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Towards a cohesive circular food economy: A motivation opportunity ability (MOA) approach to understanding an emerging group of practitioners in Metro Vancouver

SPECIAL SECTION
Community-Based Circular Food Systems

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Abstract

Nearly half of the food produced in Canada is lost or wasted, leading to negative environmental impacts and contributing to rising levels of food insecurity. The circular food economy (CFE) has been proposed by stakeholders and policymakers as a potential framework for solving the food waste problem through a variety of business and non-profit food-related waste reduction and prevention initiatives, creating a community-based circular food system. This research asks: How do individuals working in the food sector mobilize CFE

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practices in their work? What are the motivations, opportunities, and abilities influencing those working in the emerging CFE sector in Metro Vancouver? To answer these questions, this research analyzed interview data from food sector stakeholders (n = 22) contributing to the Metro Vancouver CFE. This study applies the motivation opportunity ability (MOA) framework to guide data analysis. The findings indicate that there are conflicting priorities to CFE approaches in Metro Vancouver, leading to a lack of cohesion among initiatives and to barriers to a more equitable CFE. Stakeholders contributing to the CFE notice competing visions in best practices to reduce waste leading to a paradox of managing waste instead of prevention.

Keywords
circular economy, circular food economy, food waste, MOA framework, motivation opportunity ability framework, Metro Vancouver

Introduction

In Canada, 46.5% (21.18 million metric tonnes) of all food produced is lost or wasted, costing the Canadian economy CA$58 billion annually and contributing 25.69 million metric tonnes to greenhouse gas emissions (Nikkel et al., 2024). In the province of British Columbia, it is estimated that CA$516.5 million worth of food from the retail sector is wasted (Ministry of Environment & Climate Change Strategy, 2019), and within the region, food makes up 15% of Metro Vancouver's solid waste sent to landfills (Tri Environmental Consulting, 2019). This massive food waste harms the environment and is detrimental to food security (Santeramo, 2021), making it critical that food resources are managed more sustainably (Göbel et al., 2015). Reducing food waste and ensuring equitable distribution can enable feeding more people while making the food value chain more sustainable and resilient (Garrone et al., 2014).

A circular economy (CE) attempts to solve the broad problem of waste by eliminating waste and pollution, reusing products and materials, and regenerating nature (Ellen Macarthur Foundation, n.d.). A circular food economy (CFE) addresses waste in the food supply system and seeks a sustainable destination for food products that is restorative, healthy, and offers financial benefits for stakeholders (Lugo et al., 2022). A CFE design eliminates waste from the food system (Soma, 2022) by using circular loops to reuse, recycle, recover, and reprocess edible and inedible food (Lugo et al., 2022), a practice growing in popularity among policymakers to advance sustainable development (Ashton et al., 2022).

Political will exists in Canada to make the shift toward a CFE. In the province of British Columbia, the CleanBC Roadmap to 2030 plan targets reducing waste and turning it into resources (Government of British Columbia, 2018). The goal is to keep 95% of residential food and yard waste out of landfills by 2030 (Government of British Columbia, n.d.). At a regional level, Metro Vancouver's Climate 2050 Strategy commits to a CE transition that reduces greenhouse gas emissions (Metro Vancouver, 2018a). Many municipalities within the region are integrating CFE goals into plans and policies (City of Richmond Recycling and Solid Waste Management, 2021; City of Vancouver, 2018). For example, the City of Richmond's Circular City Strategy plans to shorten the food chain from farm to fork by encouraging food service establishments to prefer locally sourced foods (City of Richmond, 2023). Metro Vancouver encourages restaurants to prevent food waste or donate it before recycling it into compost (Metro Vancouver, 2018b). Although governments seek to make this shift, businesses and other stakeholders are also taking responsibility for preventing loss (Leipold et al., 2021), and creating their own community-based circular food systems. However, there is no broadly recognized definition, or singular practice, within the CFE (Lugo et al., 2022). As a result, stakeholders, including nonprofit organizations and food businesses with different and often competing interests and varying levels of influence, take a range of actions (Lugo et al., 2022) that may or may not be consistent with the goals of advancing a CFE.

In the current dominant food system, wasting food is easy, contributing to a throwaway society (Evans, 2012). It has become easy to waste because food waste prevention can be difficult due to food

safety concerns, confusing date labelling, lack of staff training, and marketing that encourages over-purchasing (Huang et al., 2021). Moreover, expectations such as stringent aesthetic standards result in nutritious food being discarded simply due to cosmetic reasons (Soma, Kozhikode and Krishnan, 2021). Although food retailers are in a powerful position to diminish food waste (Huang et al., 2021), saving food that would otherwise be wasted is not part of business as usual (Gollnhofer, 2017). With all of the regulatory, economic and cultural barriers hindering efforts toward circularity, and to better support their food waste reduction efforts, it is important to understand the perspectives of an emerging group of stakeholders in the food sector who are swimming against the current to participate in the CFE.

Drawing on interviews with 22 informant CFE stakeholders working in the CFE, this study asks two research questions: 1) how do individuals working in the food sector mobilize CFE practices within their work, 2) what are the motivations, opportunities and abilities influencing those working in the CFE sector in Metro Vancouver? The research applies the Motivation, Opportunity, and Ability (MOA) theoretical framework, which states that when an individual has motivation, opportunity, and ability, they can mobilize them to accomplish their goal (van Geffen et al., 2020). Understanding stakeholder motivations, opportunities, and abilities can provide a comprehensive picture of the CFE landscape in Metro Vancouver and lay out relevant information for policymakers about the drivers to CFE participation. The Metro Vancouver food system relies on its provincial regulatory framework but needs a cohesive circular plan for success. This study provides the data that can help align CFE actions and fill the policy gaps with opportunities to reduce and/or prevent food waste. Policymakers should not develop CFE policies in silos as there is no "one size fits all" approach and should consider the flexibility needed by businesses and organizations to pivot and adapt when mobilizing CFE solutions.

Literature Review

The circular economy (CE) is an alternative economic model that incorporates resource efficiency, regeneration of natural systems, and recycling or recovering materials at the end of their life cycle (Bolger & Doyon, 2019; Mukherjee et al., 2023). It is proposed as an alternative to the linear economy that could replace the take-make-use-dispose system (Bolger & Doyon, 2019; National Zero Waste Council, 2021). Morseletto (2020) states that the CE reduces the use of primary resources and closes the loop of materials within the limits of environmental protection and socioeconomic benefits (Figure 1). The CE model meets the needs of the growing population within the boundaries of ecological systems (Cairns et al., 2021). Ghisellini et al. (2016) argue that the CE calls for radical alternative design solutions at the intersection between the life cycle process, the environment, and the economy.

