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MICROMENDING THE METABOLIC RIFT: AN ANALYSIS OF FOOD WASTE COMPOSTING SYSTEMS IN LEXINGTON, KENTUCKY

THESIS

A thesis submitted in partial fulfillment of the requirements for the degree of Master of Arts in the College of Arts and Sciences at the University of Kentucky

By

Casey D. Byrd

Lexington, Kentucky

Director: Dr. Tad Mutersbaugh, Professor of Geography

Lexington, Kentucky

2021

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ABSTRACT OF THESIS

MICROMENDING THE METABOLIC RIFT: AN ANALYSIS OF FOOD WASTE COMPOSTING SYSTEMS IN LEXINGTON, KENTUCKY

The metabolic rift theory explores materials and social exchanges between rural and city communities and human-nature relations. Metabolic rifts can exist both environmentally and socially and are often geographically or culturally unique. Ultimately the metabolic rift is earmarked by an increasing disconnection between humans and their environment. This thesis draws upon life cycle analysis studies, social economic studies, and environmental and sustainability studies to argue that large scale contemporary urban composting efforts, although well intended, are insufficient to mitigate the effects of the metabolic rift. Mobilizing theories around capitalism and the metabolic rift, this research paper connects social, environmental, and economic notions of striving to mend the metabolic rift and challenges the efficacy of composting to achieve this goal.

KEYWORDS: Composting, Metabolic Rift, Marxist Geography, Micromending, Sustainability

Casey D. Byrd

5/4/2021

MICROMENDING THE METABOLIC RIFT: AN ANALYSIS OF FOOD WASTE COMPOSTING SYSTEMS IN LEXINGTON, KENTUCKY

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5/4/2021

Acknowledgements

"Just like Appalachian women, Ironweed has strong roots that imbed it into the mountains, holding firm so it can't be uprooted without a fight. We Appalachian women are also rooted deep in the mountains, held to the land we love, willing to fight to save it"

-Joan V. Linville

This project was inspired by Tad Mutersbaugh, my committee chair, and his previous experiences researching compost systems. Tad's consistent guidance and encouragement helped see this project through from inception to completion and I am deeply thankful for the past 2 years I've spent working with him on this. Thank you to my committee co-chairs, Cagle and Ted Schatzki—your comments, suggestions, and questions were integral to the fine tuning of this research. Thank you to each of my interview participants, I feel honored to have shared Zoom time with you during the pandemic and appreciate the stories and memories you shared with me.

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Project Background

An “irreparable” rift in the processes between human and nature exists, it is manifested today as global climate change, mass extinction, soil degradation, ice cap loss, more frequent and intense natural disasters, and much more. However, this project argues that a mending of this rift is not only possible but happening simultaneously all over the world through a phenomenon I call “micro mending”. To explore micromending, a term coined later in this research that explains a social and metabolic phenomenon, we look towards local composting efforts as representative of a broader micromending. I chose composting because food waste is symbolic of the problems inherent in global systems of capitalism and composting attempts to address the larger ecological concerns around food and organic waste. Contemporary composting systems confront many cost and operational hurdles however, barriers to implementing large composting systems cannot be fully resolved through composting technology because better operations can help, and micromending also provides a path forward. However, a comprehensive solution will require fundamental changes to the food and waste disposal systems.

To honor my Appalachian background, I must include a little storytelling. Here, I give the background story of what brought this project to fruition, this type of background story is atypical in academic theses but it’s part of future history and it ought to be told…

I walked the secluded field lined with three long mounds of partially decomposed food and organic matters, those very same fields my grandfather worked as farm manager for UK’s Coldstream Farm. The sweet earthy aroma is unleashed from the depths of the

compost piles as steam slowly trickles into the air. As I use a small skid steer to turn the windrows, whole oranges topple down the bucket and watermelon rinds matted with worms are exposed underneath as black soil like particles are tossed like confetti. A large HEPA mask blocks the aroma and steam but I know it well, it's the smell of my childhood.

I was in my mid-twenties and pursuing my bachelor's degree in Boston, Massachusetts. I saw several white vans parked with the words "Bootstrap Compost" emblazoned on both sides, I could vaguely recall seeing the 5-gallon buckets on doorways and porches around the city but had never quite understood their purpose. One snowy day I caught a driver of the van and asked what kind of composting they were doing in the city, "Y'all municipal or just hippie trash folk?" I asked him quite bluntly. The driver perked up with excitement and quickly said "We are a compost subscription. People pay us to haul away their food scraps and compost it into a usable agricultural product." I was instantly hooked. Shortly after, I quit my salaried corporate management job and began hauling scraps for Bootstrap Compost part time. Folks would see our van and honk to wave at us or yell out "LOVE YOU BOOTSTRAP", it felt like I was a superhero and composting was my superpower.

