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Full length article

The prospects of waste management in the hospitality sector post COVID-19

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ABSTRACT

COVID-19 has imposed significant detrimental effects on the global hospitality sector. These effects have primarily been considered from the socio-economic perspective, ignoring the implications of the pandemic for the environmental performance of hospitality services. By drawing upon emerging evidence from various academic and non-academic sources, this conceptual paper critically evaluates the implications of the preventative and protective measures adopted against COVID-19 for the generation of the hospitality sector’s food and plastic waste. The implications are divided into direct and indirect and considered through the prism of temporality of their anticipated occurrence (immediate, short-term and medium-term perspective). The paper proposes potential strategies to aid in the management of these wastes in the hospitality sector in a post-pandemic world. To address the issue of food waste, the hospitality sector should be integrated into alternative food networks (AFNs) and short food supply chains (SFSCs). Business coopetition between hospitality enterprises and other actors of the food supply chain is necessary for the success of such integration. To address the issue of plastic waste, the hospitality sector should invest in ‘green’ innovation. This investment needs to be encouraged and supported by targeted policy interventions. The paper argues that these strategies are critical not only in the context of the COVID-19 pandemic, but will also remain valid for the sustained development of the hospitality sector in light of future disastrous events, especially climate change. The paper discusses the institutional and organisational prerequisites for the effective implementation of these strategies and highlights the related research opportunities.

1. Introduction

The COVID-19 pandemic has demonstrated the fragility of the hospitality sector and showcased its vulnerability to external disruptions. To prevent the virus, the closure of international borders eliminated inbound tourism (Gössling et al., 2020) which used to be a significant source market for hospitality providers. National lockdowns were subsequently introduced (Hall et al., 2020) putting hospitality operations on a complete standstill. Except for hospitality businesses specializing in food takeaway and delivery, the hospitality sector ceased to temporarily exist as such.

The implications of the forced lockdown for the hospitality sector were manifold and, largely, detrimental. Forced business closues prompted hospitality providers to furlough their staff or make them redundant (Larue 2020). The preventative and protective measures against COVID-19 had eradicated the determinants of effective hospitality operations, i.e. instant flows of cash and hardworking employees, highlighting a bleak post-pandemic future for the sector (Filimonau et al., 2020a).

The lockdown measures will eventually be lifted across the world, but the pandemic will have a long-lasting impact on the hospitality sector (Nunn 2020). This impact will be socio-economic given the immediate negative effect of forced temporary business closures on the sector’s revenues and staff retention/recruitment (Filimonau et al., 2020a). There will also be a delayed detrimental socio-economic effect due to a large number of protective measures that hospitality operators will have to adopt in a post-COVID-19 world (Dube et al., 2020). These measures will include social distancing rules and enhanced hygiene restrictions (Food Standards Agency 2020). The application of these measures will reduce the operational capacity of hospitality providers and decrease the (already thin prior to the pandemic) profit margins of hospitality operators. It is expected that the anti-COVID-19 protective measures will remain in place for some time (BBC 2020b) which does not facilitate business confidence in rapid financial recovery. Consumer demand for hospitality services will not reinstate immediately in a post-pandemic future due to health and safety precautions amongst
customers (Gursoy et al., 2020). Although the rebound effect in consumption of hospitality services is possible (Jingjing 2020), there has been limited evidence of its occurrence to date. A new wave, or even several waves, of the virus are anticipated (Xu and Li, 2020). Until an approved vaccine becomes widely available, hospitality providers, when they fully reopen, will be bound to strictly adhere to the governmental guidance on social distancing and preventative hygiene (BBC 2020b).

Academic discourse on the implications of the pandemic for the hospitality sector has duly revolved around the socio-economic well-being of hospitality operators and their employees (Dube et al., 2020). COVID-19 will worsen the sector’s environmental performance (Gal- anakis 2020), but this perspective has not been discussed scholarly yet. The worsened environmental performance of hospitality operations is attributed to the loss of food stock inventories by hospitality businesses during national lockdowns (immediate direct effect). The environmental performance of hospitality operators will also worsen because of the (current and future) business needs to adopt a number of preventative and protective measures against the virus, such as social distancing and deep cleaning (short-to-medium term direct effect). The worsened environmental performance will also relate to the future reduced operational capacity of the hospitality sector. The implications of this reduced capacity may stretch beyond direct hospitality operations and, potentially, across borders of traditional hospitality markets (medium term indirect effect).