The CE has emerged within the last decade to advance sustainable development through supply chain management and managing products at the end of their life (Ashton et al., 2022), a reliable way for businesses to support environmental integrity and regenerate eco-industrial development (Ghisellini et al., 2016). Although the CE is open to a variety of interpretations (Morseletto, 2020), Temesgen et al. (2020) argue that it does not answer the ontological and epistemological questions needed to address the complex environmental, economic, and social problems of society, perhaps because the CE is practice-based, and led by businesses, consultants, policymakers, and political think tanks (Ashton et al., 2022).

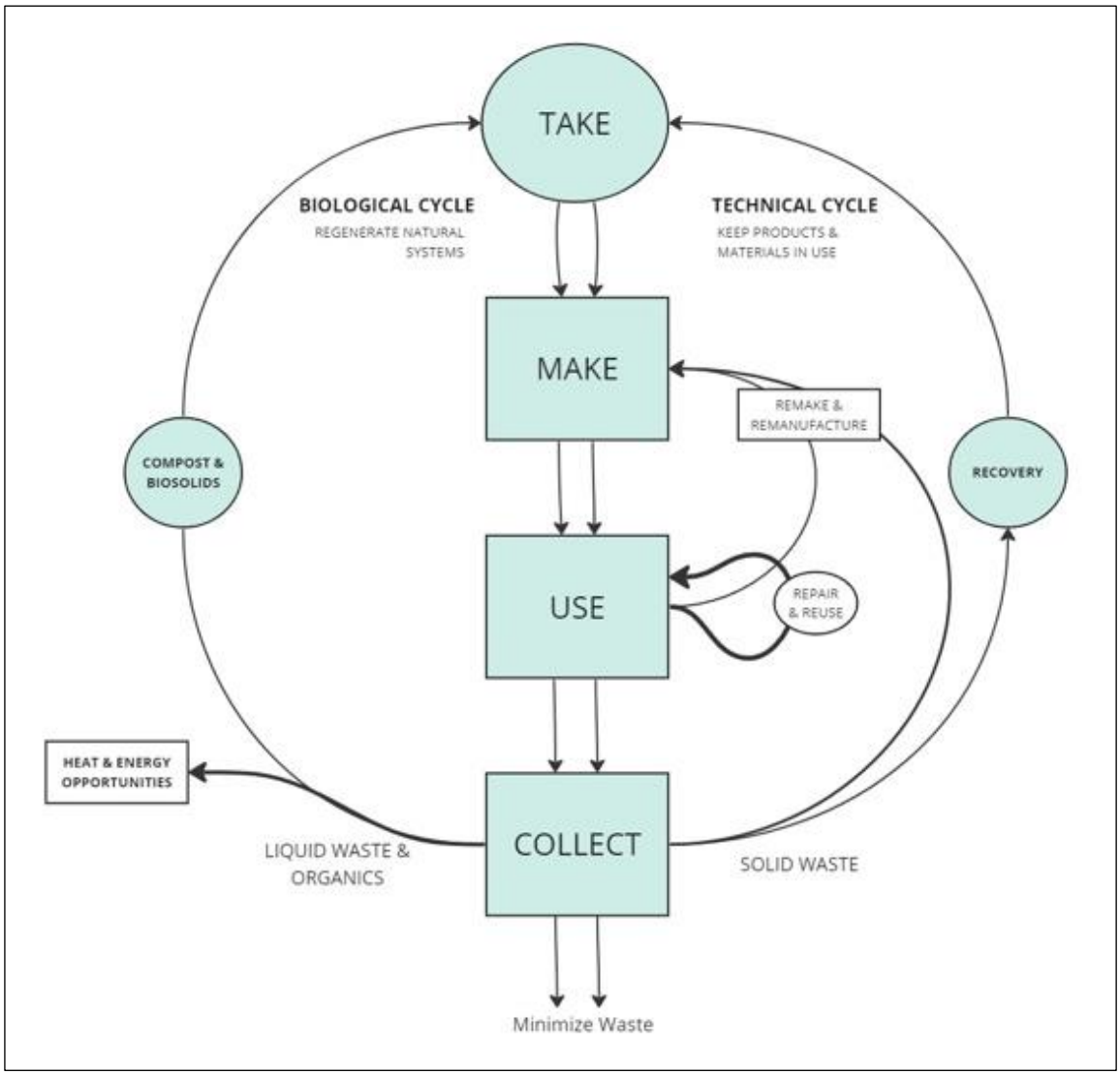
There are several types of CE models, particularly among business models in sectors such as agriculture and food products (in which this research is situated), furniture, textiles and apparel, electronics, and equipment and machinery (Bocken et al., 2019). Mukherjee et al. (2023) explain how the CE can exist among businesses that adopt a variety of structures and ways to contribute to the economy. These include upstream solutions such as value creation, partnerships and collaborations, and downstream solutions such as revenue mechanisms, offerings, valued delivery, and products. Although businesses play a large role in CE implementation, governments can play a supportive role through strategic planning (Bolger & Doyon, 2019). However, as defining CE in urban systems is difficult, it is challenging for local governments

to measure their success in using CE as a tool to reduce waste.

As CE proponents aim to advance economic prosperity, ecological integrity, and social well-being, Ashton et al. (2022) recognize that in practice some of these pillars will win while others will lose, and criticize the current approach to CE for not addressing social inequalities and power structures that exist within circular practices and neglecting the aspirations of community members, particularly the marginalized. Furthermore, some have argued that dominant CE practices can dismiss real issues around worldviews to achieve economic profit, that CE practices can be implemented for "feel-good" reasons or for greenwashing and continuing to promote a consumerist culture (Temesgen et al., 2021). Mukherjee et al. (2023) argue that CE initiatives are often done at only a surface level among G20 countries.

There may also be paradoxical tensions when two of the three pillars of sustainability— economic, social, environmental—conflict (Daddi et al., 2019). De Angelis (2021) defines a CE paradox as "competitions versus collaboration in innova-

Figure 1. The Circular Economy



Adapted from National Zero Waste Council, 2021,

tion for circularity; efficiency versus resilience" (p. 4). When a paradox is present, tensions and contradictions arise among CE initiatives (De Angelis, 2021). Companies within the circular economy could pursue environmental outcomes, such as reusing and recycling raw materials, while raising the quality of the products and simultaneously increasing product competitiveness (Daddi et al., 2019). The increase in production may then contradict the environmental objective of reducing waste. Since the CE is rooted in traditional economic growth-oriented ideology, Ashton et al. (2022) have pointed to the divide that has developed between grassroots CE initiatives and initiatives seeking economic growth. These specific critiques showcase the common CE pitfalls that can arise, some of which are highlighted in this study.

