether the motives are environmental or partly food hygiene/health/safety (and related regulations) related.

4.1.5 Green transportation

Only a few restaurants were found to be active in environmentally sustainable transportation of goods. This is not surprising given that on the more significant inbound transportation part, restaurants have little say/control: this is managed entirely by the suppliers (of inputs). Suppliers generally use large trucks and bulk deliveries with consequential low environmental impact; restaurants also therefore do not see any reason to be involved. On the outbound transportation side though, when delivering to customer locations, some restaurants use fuel efficient vehicles/motorcycles; the motivations are both economic as well as environmental.

4.2 Findings on green drivers and barriers

4.2.1 Green drivers

The green drivers were found to be mostly in line with those suggested by previous researchers for restaurants. Government regulations, especially those on (greater) recycling and waste management, were identified as the principal driver. As appropriately captured by one Restaurant Operations Manager: *“The only way it is going to impact is if the government steps in”*. There is indirect influence from other regulations too, such as the health, safety and sanitation/hygiene ones involving restaurants.

Pressure from local community was identified as the next important driver, where local community refers to the local council (or government machinery) and local businesses. Local businesses operate in close proximity with one another; they therefore exert pressure on each other to project an environmentally friendly image so that the community as a whole can acquire such an image. Local council also exerts pressure via different environmental initiatives at the local level.

Many restaurants highlighted gaining competitive advantage as an important green driver; their focus is on repositioning and acquiring a green image by offering organic vegan/vegetarian options and attracting more customers, especially the increasing number of environment/health focussed ones. Customers’ attractiveness towards green restaurants and their driving green practices was in fact observed for some of the restaurants.

Stakeholder pressure was identified as a green driver by a moderate number of restaurants, specifically the ones which are part of a large chain. This refers to the restaurant’s parent company or stakeholder (generally with stringent environmental requirements and systems) pressuring/mandating it to follow those requirements.

A moderate number of restaurants also highlighted organization commitment (for greening) and reducing costs (through greening) as drivers. The role of senior management's green-related knowledge, attitude and commitment on the extent and nature of green practices implementation is well recognized across sectors incl. for restaurants; therefore this finding is not surprising. Similarly, many green initiatives such as those which lead to reduction of resource and energy requirements also consequently lower the cost of operations; hence it makes sense for cost reduction to be considered as a motivation/driver for those initiatives.

Most of the above drivers can be explained from the perspective of the Institutional theory, which examines how external pressures influence organisational actions (Hirsch, 1975). According to this theory, firms are under constant coercive, normative and mimetic pressure to adapt to and be consistent with their external institutional environment (in this case implementing green practices) (DiMaggio and Powell, 1983). Exerted by those in power, coercive pressures are powerful institutional forces that influence organisations to change their behaviour, while mimetic pressures are faced by firms to imitate/mimic the actions of their successful competitors in the industry in order to follow their success or to avoid losing their competitive advantages. Normative pressure arises from end consumers/owners to ensure the implementation of what constitutes appropriate and legitimate behaviour.

Here, we can see coercive pressure coming from government regulations, non-compliance to which could mean penalties/termination of business permits; in the case of restaurants which are part of a large chain, the coercive pressure also comes from their parent companies with associated infringement penalties. There is some element of mimetic pressure to go green as per nearby competitors, as also a lot of normative pressure from health/environmental conscious customers. Finally, the environment commitment of restaurants can also be viewed from a institutional theoretic perspective (Scott, 2001), namely, mimetic cultural cognitive isomorphism (socio-cultural responsibility), a rational desire to embrace environmental practices that are consistent with the obligations and values of society where they operate (Hsu et al., 2013).

4.2.2 Green barriers

The green barriers highlighted by the restaurants are also largely in line with the literature. Green inputs (ingredients and equipment) are more expensive than normal ones; cost of these inputs was therefore identified as a barrier by all the restaurants. As per the respondents, the unpredictable nature of the restaurant business and changing customer habits makes it

difficult to be confident about recovering these (higher) green input costs/investments. In the words of one restaurant General Manager: *“It is not easy being green”*.

The second important barrier, and which was identified by a large proportion of restaurants, is the lack of knowledge (of GSCM). Application of GSCM in restaurants has started not that long ago, and therefore, it was unsurprising to find many restaurants unaware of the range of green practices they could implement, the significance of those practices and their potential benefits.