This conceptual paper will outline the direct and indirect implications of COVID-19 for the environmental performance of the global hospitality sector, looking in particular at the issue of solid, food and plastic, waste generation. The paper will review the evidence of environmental impacts from hospitality operations as showcased by the trade press, popular media reports and emerging academic publications. The paper will highlight specific hospitality practices that can generate excessive wastage of resources in a post-pandemic world. The paper will discuss strategies that should be adopted by the sector in order to enhance its environmental sustainability in light of the on-going COVID-19 outbreak, but also future disasters. Some of the strategies proposed herewith will remain valid after the pandemic is over. The adoption of these strategies can be critical for improving the environmental performance and building the business resilience of hospitality operators in view of such future disasters as climate change, for example.

### 2. Food waste

Food waste has been recognised as a major environmental challenge for the global hospitality sector (Papargyropoulou et al., 2016). For example, only in EU-28, circa 11 Mt of food are wasted by hospitality operators per year, which is equivalent to 12% of total food waste produced across the food supply chain of this region (FUSIONS 2016). Due to various operational and non-operational reasons, substantial amounts of food are wasted in kitchens of hospitality providers (Silvennoinen et al., 2015) and equally significant wastage occurs on customer plates (Dolnicar and Juvan 2019). The excessive magnitude of food wasted in the hospitality sector has accelerated its scholarly research which has covered a number of consumption markets, such as the USA (Sakaguchi et al., 2018), China (Wang et al., 2018) and Sweden (Eriksson et al., 2018). Research has also targeted various hospitality sub-sectors, such as fine-dining restaurants (Charlebois et al., 2015), casual dining restaurants (Filimonau et al., 2020c) and coffee shops (Filimonau et al., 2019). Research has highlighted the importance of consumer behaviour (Filimonau et al., 2020b), managerial attitudes (Filimonau et al., 2020d), political support (Papargyropoulou et al., 2019), and employee actions (Goh and Jie 2019) in food waste prevention and mitigation.

The COVID-19 pandemic has exacerbated the challenge of food waste in the hospitality sector by imposing the immediate direct, short term direct and medium term indirect effects (Fig. 1). The immediate direct effect was observed in significant quantities of food wasted after the lockdown measures were announced (Aldaco et al., 2020). In most countries these announcements came at a short notice, with most hospitality businesses being unprepared to almost instantly shut their operations down. For example, in the UK the lockdown measures were imposed on Monday, the 23rd of March 2020, i.e. right after a weekend when many people dined out. By the time of the lockdown announcement, foodstuffs remained in stock in UK hospitality businesses with limited time for their effective utilization. While some hospitality operators froze this surplus food, gave it to staff, provided it to local retail outlets, donated it to food rescue charities or cooked meals for health professionals, a lot of food excess went to waste (Eley and Hancock 2020). One of the reasons was the lack of freezing facilities as most hospitality operators were located in city/town centers with their restricted space and, subsequently, limited storage capacity. Limited opportunities for surplus food redistribution were another issue. While food banks and charities rescue surplus food around the world (Nair et al., 2018), these remain small in number and largely unsupported by other stakeholders in their charitable work (Hecht and Neff 2019). Due to the lack of human (volunteers), financial (money) and physical (transport) capital amongst charitable organisations, the opportunities to rescue surplus food from the hospitality sector at the time of the lockdown were reduced (Civil Society 2020).

The short term direct effect of the pandemic on food wastage in the hospitality sector was attributed to the reported growth in the quantities of food wasted by takeaways and restaurants. These, during the lockdown, turned to food takeout and delivery (Zambrano-Monserrate et al., 2020). Food was wasted in these businesses due to unpredictable consumer orders. Some takeaways, in pursuit of customer loyalty, offered discounts and flexibility in ordering food (Smithers 2020b). For example, customers were given an option to cancel orders at a short notice. The discounts resulted in over-ordering which led to food waste generation in households (Zambrano-Monserrate et al., 2020). The flexibility in placing orders resulted in last-minute cancellations with leftover meals produced in the kitchens of takeaways (Li et al., 2020).

| Waste | Impact | Immediate | Short-term | Medium-term |
|-------|--------|-----------|------------|-------------|
|       |        | 6 months  | 12 months  | 24 months   | 36 months   |
|       |        | Direct    | Direct     | Direct      | Indirect    |
| Food  |        | Unfinished food inventories due to sudden implementation of national lockdowns and temporary business closures | Increased food wastage in food take-away businesses due to the surge in popularity of home food deliveries | Wastage of food in the upstream of the food supply chain due to reduced orders from catering businesses and permanent business closures |
| Plastic | Increased use of single-use plastics and single-use gloves and face masks in food preparation and service due to enhanced hygiene requirements | In addition to increased use of single-use plastics and single-use gloves and face masks | Increased use of plastic packaging in food deliveries |

Fig. 1. The impact of the COVID-19 pandemic on generation of wastes in the hospitality sector. Source: Authors' own elaboration.
Although many takeaway businesses redistributed this surplus, the redistribution was not always feasible due to its operational limitations, as discussed above.