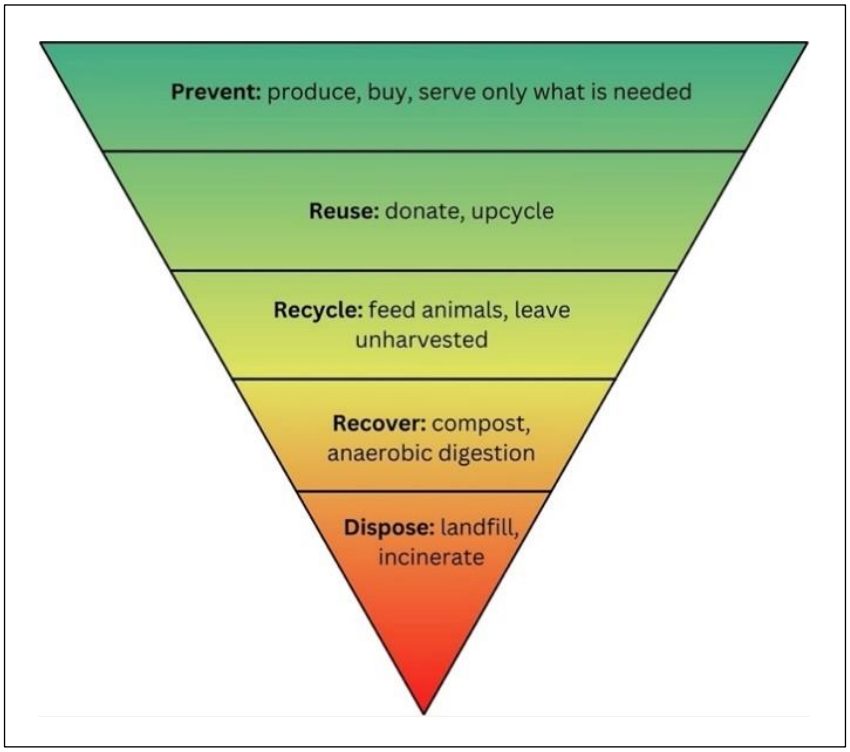
Circular Food Economy

Lugo et al. (2022) define CFE as:

> a co-creative food ecosystem that enhances food safety, food security, and biodiversity conservation, preventing food losses and waste, managing perishability, and using regenerative agriculture through reusing, recycling, recovering, and reprocessing edible food and inedible parts into circular loops and alliances. (p. 29)

The aim of a CFE is to close the loop along the supply chain line and reuse food, minimize surplus, and avoid waste, involving three interconnected stages: food production, food consumption, and food surplus and waste management (Jurgilevich et al., 2016). The process reduces food waste generated within the food system, reuses food, uses by-products, and regenerates nutrients. To support CFE, the food recovery hierarchy (Figure 2) adapted from Kenny et al. (2023) and Papargyropoulou et al. (2014) offers guidelines for preventing and managing food waste most appropriately, with the most preferred method at the top to the least preferred at the bottom. Soma (2022) identifies limitations of this hierarchy, including limiting innovation, lack of consideration of scale, and lack of distinction between types of food. Regardless, food waste prevention is the highest and most important component of the hierarchy, followed by feeding people, then animals, before recovering nutrients and energy (Varney, 2021). Leaving food for landfill and incineration is the least preferred method. Soma (2020) encourages scale to be considered when focusing on preventing waste and on food waste outputs. When wasting food becomes commodified and creates value, there will always be a demand for more waste and less effort to reduce at the source. Therefore, a new framework for a CFE that is also based on justice, reconciliation, and innovation has been proposed (Soma, 2022). It is thus clear that transitioning to a CFE is complex

Figure 2. The Food Recovery Hierarchy



Adapted from Kenny et al. (2023) and Papargyropoulou et al. (2014).

and multi-dimensional, requiring systemic innovative solutions (Cairns et al., 2021).

CFE is unique from other CEs (e.g. textiles, construction waste) due to the perishability of the materials. In the food supply chain, there are varying levels of production, availability, and seasonality which result in different conditions than those of CEs whose materials could be used in a variety of ways (Lugo et al., 2022). Therefore, some of the barriers and opportunities in the CFE may be specific to the food sector.

Coghlan et al. (2022) suggest that considerations of CE social benefits are often missed. Leipold et al. (2021) found that in CE narratives in France, social issues are often excluded from political conversations, leaving them solely economics-based. The social sector is complex in a CFE. as there are several stakeholders, with competing interests and varying levels of influence (Lugo et al., 2022). These opposing interests raise new questions about the ability to plan for a cohesive future with a common set of visions (Barry et al., 2018). However, diverse visions and solutions can also be a tool for resiliency in CFE, as recognized in other food systems resiliency studies (Cabell & Oelofse, 2012; Worstell, 2020). Mourad (2016) identifies these competing interests to contribute to either "weak" or "strong" sustainability. For example, recycling and recovery may support incremental change, as they are considered "weak" solutions compared to waste prevention, a "strong" solution (Mourad, 2016). To go beyond weak solutions, Mourad (2016) argues that food systems governance structure needs to be rethought, including the power relationship between producers, manufacturers, retailers, food banks and other actors.

A CFE aims to transform the economy, presenting new, innovative business opportunities so that food is reused, recycled, recovered, and reprocessed (Lugo et al., 2022). Businesses would have the opportunity to redirect food, perhaps giving it to people in need (Leipold et al., 2021; Papargyropoulou et al., 2014), creating upcycled products from material that would otherwise be wasted (Jurgilevich et al., 2016) or creating fuel and energy through anaerobic digestion (Usmani et al., 2021). A CFE leads to new business models, creating innovative jobs (Lugo et al., 2022) and generating technological innovations to promote sustainability models (Springle et al., 2022). All these alternatives fall at various points of the food recovery hierarchy. Their implementation by actors in CFE can better be understood through the lenses of the motivation, opportunity, and ability framework.