Finally, many restaurants were found to be struggling to source eco-friendly and organic products locally. The difficulty was sometimes on the quality front and sometimes the requisite quantity was not available. This lack of consistent supply or supplier commitment (to provide green products) was therefore identified as the third key barrier.

Theoretically, the findings on barriers can be explained from the perspective of the resource based view (RBV) (Barney, 1991), which considers firms to be a bundle of resources and capabilities (both tangible, such as buildings and money and intangible, such as knowledge) that need to be distinctive if they are to be competitive. On the other hand, a lack of resources and knowledge could mean being less/non-competitive. The restaurants considered here are all small and medium restaurants with limited resources, which constrains their ability to invest in expensive green equipment, in training themselves and upgrading their green knowledge, in hiring and training green chefs, and in sourcing eco-friendly/organic products from distant suppliers (if not available locally). This in turn is reducing their competitiveness on the critical (and emerging) green dimension, and leading to their replacement with more resourceful, large organised restaurant chains on the high street. In Table 1, we can see, restaurants, which are part of a chain such as E, T and N, and therefore with greater resources implementing green practices to a greater extent than the others.

5. Conclusions

This study is arguably among the first comprehensive studies to understand GSCM application in restaurants, both in general as well as for the United Kingdom. A good understanding of green practices both in terms of their nature and extent of implementation is now available for individual restaurant operational stages: specifically, the green design, green menu design, green purchasing and packaging, green cooking and green transportation practices. We also have a good understanding of the drivers and barriers that motivate and

impede restaurants to implement these practices. The findings have several managerial implications.

Firstly, restaurant owners and other stakeholders now know all the green practices and sub-practices they could implement at each operational stage. Also, the challenges they need to overcome such as on keeping green costs/investments down and being able to recover these, ensuring regularity of green/sustainable supplies and the need to transfer green-related knowledge to staff. This knowledge itself would enable more green practices and sub-practices to be tried as well as successfully implemented.

On their part, policymakers can note the disparity in green practices implementation across restaurants, both in terms of the number of operational stages covered and the variety/range of sub-practices within each. They can work towards reducing this disparity (either across the board or selectively) by strengthening some of the identified drivers and/or dampening the barriers. For example, they could strengthen the regulations with regards to green menu design (mandating a certain percentage of sales to be green or banning provision of bottled plastic/glass bottle), or green cooking (penalizing energy consumption beyond specified limits based on restaurant size). Other options could be: i) Providing tax relief and financial support to restaurants implementing green practices; ii) Facilitating training on GSCM to restaurants; iii) Promoting collaborative relationships and GSCM knowledge transfer between high and low green practice implementing restaurants.

Despite the novelty and comprehensiveness of the study, it has some limitations. Firstly, it is based on only twenty restaurants; a more exhaustive study through a survey could serve to enhance the generalizability of the findings. Secondly, only small and medium restaurants are covered. Given that nature of GSCM could differ for large/organized sector restaurants, a separate study of a similar kind is needed for them. Performance implications (incl. environmental, economic and organisations) from GSCM is another area which has been discussed quite superficially in this work. This needs to be explicitly discussed in future studies. Finally, this work can be repeated for other countries and the differences in findings across them compared and contrasted.

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Appendix I

Interview protocol

- What does the restaurant offer?
- What sustainable/ eco-friendly practices are carried out at the restaurant?
- How familiar are you with the concept of green design? Were there any eco-friendly aspects considered while designing the restaurant?
- Are there any environmental friendly factors considered such as on energy consumption and carbon emissions during cooking operations?
- What kind of dishes are offered on the menu? Are there any dishes which are organic?
- How do you select your suppliers? Do you prefer to choose suppliers that implement eco-friendly practices while manufacturing the products?
- Do suppliers use fuel efficient vehicles while transporting the goods to the restaurant?
- Does your restaurant offer delivery service? If yes, do you use fuel efficient medium for transportation?
- What do you think are the drivers to implement green practices? For example, government regulations, customers?
- What do you think are the barriers to implement green practices? For example, costs, lack of knowledge?
- To what extent do environmental practices affect the economic performance of the restaurant?