The medium term indirect effect of the COVID-19 pandemic is reflected in the impact of the lockdown measures on the upstream of the (inter)national food supply chains (Sharma et al., 2020). The temporary closure of the hospitality sector disrupted the sophisticated, often long-established, links of hospitality operators with their food suppliers (Eley and Hancock 2020). The lockdown measures prevented movement of labour migrants working in farms (FAO 2020). As a result, catering suppliers and, particularly, food producers (farmers) had large inventories of unsold foodstuffs. Media reports from around the world (see, for example, Cook 2020) showed that most of this food was wasted as farmers had no alternative ways to redistribute the surplus. In supply chain management this phenomenon is known as the ‘ripple effect’ (Dolgui et al., 2020) and its impact is likely to last. Some hospitality businesses may not re-open after the pandemic while many will return to operate at a reduced capacity which is due to predicted low consumer demand (Gursoy et al., 2020). Reduced operational capacity suggests that food producers and catering suppliers will continue facing the problem of surplus food for some time. This surplus food is likely to be wasted.

2.1. Potential mitigation strategies

The fragile nature of the hospitality food supply chain underlines the need for hospitality operators to reconsider their work with catering suppliers and food producers. In the future, all actors of the food supply chain, including hospitality providers, should move away from the traditional model of food supply which is bulky and unresponsive to sudden external pressures. By involving multiple actors (farmer-wholesaler/distributor-catering supplier-hospitality business) the traditional business models of food procurement lack visibility and impede sympathy. There is no flexibility and, if one actor of the chain experiences a sudden need in something, the chain is unlikely to react to this need instantly. For example, if a farmer has produced too much food, it is difficult, if not impossible, for them to sell this surplus. Farmers set, usually finite, contracts with wholesalers and catering suppliers and these contracts offer little scope to add to or delete the food inventory (Dolgui et al., 2020). This surplus food may be left to rot in the field which leads to wastage in primary production. On the other side of the food supply chain, if a restaurant manager has a suddenly reduced need in a particular food stock, it may be difficult for them to cancel outstanding food orders due to contractual obligations with a ‘middle man’. The food gets delivered to a restaurant and often goes to waste as it is no longer required in the kitchen.

A potential strategy to prevent food waste occurrence and build more reliable relationships across the food supply chain in a post-pandemic world would be to form alternative food networks (AFNs). These are characterised by the spatial and temporal proximity of all actors (Bernardi and Tirabeni 2018). Actors can communicate with one another directly, thus building trust and improving the agility, responsiveness and resilience of the food supply chains. Given the spatial proximity element, AFNs can contribute to the short food supply chains (SFSCs). Compared to the traditional food supply chains, SFSCs are more resilient to external impacts and more environmentally-benign (Sellitto et al., 2018). They also reassure food integrity and provide customers with confidence as more safety measures will be required when moving from farm to fork in a post-COVID-19 world (Rizou et al., 2020). AFNs and SFSCs can increase the social and network capital of all actors across a food supply chain in a specific locality (Bernardi and Tirabeni 2018). This will not only improve the preparedness of actors for future disastrous events, but can also outline the scope for business innovation. For example, AFNs can be utilised to redistribute surplus food from farm to fork under the ‘business as usual’ conditions. This becomes possible due to the links established between an excess food owner (farmer) and a food operator (for example, a restaurant or a retail outlet) (see Fig. 2 for details). Digital technology can facilitate surplus food redistribution (Galanakis 2020), thus minimizing food loss and waste across the food supply chain but, particularly, in primary production (Beausang et al., 2017).

Building AFNs and SFSCs is especially important in light of climate change which can expose the vulnerability of global food systems to external disruptions (Zambrano-Monserrate et al., 2020). Increased probability of extreme weather events with their multiplying, cascading, impacts on the critical infrastructure (Pescaroli and Alexander 2016), such as the well-established food supply chains, can disrupt food deliveries. As demonstrated by the COVID-19 pandemic, unpredictable consumer behaviour, such as panic buying and stockpiling in the time of crises, may exacerbate this disruption (Hobbs 2020). By forming the local ‘bubbles’ of food production, distribution and consumption, all actors of AFNs and SFSCs can build the capacity to, at least partially and temporarily, withstand the disruptions. This improved capacity will make actors more robust and enhance their resilience to external pressures. AFNs and SFSCs can be built in any market but they have all pre-conditions to be formed in regions that specialise in food production but have large markets of (out-of-home) food consumption (Sellitto et al., 2018). Local production in such regions can fulfil a significant share of demand for food in hospitality services, thus making a good case for the development of AFNs and SFSCs.