Motivation Opportunity Ability (MOA) Framework

The MOA theoretical framework is used in this study to analyze CFE practitioner experiences. According to MOA, if an individual has motivations, opportunities, and abilities, they can mobilize these elements to accomplish their goals and change a behaviour (Ajzen, 2002; Ölander & Thøgersen, 1995; van Geffen et al., 2020). Motivation involves one's desire, readiness, intention, values, or willingness to make the change; Opportunities refer to the extent to which preconditions or limitations impact actions to make the change; and Abilities are the skills, knowledge, proficiencies and habits available to make the change (MacInnis et al., 1991; Ölander & Thøgersen, 1995). When tackling food waste reduction, motivations can go beyond personal interests to include values, yet these values can be hindered by other factors (Soma et al., 2021). For example, if one wants to reduce their household food waste because they value environmental conservation, they are considered to have high motivation; if they are educated on ways to reduce waste at home through meal planning they have a high ability; however, if they lack the time to meal plan they have a low opportunity (National Academies of Sciences, Engineering, and Medicine [NASEM], 2020). Therefore, an individual's value may not be supported by an enabling environment that would allow them to act accordingly. This phenomenon is also known as the "value action gap" (Barr, 2006). Various scholars have adopted the MOA framework to better understand environmental and sustainability behaviours (de Jonge et al., 2014; Ölander & Thøgersen, 1995), including reducing food waste (Soma et al., 2021). The novelty of this study is that using the MOA framework it explores the practices of an emerging group of CFE practitioners, and therefore

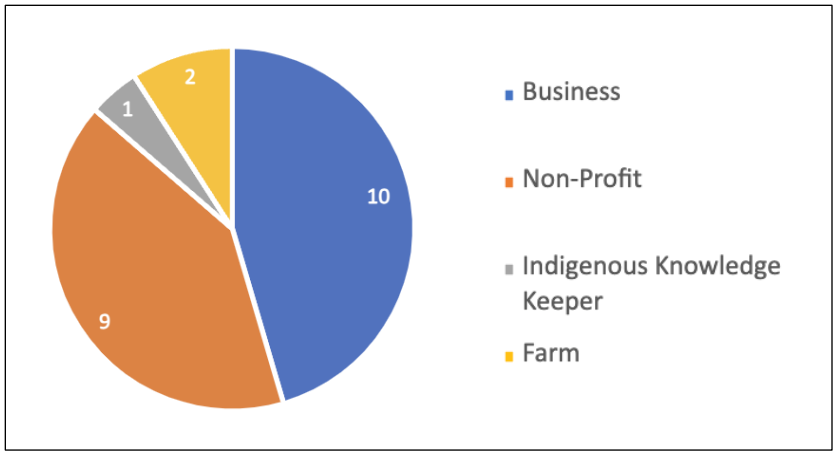
provides useful insights for future interventions to encourage involvement in CFE.

Methods

The participants targeted for this study were working on various CFE initiatives in Metro Vancouver. Purposeful sampling was used to ensure that interviewees presented information-rich cases (Baxter & Eyles, 1997). The participants targeted for this study were working on various CFE initiatives in Metro Vancouver. An initial list of potential informants meeting the criteria was created based on researchers' networks and reports published on best practices of circular food economy initiatives (Cairns et al., 2021; National Zero Waste Council, 2021). There was a conscious effort to ensure that a diversity of voices was included as research participants. Once an initial round of potential interviewees was established and interviews were underway, snowball sampling was used to purposefully obtain additional information about potential interviewees (Naderifar et al., 2017). From January 2023 to March 2023, 22 semi-structured informant interviews were conducted with various CFE stakeholders in Metro Vancouver. It is important to note that several groups declined the interview invitation due to capacity constraints; some organizations noted that their CFE work in the region had ceased to exist when they were contacted. These challenges highlighted the emerging nature of many of the start-ups and social enterprises working in this sector and are included below. Among the 22 stakeholders interviewed, 10 represent businesses, entrepreneurs, or for-profit enterprises, eight represent nonprofit organizations, two represent farms, and there was one Indigenous Knowledge Keeper, Leona Brown, who expressed consent and preferred to be fully named. Interviewees represented a variety of cities in Metro Vancouver, including Vancouver, Burnaby, Richmond, North Vancouver, Delta, Langley, Abbotsford and Tsawwassen. The sectors represented are shown in Figure 3.

Interview questions were open-ended and semi-structured, and focused on participants' motivations, opportunities, and abilities working in the CFE sector in Metro Vancouver. The questions were designed to better understand why people do their work (e.g., values), what supports or barriers they face, and how they define a CFE. Interview questions attempted to avoid using the terms CE or CFE to avoid any confusion around this emerging jargon and to ensure accessibility. Instead, questions focused on food waste reduction and prevention, as well as food-related efforts in sustainability, all of which can be connected back to the CFE concept. Analysis of the interviews started with the first author coding using NVivo and developing a coding tree based on the MOA framework. The preliminary codes (coding tree) and quotes were then shared with the team, and we collectively applied Ryan and Bernard's (2003) thematic approach for qualitative research. Based on further reviews, the team proceeded to winnow the themes, identifying subthemes and then ensuring that that code is categorized and linked back to the theoretical framework (Ryan & Bernard, 2003).

Figure 3. Distribution by Sector of Those Interviewed



Limitations

The participants and organizations contacted were not an exhaustive list of CFE initiatives in the region due to personal network limitations, or failure to identify through online searches. Although there were a variety of attempts to diversify the interviewee group, they were met with challenges, especially with

capacity constraints in smaller initiatives. A major limitation of this study is that of the 22 participants, very few were from minority groups and only one identified as Indigenous. Lack of adequate representation of racialized communities in the sustainable food sector may indicate the variety of barriers to entering the CFE space and green innovation in Metro Vancouver (Varney, 2021; Warshawsky, 2021).It is important to note that this study focuses on the MOAs of individual practitioners in the CFE: the broader systematic aspects of CFE are beyond its scope. Since many stakeholders interviewed are leaders of their organization, their identity and their MOA can be strongly tied to the group they are representing, making it difficult to distinguish between their MOA and their organization's MOA. Despite these limitations, this paper allows for a fairly realistic overview of the current CFE landscape in Metro Vancouver.