Another strategy for reducing food waste in the hospitality sector and along its food supply chain in a post-COVID-19 world in the immediate, but also short-to-medium, perspective is in the (better) integration of food rescue charities, food processing enterprises and operators of anaerobic digesters into AFNs and SFSCs. Food rescue charities can aid in the redistribution of surplus food by taking it from hospitality providers to people in need (Filimonau and De Coteau 2019). Food processing enterprises can work closely with hospitality operators and food producers and, in the case of any surplus food on a farm or in a hospitality business, collect this food for freezing or processing (FAO 2020). For example, jams and chutneys can be made of any surplus fruits and vegetables while fish can be vacuum-packed and deep frozen. These foodstuffs can subsequently be procured by hospitality operators at a discounted price. Any food leftovers from farms and restaurant kitchens, including those arising from customer plates, can be used by anaerobic digesters to produce energy (Kuczmann et al., 2018). This energy can subsequently be supplied to the providers of food leftovers. Any profits made from selling this energy can be shared between all actors involved, i.e. providers of wasted food and operators of anaerobic digesters.

2.2. The prerequisites for the mitigation strategies

Institutional and organisational factors need to be addressed for the proposed mitigation strategies to work effectively in a post-COVID-19 world (Espejo et al., 2020). The implementation of institutional factors is largely dependent on the political will of (local/regional/national) authorities. The success of organisational factors is mainly determined by the readiness and preparedness of hospitality providers, and other actors across AFNs and SFSCs, to work towards a common goal.

The institutions of power are critical to building the pre-conditions for food waste mitigation in AFNs and SFSCs. They should provide incentives to hospitality operators to prevent food waste occurrence. Incentivisation was important for addressing the challenge of food waste prior to the pandemic (Filimonau and De Coteau 2019). It will become particularly critical in a post-COVID-19 world as national lockdowns have ceased the cash flows in the hospitality sector (Nunn 2020). Food waste prevention and mitigation is unlikely to be a priority for hospitality businesses after the pandemic. This highlights the need for the government to use ‘soft’ market-based policies and tools (Richards and Hamilton 2018) in raising the profile of this issue amongst the sector professionals. Examples of such policies and tools include interest-free
(emergency) loans (FAO 2020) or subsidies for those hospitality operators actively engaging in building AFNs and SFSCs in specific localities.

Institutional support is required to integrate other actors of relevance into AFNs and SFSCs. This primarily concerns food rescue charities whose work has aided significantly in food waste mitigation prior to the pandemic and proven to be critical for surplus food redistribution during the lockdown (Smithers 2020a). The number of charitable food rescuers remains small, especially in developing countries. This is a major shortcoming as the challenge of food loss and waste, particularly in primary production, persists in developing economies in the presence of hunger and malnutrition (Wang et al., 2018). This portrays wastage as being not only environmentally-un sustainable but also morally unacceptable. Charities have very limited resources that impede surplus food redistribution. Targeted institutional support is required not only in the form of traditional governmental grants, but also in other forms of assistance, such as provision of transportation and storage for surplus food.

The institutional will is necessary to streamline the processes and procedures of surplus food redistribution. Overly stringent food hygiene standards and food safety requirements represent a major barrier for surplus food donations by hospitality operators (Filimonau et al., 2019). These standards and requirements should now be revised to minimize food wastage. Another area for the revision of food hygiene standards and food safety requirements is in the use of food leftovers from the kitchen and customer plates (Galanakis 2012). Traditionally, many of these would be landfilled but, after the pandemic, food leftovers should be directed to anaerobic digesters (Kuczman et al., 2018). In small quantities and as a trial, these leftovers can be given to local farmers for use as animal feed (Salemdheeb et al., 2017). The national institutions of power should treat COVID-19 as an opportunity to reconsider their current approach to leftover food as a waste and start viewing it as a by-product, or even as a resource instead (Lee and Tongarlak 2017). The possibility of feeding leftover foods to insects with the subsequent use of these insects as animal feed should also be examined (Salomone et al., 2017).

The organisational factor is important in building the social and network capital of AFNs and SFSCs as, currently, this capital may be insufficient. The social and network capital of hospitality operators is restricted by definition as most of the sector is represented by small-to-medium sized enterprises. The network of such enterprises alongside the links they have established with one another, but also other actors of the food supply chain, are often limited (Kim and Shim 2018). This is attributed to a highly competitive and diverse market of hospitality services in which each individual business strives to prioritise its short-term financial wellbeing over building the long(er)-term, industry-wide, network capacity (Binder 2020). The economic paradigm of the ‘tragedy of the commons’ can be used to explain the uncaring behaviour of hospitality operators. This paradigm describes why individuals, in the presence of a finite resource, such as the environment, tend to act selfishly (Patt 2017). The ‘tragedy of the commons’ can be extended from the realm of consumer behaviour to the realm of business decision-making in the hospitality sector. While the ‘tragedy of the commons’ considers the environment as a scarce resource, in the context of hospitality services this resource is represented by customers.

Hospitality operators are conservative in that they are often reluctant to accept any alternative, innovative ways of doing business. This is reflected in the limited uptake of environmental innovations in the hospitality sector (Martin-Ríos et al., 2016). This conservatism prevents hospitality businesses from adopting novel methods of food procurement. It further averts them from engaging with other actors of the food supply chains for the sake of communal, rather than individual, benefit, as discussed earlier. Strong organisational will is required to change the mind-set of hospitality providers by turning them from the ‘conservatives’ into the ‘innovators’ or even the ‘market disruptors’. Crises and disasters offer scope for organisational learning and enable businesses to re-think past business and organisational behaviour models (Filimonau and De Coteau 2020). The COVID-19 pandemic should be used by hospitality operators for identifying and conquering the new, previously unthought-of, (business) opportunities. This novel, out-of-the-box, thinking may prompt hospitality businesses to no longer consider other hospitality operators as competitors, but as collaborators or, at least, as cooperetitors.

This innovative business strategy of coopetition (Czernik and Czakon 2016) may extend beyond the goal of food waste prevention and mitigation. In the time of crises, not only surplus food can be redistributed from one hospitality business to another or from one farmer to a hospitality business. Human resources or the infrastructure of hospitality operators and other actors within the food supply chain can also be ‘shared’. For example, to avoid wastage, the surplus food can be re-allocated from a shut hospitality operator to the one which still functions by cooking takeout and delivery meals. The storage facilities of one hospitality provider can be used to freeze and then keep the expensive foodstuffs, such as fish and seafood, of other hospitality businesses. Restaurant staff that cannot be put on a furlough scheme by a shut hospitality operator can be, instead, temporarily ‘borrowed’ by those hospitality businesses that are still in operation, such as takeaways. Redundant staff can even be temporarily employed, after appropriate training, by food producers who suffered from the lack of farm workforce during national lockdowns (FAO 2020). Such coopetition can be underpinned by the principles of the ‘sharing economy’, thus...
up-taking it from a (more) traditional, customer-to-customer (C2C) or business-to-customer (B2C), realm to a new, business-to-business (B2B), realm. Limited evidence of effective sharing, especially with sustainability goals, has been recorded in this realm to date (Grondys 2019). Fig. 3 presents an action framework which can aid in the (more) effective management of food waste in hospitality services in a post-pandemic world.

2.3. The positive spillover effect of the pandemic?

The COVID-19 pandemic can also contribute to food waste prevention and mitigation in the hospitality sector. The food hygiene concerns may prompt hospitality operators to abolish such wasteful catering services as self-service ‘open buffets’ (Daily Sabah 2020). In theory, this abolition will offer more control to hospitality businesses over managing the amounts of foodstuffs that require cooking, thus reducing food waste occurrence in the kitchen due to over-production. This assumption is, however, yet to be empirically tested.

Although the overproduction of food may decrease, the abolition of buffets may drive food wastage on customer plates. The main reason behind using open buffets is in (staff) time savings that these provide. With no open buffets, hospitality businesses will have to either increase the headcount of staff or be prepared to sacrifice the speed of service. This suggests that, to maintain competitiveness, hospitality providers will have to allow for a certain time lapse between the time when a customer places a food order and the time when it gets delivered to their table. There is a probability that the food ordered will no longer meet consumer expectations, resulting in plate leftovers. Potential changes to food waste flows in hospitality businesses operating under the effect of new preventative and protective measures in a post-COVID-19 world need to be carefully understood.

Another potentially positive impact of the pandemic on food wastage in the global hospitality sector can be attributed to the increased appeal of the ‘local’ (Tomassini and Cavagnaro 2020). National lockdowns have prompted consumers to better recognise the value of locally produced foodstuffs and appreciate the work of local food producers (farmers). In the UK, for example, consumers have started purchasing more local food (Searle 2020). This may, in theory, minimise food wastage in hospitality services due to reduced spoilage in transit.