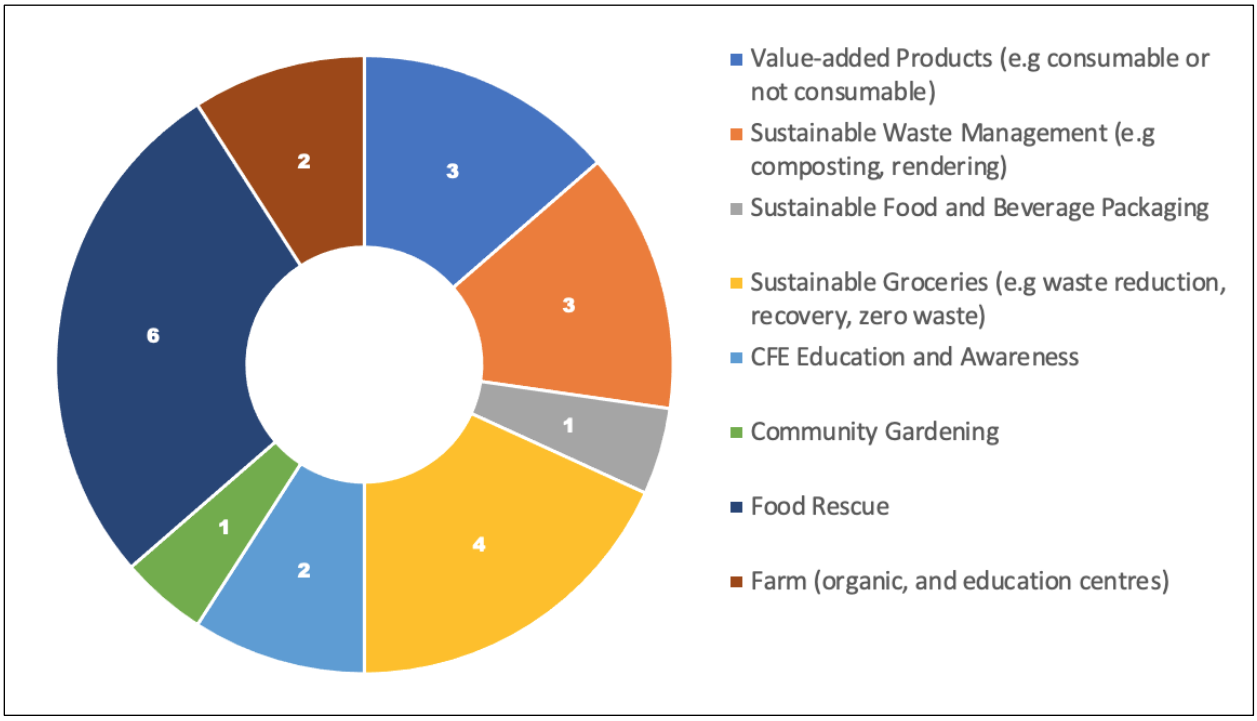
Results

This section summarizes the main findings from the key informant interviews. The findings from this study explain the complexity existing around a CFE in Metro Vancouver that will be considered in the discussion. The following sections outline how individuals working in the food sector mobilize CFE within their work, followed by their motivations, opportunities, and abilities.

Circular Food Economy Mobilization Practices

Figure 4 outlines the eight different ways the CFE is mobilized through the work of stakeholders in this study. Many (n = 10) of the groups interviewed apply CFE approaches to rescue and/or redistribute food. They include nonprofit organizations that acquire food from grocery stores that would otherwise be wasted and redistribute it locally to those in need, following a food banking-type model. Many of the food rescue nonprofits receive their donated food from large grocery stores. Other rescue groups take food from farms that would otherwise be wasted, and either distribute it to those in need or turn it into value-added products. Stakeholders interviewed contribute to CFE through value-added initiatives, through their food retail businesses. Food retail businesses sell food in various forms, through alternative grocery stores such as zero-waste grocery. Those working in the composting sector mobilize in a variety of different

Figure 4. Overview of the Circular Food Economy Mobilization Practices of The Interviewees



ways, such as through nonprofit and community education, consulting services, or soil restoration. Finally, a variety of these stakeholders, particularly the farmers, reduce waste at the source and contribute to the CFE by circulating nutrients back into the soil.

Conflicting Landscape and Competing Visions of Circular Food Economy in Metro Vancouver

There was a clear divide between CFE approaches, which at times led to tensions between CFE practitioners. This was especially true between individuals working in larger organizations/ companies and smaller ones. There were also tensions between a charity or small-scale approach and a for-profit approach to CFE. One farmer felt that small-scale operations are not to be compared to large corporations: "[the name of a large-chain supermarket], they have food waste, we don't have food waste" (Farm 1).

Several participants also alluded to the dependency of CFE on the charity model, particularly focused on food rescue. As one nonprofit worker noted, large grocery stores have food rescue charities to fall back on when they produce a lot of waste: it is their "get out of jail free card" (Nonprofit 3). This focus on putting the responsibility of food waste reduction on nonprofits led one business to question the mission of food charities, and whether their work is based on social services and needs, or is a way to let companies producing waste off the hook. One CFE business argues that charities are having to pay for the inability of companies (often grocery stores) to manage inventories (Business 5). They stated that nonprofits focusing on food rescue are the ones receiving much of the grant money, which leads to greater competition among initiatives. Further, they alluded to how this approach is reducing the supply of food waste: "[The] upcycling business, they are competing against nonprofits, for feedstock, guess what that does? It drives down the supply for these not-for-profits" (Business 5).

Some of the individuals felt conflicted about making a profit from CFE, especially when there is dire food insecurity. This was perceived by one participant as a lack of values (Nonprofit 8); that while there is a range of people doing CFE work for environmental sustainability, in the last five years, they have seen more approaches entrenched in profit-making.

Motivations

Under the category of motivation within the MOA framework, we sought to understand what made the participants motivated to be involved in CFE initiatives. These motivations are the values, beliefs, and attitudes that propel the stakeholders to participate in CFE despite numerous obstacles.

Environmental motivations

Reducing food waste for environmental and sustainability reasons was the primary motivation for the majority (n = 14) of the participants, who felt proud to be able to contribute to something that supports environmental protection, especially with the growing pressures of climate change and inequity in the agri-food system. One individual from a food rescue organization said that reducing food waste is a "very apolitical way to dramatically cut emissions because it doesn't matter what side of the political spectrum you're on, nobody likes food waste" (Nonprofit 1).

For-profit stakeholders see the need for businesses to behave more responsibly within the food industry, in which there is a lot of waste. Furthermore, individuals from nonprofit and for-profit organizations alike found personal reasons to contribute to a CFE. An industry leader working in composting noted "I've got three kids, and I want them to have a future that is not the way it's going right now" (Business 5). There was a sense of accomplishment and gratification among those who felt good about contributing to a different type of business practice and challenging the status quo.

Social equity and health motivations

Interview participants were also motivated by social justice considerations such as solving food insecurity. One nonprofit participant identified low income and the high cost of living to be the causes of food insecurity and stated that their food rescue programs give people the resources needed to move towards food independence (Nonprofit 4). For one industry participant, CFE practices can be

a tool to support marginalized communities: "I really see the circular economy…as a mechanism to support community to empower and uplift communities as a whole" (Business 3). Several interviewees recognized the health benefits their initiatives provide community members; for example, through upcycling food with added nutrients or providing healthy food to people in need.

Economic motivations

Participants were motivated when they felt that their initiatives were providing something different, not as common in the current linear economy. One farmer discussed how the CFE can be a model for cooperative economic development (Farmer 2). A group felt that through direct sales from farm to consumer they are developing an alternative economy, that removes the "middleman" or intermediary and reduces the risk of waste (Nonprofit 3). Nonprofit and for-profit participants alike were motivated by the educational opportunities that a CFE presents, bringing food waste knowledge and education into people's homes.