The pandemic may also spark procurement of local and seasonal foodstuffs, thus leading to the reduction of food miles with the related carbon benefits (Pratt et al., 2017). However, media reports from France (Snouwaert 2020) and the UK (Selby 2020) indicate that the local appeal is only applicable to cheap foodstuffs as customers tend to save money in the time of crises. This suggests that expensive foodstuffs, such as quality cuts of meat, fish and seafood, may potentially be wasted more in a post-pandemic world, both in hospitality services and in the upstream of their food supply chains. Better understanding of consumer behaviour in a post-COVID-19 future and its (positive or negative) implications for food wastage in the hospitality sector is necessary.

3. Plastic waste

Although popular media reports have highlighted the issue of plastic waste in the context of hospitality services (BBC 2019), the related research agenda is under-developed. ‘Grey’ literature has assessed the...
potential contribution of the hospitality sector to global plastic pollution (WRAP 2013), but very few academic studies have attempted to shed light on the managerial approaches to its mitigation (Koiwanit and Filimonau 2021). The challenge of plastic waste has been severely under-researched in the ‘old normal’ realm of hospitality service provision. The pandemic has added new insights into the so urgently needed scholarly investigation of this topic.

COVID-19 imposed immediate and short-to-medium term, direct and indirect, negative impacts on plastic pollution within the global hospitality sector (Fig. 1). While the pandemic has had a positive effect on consumer and manager awareness of food safety and hygiene, it will force hospitality businesses to take extra precautions when serving food and beverages to their guests. These precautions will be reflected in the immediately increased usage of disposable masks, gloves, cutlery and, in the case of food deliveries, plastic packaging (Silva et al., 2020). For example, increased demand for food takeout and delivery has already caused a surge in plastic waste pollution (Ikiz et al., 2021). This pollution trend is expected to continue despite the declared bans on the use of single-use plastic in hospitality services across the world (Tanaka-senpijat 2020).

In the longer term, the food safety and hygiene precautions will be exemplified by the grown patterns of plastic waste generation in hospitality operations arising from the disposal of the larger number of empty water bottles, hand sanitizers, disinfectors and cleaning liquids (Monella 2020). For example, the well-established practice of serving tap water in a jar, which not only reduced plastic pollution but also saved money in restaurants, may cease to exist. The service of bottled water will become mainstream across the sector. Single-use menu cards may become a new reality (Gursoy et al., 2020). Although such menu cards can be made of paper, exceptional affordability of plastic pinpoints it as a probable medium for printing single-use menus in the future. More plastic is likely to be used by suppliers in food deliveries, which is, again, due to enhanced hygiene requirements and plastic affordability. COVID-19 can revive the global single-use plastic industry which has been suppressed prior to the pandemic due to the mounting public and political pressures (Kalina and Tilley 2020). For example, in the UK, the calls have been made to postpone a single-use plastic ban until at least 2022 (BBC 2020a). The hospitality sector will become an important player in this revival, primarily due to the increased demand for single-use cutlery (Silva et al., 2020).

The problem of plastic waste in the hospitality sector is attributed to its disposal. Substantial quantities of used disposable plastic masks, gloves and cutlery are being dumped in the marine ecosystems (Kalina and Tilley 2020). These plastic items have become common street litter in both developed, but particularly, developing countries (Scaraboto et al., 2020). The non-recyclability of single-use plastic and the limited recycling facilities that exist for its safe disposal should represent a major point of concern for the post-pandemic hospitality sector (Jung et al., 2021). With plastic waste still being regularly transported from developed to developing countries (O’Neill 2019), the North-South divide is likely to intensify in a post-COVID-19 world. The hospitality sector will become one of the key contributors to this intensification, thus extending the scope of its negative impacts from the environmental realm of sustainable development to its socio-economic realm.

3.1. Potential mitigation strategies

To mitigate the mounting pressure of plastic waste in the hospitality sector post-pandemic, the scope for adopting plant-based alternatives to single-use plastics should be examined. Wooden cutlery can, for example, be used (Horton 2019). Consumer studies should aim at exploring the determinants of customer acceptance of traditional cutlery in a post-COVID-19 future. Some restaurant guests may be prepared to use conventional cutlery, subject to its thorough disinfection. This development will, however, shift the problem of environmental pollution from plastic waste towards wastewater.

The example of Kenya shows that single-use plastics can be effectively eliminated from many aspects of everyday life (Horvath et al., 2018). Grounding on this example, disposable face masks can be made of plant-based materials. Plant-based materials, such as jute and sisal, can be utilised for this purpose as they represent a more environmentally-friendly medium due to its recyclability and biodegradability.