Indigenous values

The majority of stakeholders were motivated to reduce food waste by various values they felt underpin the CFE. Circularity in the case of Indigenous Knowledge Keeper Leona Brown (who expressed consent and preferred to be fully named) was motivated by Indigenous values:

> Circular food is something that Indigenous people lived by. We had no waste, there was no waste of anything. Every part of food or plant medicines was used in some shape or form, whether we're eating it, or we're wearing it or, we pray and we give it back to the land, to the trees [and] we never had garbage, we never had a landfill pre-colonization. So, what did we do? We actually would bury food by a tree. If it is bones or something, we leave it out, and we pray and give it back to the land. So another animal will come along and finish off those bones or whatever meat that we did not eat. We give it back to the land, and the land feeds back with what we need. So, it is a circular motion.

Opportunities

In the MOA framework, opportunities include the structures, systems and materials that may support the participants in creating an enabling environment to act in accordance to their values. The findings highlighted current opportunities that facilitate CFE work, as well as gaps in opportunities that may hinder CFE work despite high levels of motivations and abilities.

Supporting opportunities in the CFE

Partnerships and collaboration. Many stakeholders highlighted the support to contribute to CFE they receive from community and business partnerships and collaborations. One nonprofit participant shared an internal motto: "Do what we do best and partner for the rest" (Nonprofit 1). This opportunity was common among organizations that identified having limited capacity. Some stakeholders were also provided funding by government partnerships (Nonprofit 4, 5; Business 7) and provided research work by academic partnerships (Nonprofit 1, 5; Business 8). Collaborative learning opportunities helped support stakeholder opportunities, such as the Circular Food Innovation Lab through the City of Vancouver (City of Vancouver, 2023).

Collaboration was deemed important for ongoing initiatives with the CFE in Metro Vancouver. Two nonprofit participants believed that collaboration is critical to a successful CFE (Indigenous Knowledge Keeper and Nonprofit 4). Some groups were interested in building a "food hub" for circular food services, so that, for example, if one group receives a large donation of a food type, they can distribute it to where it is needed more. It was clear that partnerships can streamline operations. Three business interviewees described how partnering with food rescue nonprofits was useful to their operations (Business 8, 9, 10).

Existing systems and structures. Regionally, provincially, and nationally, existing systems and structures have helped CFE initiatives. Organizations that have charitable status found certification critical when applying for grants. The green bin or composting system within municipalities was crit-

ical to many organizations that did not want to see food go to landfills (Nonprofit 7; Business 4, 7; Farmer 2). The Buy BC logo, which identifies a packaged product as produced in BC, and the B Corp certification, which ensures companies meet certain social and environmental standards, were recognized as important to consumers, and therefore important to stakeholders (Business 1, 10; Farmer 2). These are trusted labels on packaging that consumers recognize, possibly making shopping decisions easier. Canada Helps, a system that streamlines donation administration for nonprofits, was helpful in operations (Nonprofit 9). One interviewee's business exists within the Agricultural Land Reserve, a British Columbia region set aside for agriculture and the food industry. They stated that having this land and the farm designation helped their operations because they would not have been able to find similar space in Metro Vancouver (Business 5).

Political and economic opportunities. Participants noticed that there seems to be a political and public window of opportunity with increased attention to CFE. They stated that as CFE relies on the will of political leaders, organizations feel supported if leaders are interested. "It depends on what the interests of policymakers are, these initiatives could be important or not," said one interviewee working with farmers (Nonprofit 3). A nonprofit participant recalled many decades ago when there was "suddenly a provincial mandate to keep waste out of landfills" and composting became of interest to the government (Nonprofit 5). Multiple stakeholders noted how the public has been paying more attention to food and environmental issues over the last few decades. Some stakeholders working on CFE initiatives in Metro Vancouver saw a gap, or opportunity within the market, to advance a circular initiative in a collective manner.

With the growing prioritization of CFE, participants have observed an economic window of opportunity due to some changes in behavior that support CFE in the food industry. For example, stakeholders shared that they are seeing more of a market opportunity for "ugly" or misshapen produce, dehydrated food, and frozen foods that reduce food waste (Nonprofit 3, 5). In addition, businesses are noticing that suppliers are also more open to circular packaging, or reducing plastic packaging, than they were five years ago (Business 8, 10). One business interviewee finds hope in the growing number of upcyclers, academics, and food rescue groups contributing to the CFE (Business 4), which as will be demonstrated in the section below (see Abilities) are creating professional and intellectual support for CFE action. Therefore, the opportunities created by new niche markets and social networks are aligning the motivations, opportunities, and abilities of the participants.

Lack of opportunities in the CFE

Conventional industrial food system. The main challenge stakeholders face in their CFE work is the entrenched practices of the conventional industrial food system, such as high aesthetic consumer standards and over-purchasing to fill grocery shelves (Nonprofit 1, 3, 4, 7, 8). Others pointed to how easy it is to waste food due to the current "best before" date system (Nonprofit 4), and because how time-consuming processing and cooking food can be with busy schedules (Nonprofit 8). As one interviewee argues, "waste costs are too cheap and reinforce the status quo of food ending up in our waste streams" (Business 4). This interviewee also noted that there is no regulation for businesses to report their food waste, which they identify as a problem for measuring a baseline and reducing waste.

For-profit participants pointed to the high barriers to entering the retail/grocery business in Canada due to the few dominating corporations with the largest buying power. This makes it difficult for innovative grocery shopping alternatives. One company said that it is difficult to incentivize the CFE because the end product can be expensive to consumers (Business 8). A interviewee suggests a potential underlying cause of the expense problem: "in the food industry, there's constant fighting for margin…the most unsustainable thing has been our food prices, I think our foods been subsidized for so long" (Business 1).

Lack of funding and high operational costs. Not surprisingly, a lack of funding and high opera-

Table 1. Frequency of Barriers Identified

Barrier	# of Participants
Lack of funding	9
High staff turnover/Reliance on volunteers	7
Limited ability to grow the organization	5
High cost of land or real estate	5
High cost of labor	5
High cost of living, supplies, food	6

tional costs were considered key barriers by stakeholders working in the CFE. Table 1 shows the frequency of barriers identified by the 22 participants; some spoke about multiple barriers.

Some individuals from businesses felt limited in the support or opportunity to grow within the CFE. For example, one stated that because they do not make edible products, they have been eliminated from food funding sources despite their usage of food waste (Business 6). It was clear that CFE businesses wanted investment to move toward circularity and business model innovation. The lack of funding limited their ability to grow: a participant stated it was "really hard to do system change whilst doing operational stuff" (Nonprofit 1).

While most nonprofit and for-profit participants identified negative issues around funding, various stakeholders have received funds from municipal, provincial, and federal grants including the Canada Summer Jobs program, and two nonprofits have ongoing funding (Nonprofit 2, 5). Although the funding of running a small business is difficult wherever it is located, businesses stated that "one of the biggest problems is doing this in Metro Vancouver" due to the lack of land or warehouse space and the high costs associated with the region (Business 2).

Regulatory challenges. Nonprofit and for-profit interviewees alike have found difficulty advancing CFE initiatives due to a variety of regulatory challenges. Interviewees experienced restrictions involving red tape, bureaucracy, and business permits. One farm identified the extensive health restrictions and guidelines small farms must follow in order to access larger grocery markets (Farmer 2). Two participants noted the temporary restrictions during the COVID-19 pandemic when they were unable to reuse plastic containers (Business 9) or redistribute food from open packages (Nonprofit 7) for public health objectives.

Businesses are also frustrated by the lack of regulation around reporting amounts of food waste, leading to greenwashing. Currently, businesses are not obliged to make public their waste reduction techniques, and many for-profit stakeholders believe this lack of transparency has led to greenwashing. One participant is waiting to see how Metro Vancouver will support the CE and green entrepreneurs through supportive regulation. They believe governments speak about supporting green initiatives, but there is little action. Therefore, they are considering moving their business elsewhere (Business 1).

A nonprofit participant asserted that the government needs to take a leadership role in CFE (Nonprofit 4) instead of businesses having to convince the government of its importance. A business participant discussed how government regulation can inhibit innovation; for example, strict composting regulations can inhibit a business's ability to be creative with compost (Business 3). However, this issue is complex, as other CFE stakeholders want to see stronger food policy from governments. Multiple interviewees stated that having a policy around food not going to waste could be an effective way to support the CFE (Nonprofit 7, 8; Business 10).

Abilities

The category "Abilities" within the MOA framework refers to the knowledge, expertise and skills that would be needed to support CFE work. As CFE is an emerging sector in the Metro Vancouver area, the findings can help identify existing resources that can support new practitioners as well as gaps in training and education.

Education and training

Among the stakeholders interviewed, many stated

that their university degrees and certificates have helped them navigate their work in the CFE. A nonprofit employee emphasized the learnings they have received from Elders and First Peoples (Nonprofit 4), whose teachings on circularity and values resonated enough for them to integrate them into their work and circular initiatives. Some stakeholders were motivated to acquire their own education and conduct research. Many interviewees entered their current role with previous relevant experience that led them to learn about food waste. For example, many nonprofit participants had previous volunteer experience. Others had worked in the food industry and in restaurants as chefs. Some interviewees had been employed in the nutrition, science, or healthcare sectors. Lived experiences outside of formal education were also relevant. For example, one participant vividly learned a good deal about waste from the experience of having young children.

Professional networking and resources

After education, the most frequent "ability" was the organizational relationships and collaborations in Metro Vancouver CFE, both for-profit and nonprofit alike. A nonprofit participant stated that their whole work on CFE was "literally built upon connections" (Nonprofit 7). Nonprofit organizations frequently found that community events allowed them to learn from experts what is possible for a CFE. Many stakeholders felt that relationships they have developed have been critical to their success. Many groups found connecting with other organizations, sharing resources, and collaborating on ideas to be effective ways to reach goals: "We rely on a network of professionals across the food supply chain, in policy, technology, hunger relief, food systems, data analytics, and community development space, to help us do what we do" (Business 4).

Discussion and Recommendations

Address Competing Priorities

The findings of this study highlight the deep tensions and competing priorities that exist within individuals engaging in CFE. Some participants from for-profit companies thought nonprofits were compensating for the mismanagement of inventory by grocery stores. Grocery stores have been determined to be contributing to "charity washing," along the lines of greenwashing (Mourad, 2016). Charities recognize this as a problem, as businesses may "download all of the costs and the labour onto charities" (Nonprofit 1). Some CFE individuals wanted to turn the nonprofit model on its head and were motivated to reinvent an economically profitable solution to food rescue. However, this approach was criticized by the nonprofit participants, who claimed that a for-profit approach did not recognize the social inequalities that could develop within circular models (Ashton et al., 2022). For example, by profiting off surplus food or unmarketable food, they fear that it may reduce the amount of food that can be used by charitable organizations and not-for-profit food rescue groups to support individuals who are food insecure. At the same time, individuals working in both nonprofit and for-profit food rescue CFE could be criticized for not focusing on systemic changes (Temesgen et al., 2021), or the root causes of the food waste problem, thus ignoring the food recovery hierarchy, which prioritizes waste prevention above all (Papargyropoulou et al., 2014). Long-term sustainability efforts such as prevention could be difficult to quantify for CFE initiatives, as they lack tangible characteristics such as recycling and diversion (Messner et al., 2020).

Further tensions arise when all CFE initiatives in Metro Vancouver are competing for the same supply of food surplus and nonmarketable foods from corporate donors. When there is competition for food waste as a feedstock, there are real concerns that prevention will not be prioritized (Soma, 2022). The commoditization of food waste (Mourad, 2016) in Metro Vancouver CFE aligns with the concept of "prevention paradox": initiatives want to end food waste, but their responses focus on management instead of waste prevention (Messner et al., 2020). Krones (2020) describes how competition in the food waste market has led to a commodity frontier, such that food continues to be commoditized, and the market will eventually exhaust itself and push initiatives to move on to the next commodity (e.g., see Lant et al., 2023, as an example of commoditization of corn and biofu-

els). Thus, the competing CFE solutions do not challenge the underlying power relations between food system stakeholders, pushing food waste concerns further away from political attention (Mourad, 2016). In addition, the findings of this study are consistent with the paradox theory that is widely discussed in circular approaches (Daddi et al., 2019; De Angelis, 2021). The competition between various initiatives for food waste has led to a paradox in Mero Vancouver CFE where the commoditization of unmarketable food can lead to prevention being contrary to their interest and the growth of the sector. Even among the nonprofit models, their economic goals, needs to acquire grants, and to sustain large outputs of food are pitted against individuals' environmental motivations to prevent food waste or tackle root causes. In Metro Vancouver, an organizational paradox (De Angelis, 2021) is present which exists when organizations compete with others in the CFE sector to acquire the surplus/ unmarketable food instead of collaborating. Therefore, rather than mobilizing circularity for resiliency, circularity becomes a tool for further commodification (Spring & Biddulph, 2020).