Re-usable face masks should be promoted. These can, for instance, bear the trademarks of hospitality operators and be provided for free with marketing purposes. Face marks have become a fashion symbol (Abraham 2020) which outlines the scope for innovative thinking on how this opportunity can be harnessed by hospitality operators. For instance, branded re-usable masks provided to restaurant guests can, in theory, increase customer loyalty and enhance brand recognition.

Re-usable, branded cutlery can be provided for free and customers should be encouraged to bring it back to a restaurant in subsequent visits (National Geographic 2019). Not only will this increase consumer confidence in the cleanliness of such items, but can also shift responsibility of hospitality operators for clean-up and disinfection. Monetary discounts can be given to customers for ‘bringing in’ the re-usable cutlery which is similar to the initiatives adopted by many coffee shops in an attempt to reduce wasted coffee cups (Murray 2018). Such initiatives build upon the evidence that financial incentives can ‘nudge’ more responsible consumer behaviour in hospitality operations (Filimonau and Magklaropoulos 2020).

Digital technology can be used to reduce plastic waste. Digital menus can replace traditional paper- or plastic-made menus being accessible to customers via branded apps (Yim and Yoo 2020). The Bring Your Own Device (BYOD) concept will not only eliminate the need for disposable menus, but also enable hospitality operators to make short notice menu changes. This will contribute to food waste prevention and mitigation as flexible menus facilitate the repurpose of excess ingredients and promote sales of surplus meals at a discounted price (Filimonau and De Coteau 2019). Discounts will build customer loyalty, which is important in a post-COVID-19 world given the hospitality sector needs to restore consumer confidence.

3.2. The prerequisites for the mitigation strategies

To reduce plastic pollution from the hospitality sector in a post-COVID-19 world, similar to the case of food waste and its management, institutional and organisational support will be required. The institutions of power will be instrumental in providing effective plastic waste collection, separation, recycling and disposal services (Fan et al., 2021). The issue with such plastic waste as empty bottles in restaurants is often in the lack of adequate recycling facilities in a locality. This problem is particularly pronounced in the context of developing countries where organised municipal solid waste collection services are under-developed (Penteado and de Castro 2021). While in developed economies plastic waste recycling is more established, the issue with single-use plastic persists. Guided by the principle ‘out of sight, out of mind’, certain waste fractions are transported to developing countries for final disposal. This transfers the problem from one locality to another without effective and pro-active solution (Wang et al., 2020).

In a post-pandemic world, the institutions of power should adopt a more pro-active approach to managing plastic waste from the hospitality sector given that this waste is likely to increase significantly. For example, incentives should be given to hospitality businesses promoting plant-based alternatives to single-use plastic. Incentives can also be adopted to encourage plastic waste separation in-situ for subsequent recycling. For instance, the ‘deposit-refund’ system (Linderhof et al., 2019) can be introduced or discounts can be offered by municipal waste collection services for properly separated plastics. Disincentives can be applied to discourage wasteful behaviour. For example, the ‘pay-a-s-you-throw’ programmes can be considered whereby hospitality operators pay per weight of disposed plastic waste. Such programmes have
proven effective in various contexts (Linderhof et al., 2019) and can, potentially, be rolled out towards the hospitality sector in a post-pandemic world. The current ‘flat’ charge for solid waste disposal discourages hospitality operators from more effective solid waste management (Silva et al., 2020).

Organisational commitment is necessary to invest in plastic waste reduction in hospitality services. The low cost of single-use plastic and affordability of its disposal (Trower 2018) may prevent hospitality operators from purchasing more environmentally-benign cutlery and re-usable face masks. The willingness to invest in plastic waste management will be further hindered by the need to address other operational challenges of the immediate post-COVID-19 future. These challenges include procurement of protective equipment and staff recruitment and training. Investment decisions have been traditionally difficult for hospitality operators, especially for small-to-medium-sized enterprises (Filimonau et al., 2020c). Investment decisions on solid waste management can be particularly hard to make, especially in the time of crises, which requires genuine organisational commitment towards sustainability.