The Need for Systems-Based Solutions

Despite the commonalities in individual motivations including environmental, equitable, and economic, the competing priorities within Metro Vancouver's CFE have led to deficient waste prevention which frustrated several stakeholders. A nonprofit interviewee was very adamant in their frustration over CFE solutions because they felt initiatives were not addressing the root cause of the issue (Nonprofit 10). Mourad (2016) has identified the need for a collective approach to CFE to go beyond "weak sustainability" solutions, such as donations, and implement "strong sustainability" which would tackle the root causes. Weak sustainability contributes to a two-tiered food system, that while the well-off enjoy premium food retail opportunities, many Canadians are left dependent on food charities and food banks, pushing responsibility for change onto NGOs and charities (Riches & Tarasuk, 2014). This approach allows large corporations, as one business owner noted, to have a "get out of jail free card" (Business 7) regarding wasteful practices. This two-tiered food system forces us to question what the motivations of the CFE are. One nonprofit participant summed up their struggles with the two-tiered food system of functioning in a system whereby those who are food insecure are reliant on recovered food and their internal conflict of wanting a more transformative solution versus applying an incremental approach, as they note "change the world or keep people alive" (Nonprofit 1). This is consistent with the analysis that circular goals need to incorporate both upstream and downstream architecture (Mukherjee et al., 2023). Despite wide interest in strong sustainability, the lack of opportunities in CFE initiatives is a barrier to enabling systems change. As a result, several business and nonprofit participants face challenges mobilizing their vision due to high operational costs (e.g., expensive real estate, supplies, food, living and labour in Metro Vancouver). Despite their high motivations, some of these factors are beyond their control and could force them to cease operations.

Identify Pathways, Direction and Vision through Intersectoral and Intergovernmental Collaboration

Although there is collaboration in various spaces of the CFE, many initiatives are working in a silo, independently fighting for resource and creating conflicts among their proposed solutions. In addition, some initiatives have neglected the food recovery hierarchy (Soma, 2022), which emphasizes the importance of reducing waste at the source. Since there is no one pathway toward CFE, an overarching vision would help mobilize an overall direction for change and harmoniously weave various pathways together. This study found missing initiatives that aim to bring the sector together through governmentally established CFE pathways. An example of a collective approach was studied by Varney (2021) in the City of Vancouver, using a theory of change model highlighted by diverse stakeholders to identify collective pathways to a CFE and what this might look like from different sectors. It is important to note that the model must be formed in a participatory manner, engaging with more community members to ensure clear, achievable targets (Varney, 2021). While this visioning

process can be facilitated by government, it can also be carried out by other actors and sectors depending on context, place, and culture.

To develop visions and pathways, intergovernmental support in the CFE of Metro Vancouver is necessary. Mourad (2016) insists that varying levels of government rethink their authority around food systems, reconsidering the power relations that governments have with producers, manufacturers, retailers, food banks and other actors. Rethinking could include further regulation and taxation to redistribute wealth within the food system (James et al., 2021). Participants in this study agreed that for an intergovernmental approach to happen, there needs to be political will. An intergovernmental approach would ensure that the invested interest and prioritization of the CFE is not at the will of elections and instead is embedded in policy. There is considerable potential for a progressive food policy that shares contributions from various levels of government, nonprofits, private enterprises, and communities (Warshawsky, 2021). An intergovernmental approach would incorporate actions from all levels of government and clarify whose jurisdiction covers various actions, helping to communicate and design pathways toward CFE and bring resilience to the Metro Vancouver CFE.

Strengthening Motivations, Opportunities, and Abilities for a Circular Food Collective Pathway

When a stakeholder's MOA is inadequate, they are more likely to revert to societal cues, social norms, or the business status quo of business as usual, reducing their ability to make a behavioral change (NASEM, 2020). Increasing motivations among stakeholders can support and strengthen the CFE movement. CFE motivations could be stronger if prevention were seen as a social norm (NASEM, 2020). For example, if food rescue as a means to decrease food waste was not perceived as the only option, initiatives could turn towards a more preventative circular approach. In addition, creating the right opportunities within the CFE landscape can support initiatives when they shit to circular principles. For example, diminished opportunity due to economic pressures such as lack of funding and high rent can reduce motivation to continue with CFE practices.

Various participants in this study are looking for better opportunities in Metro Vancouver CFE, seeking collective action to improve efficiencies and increase capacity. There is a collective interest in the environmental and social consequences of food waste. It is critical to keep this momentum among initiatives in order to hone in on the shared priorities and opportunities which could in the long term change linear business models and policy (Mourad, 2016). Increasing the abilities of CFE stakeholders to participate can bring more impact and even transformation as well, as motivations for CFE cannot solely change behaviours (NASEM, 2020). Educational and skills building for CFE can include collaborative meetings for businesses, nonprofits, academics, and public sectors to connect and learn and strategize around shared targets. Most important, CFE stakeholders repeatedly raised the need to increase education and skills to better prevent food waste through their initiatives.

Conclusion

The increasing level of food waste is causing significant environmental, economic, and social concerns. To address this issue, individuals in businesses, nonprofits, and leaders in CFE are taking on the responsibility of developing circular initiatives. This study asked the following research questions: How do individuals working in the food sector mobilize CFE within their work? What are the motivations, opportunities and abilities influencing the practices of those working in the CFE sector in Metro Vancouver?

The findings indicate a variety of ways that individuals working in the food sector can support a CFE, thus creating their own community-based circular food system. Many initiatives are reducing waste through operations and production, minimizing ordering, growing in smaller volumes, and redistributing excess. Numerous organizations interviewed support a food rescue model, in which food that would be wasted is donated or purchased from various sources and redistributed. Other organizations follow a food bank-style system. Many businesses interviewed contribute to CFE through upcycling and value-added products. How-

ever, within this diverse landscape, there is conflict and competing visions, which lead to tension.

Furthermore, stakeholders were motivated to contribute to the CFE for environmental, socially equitable, and economic reasons, as well as to incorporate Indigenous values. Stakeholders found support in partnerships and existing structures in the food system, and through windows of opportunity. However, their opportunities were inadequate due to the conventional food system, lack of funding with high costs of operations, and lack of government support. Participants indicated their abilities to contribute to the CFE were substantially due to education and professional networking or resources.

The findings of this study indicate competing priorities within the CFE, leading to a paradox among motivations and conflict as numerous CFE practitioners struggle to follow the food recovery hierarchy, which prioritizes reducing food waste at the source. Strengthening the motivations, opportunities, and abilities of CFE practitioners in Metro Vancouver can help identify diverse CFE pathways. Future CFE studies may explore how diverse CFE approaches can contribute to overall food systems resiliency.

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