Traditional conservatism of the hospitality sector will also play a role in plastic waste management. Hospitality operators are reluctant to invest into the future ‘intangibles’, such as enhanced corporate image, rather than the immediate ‘tangibles’, such as improved cash flows (Filimonau and De Coteau 2019). This links to theories of environmental innovation and corporate social responsibility. These theories emphasise the importance of personal sustainability values of business leaders in thinking unconventionally and seeing future opportunities for maintaining market competitiveness (Martin-Rios et al., 2018). Such examples of disruptive innovations in the hospitality sector as digital food delivery platforms (for example, Deliveroo or UberEats) or digital surplus food redistribution apps (for instance, Too Good To Go) demonstrate the value of pro-active and novel thinking. These ‘unconventional’ business models represent the only segments of the global hospitality sector that did not come to a complete standstill in the time of the forced lockdown. This demonstrates how novel, pro-active, thinking can aid in better preparation for disastrous events. Fig. 4 presents an action framework for the (more) effective management of plastic waste in hospitality services in a post-pandemic world.

4. Conclusions

The COVID-19 pandemic has exposed the vulnerability of the global hospitality sector to external pressures. Although the effect of the pandemic was devastating, COVID-19 should be considered by the sector professionals a learning opportunity. This is of particular relevance for waste management practices adopted by hospitality operators. Waste management in hospitality operations was mediocre prior to the pandemic, but COVID-19 has worsened it. The pandemic has also transferred some of hospitality wastes to the upstream of the sector’s supply chain. With no prevention and mitigation measures applied, the hospitality sector will produce disproportionately high volumes of food and plastic waste in a post-COVID-19 world. This will undermine the environmental sustainability of global hospitality services.

This paper argued that the pandemic outlined the need for the hospitality sector professionals to prepare for future disastrous events. Climate change represents a major disaster to watch as its consequences will be damaging to hospitality operators. Measures are necessary to enhance the agility of the global hospitality sector and improve its resilience to future disasters. Hospitality operators should invest in more environmentally-friendly product alternatives, such as plant-based or re-usable cutlery, instead of single-use plastics. Hospitality operators should also build novel, more environmentally-benign and responsive to disastrous events, business models of food procurement. These novel models can revolve around the concepts of alternative food networks (AFNs) and short food supply chains (SFSCs). Long-term organisational commitment of hospitality operators and governmental support are paramount for the industry uptake of such novel business models.

Although climate change is similar to the COVID-19 pandemic in terms of the damaging power it holds, it is also notably different. Unlike the pandemic which has evolved rapidly, climate change is growing

![Figure 4: An action framework for the more effective management of plastic waste in the hospitality sector in a post-pandemic world. Source: Authors’ own elaboration.](image-url)
slowly. Unlike COVID-19 which has affected almost everyone everywhere in the world, climate change will primarily impact the most vulnerable categories of global population. Climate change may be too abstract to comprehend so that it does not prompt immediate defensive reaction to combat its consequences. The global hospitality sector should improve its environmental performance now, when the effect of the COVID-19 pandemic is still in the air. If improvements are left for later, the memory of this disaster will vanish and the sector professionals will forget about the need to stay vigilant and prepare for future disastrous events, such as climate change. This suggests that the hospitality sector professionals may return to their past, largely unsustainable and irresponsible, business practices, ignoring the lessons taught by the pandemic.

Research is necessary to support the progression of the hospitality sector towards environmental sustainability in a post-COVID-19 world. This research should explore the feasibility of integrating hospitality businesses in AFNs and SFSCs, looking, in particular, at the impediments of such integration and evaluating how these impediments can be overcome. The determinants of business cooperation in the context of food and plastic waste management should be examined from the perspective of hospitality managers, catering suppliers, wholesalers, farmers, policy-makers and other actors across the food supply chain. This includes food rescue charities, operators of anaerobic digesters (for food waste) and local recycling facilities (for plastic waste). The role of consumer preferences and enhanced social distancing rules should also be studied.

The key limitation of the paper is in its conceptual nature. The novelty of the COVID-19 pandemic and its uncertainty diminish the accuracy of scholarly predictions. To partially overcome this limitation, the paper elaborated on the importance of food waste management in the pandemic’s aftermath and in light of future disastrous events, such as climate change. Limited scientific knowledge of COVID-19 and an insufficient understanding of its short- and long-term effect on the hospitality sector pinpoints possible subjectivity of any elaborations of the exact magnitude of this effect. To partially address this shortcoming, the paper grounded its arguments on available, yet limited, evidence reported in popular media, trade press and emerging academic publications. While being not necessarily scientifically-robust, such reports are more reliable than any ‘guestimates’ made on the topic in question. Such reports enable the parallels to be drawn and extrapolations to be made on the basis of existing and past evidence as to how COVID-19 may affect the future of the hospitality sector.

CRediT authorship contribution statement

Viachaslau Filimonau: Conceptualization, Data curation, Writing - original draft.

Declaration of Competing Interest

None.

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