In 2017, I Instagram messaged a Lexington, Kentucky non-profit organization I had volunteered with in the past called Seedleaf. Ryan Koch answered, and I told him a bit about what I was doing for Bootstrap Compost. I told him I really wanted to share what I had learned with Lexington, Kentucky. Ryan and I both agreed we didn't want to be in competition with one another in such a small town and that it would be worth exploring the costs of a community compost program. During the following year we

discussed how things would work, what pricing would be, he and Christine Smith, the current Seedleaf director flew to Boston to meet with me and tour large scale compost systems. My father called me a few months before I was slated to move home, he informed me that he snagged a 2001 Ford Ranger on the way to the junkyard and was going to fix it up for the Compost Carpool to kick off. The vehicle ended up being a financial nightmare, but the gesture was exactly the investment we needed to get residential composting started in Kentucky. After I let Ryan know, I had secured a vehicle and could be a paid hauler and co-founder of the residential program, we agreed that I would be relocated in Kentucky and ready to launch the Compost Carpool in January of 2019.

A few months and a few thousand miles later, Seedleaf launched Kentucky's first ever residential compost program, the Compost Carpool. Throughout the year, the program expanded their city contract to serve 35 restaurants/cafes and 96 residential subscribers. Sadly, in March of 2020 when the COVID-19 pandemic was brewing, Seedleaf sent an email to all of their newsletters subscribers stating that "...this work [composting] is costly and requires a great deal of resources. Unfortunately, we simply cannot continue to invest the organizational energy and financial resources into food waste collection in a way that is sustainable or safe for Seedleaf and its staff at this time. We are sad to see this operation end and we appreciate your understanding… All pick-ups will cease March 29th." (Seedleaf, 2020). Despite being laid off in the face of an impending global pandemic, community composting wasn't a dream I wanted to back down from yet, so I emptied my personal savings into the purchase of a pre-owned F150 and 100 yellow buckets and lids, giving birth to Treehouse Compost LLC.

Bringing residential composting to Lexington and letting urban folks know that composting is possible, and it is beneficial has been a pipedream of mine that started with my very first batch of finished compost (Figure 1). As I have been in the private compost industry for five consecutive years now, I am seeing deep issues with access to large-scale composting systems and the benefits of those systems. I humbly welcome you to my master's journey and hope that the end product will contribute to the growing body of literature on the metabolic rift and community-scale composting.

With many years as a compost fanatic, there is so much I could say on composting. First and foremost, I want the readers to know that in Appalachia, and rural farming communities more broadly, composting is a culturally important and ritual that spans across generations. Anytime I mention compost in my community, there is always a few people that get starry eyed and share fond memories of their grandparents' compost pile and their first memories of composting. For Appalachia, composting is part of our people's histories, stories, and legacies and we ought not overlook the value of these shared stories and histories. Like many others in my community, composting can be emotionally evoking and serves to connect us to our lands and peoples of the past. However, as compost is gaining the attention of urbanites and multimillion dollar companies, I want to stress the importance that we not lose the social and cultural histories of composting.

Secondly, as I have witnessed in the compost community, community-scale composting systems are often led by or executed by queer and marginalized populations. However, there is a lack of academic research around the identities of radical urban composting to back up my observations. Another observation I made is that municipal

composting and larger contracted composting services tend to align with white hetero-normative work cultures and headed by rich white men that are politically and economically privileged. Again, these are purely my observations and there is no academic research to back up these claims.

Unfortunately, due to COVID-19, this research project doesn't dive deeply into the identities and social histories of the composting in Kentucky. Furthermore, due to the COVID-19 restrictions in place during the time I conducted my research, I decided that this would be a research project focused on pre-consumer waste composting systems in Lexington, Kentucky. This project looks at the social, economic, and natural implications of composting systems as it relates to the metabolic rift theory and is centered around two different yet similar composting systems operating under systems of capitalism. This project shows two sides of the compost puzzle, one where community members use a composting service to address environmental concerns, and one where a large university uses a composting system to help save money (or create a potential future revenue stream) and meet internal sustainability goals.

Figure 1: Using my first batch of compost. Highbridge, Kentucky. Circa 1995

Positionality Statement

"Students new to fieldwork may be tempted to individualize the problems and ethical dilemmas they encounter, thereby assuming that these issues stem from a lack on their part (of confidence, training, contacts, knowledge, intelligence, etc.). If researchers are individualizing their doubts and problems, they may be reluctant to make them part and parcel of their written work, thereby obscuring the ways in which politics and ethics are systemic elements of fieldwork." (Sundberg, 2003: 187).

I am a student that is new to fieldwork. I am a new business owner. I am a new academic. I am learning so many things related and unrelated to my graduate studies. This isn't my world, and I will make beginner mistakes in my research. In this research project, I strive to address the mishaps, barriers, and shortcomings of my research head

on. I come, as a queer compost hauler from the holler to the ivory tower to call attention to community-scale composters and our value within urban sustainability initiatives.

Established at the University of Kentucky and owner of Treehouse Compost, this project takes place in my home field and is the fruition of a lifelong compost obsession. As a queer white Appalachian living with physical and intellectual disabilities, I understand that I have a limited perspective on the experiences of urban communities and community members of color. I am privileged in the fact that I am a white academic and reside on 10 acres of green space in Appalachia. My father was the first of our family to attend community college, and I am privileged to have been the first generation Undergraduate and Graduate student in my lineage.

It is important to note that I am coming into this project from being involved in the public, private, and non-profit realms of urban composting. Public initiatives can do a lot in terms of system scope and social reach but due to large amounts of public investments and capital needed for large systems, they can oftentimes fall victim to the unjust system of capitalism in which it operates. On the other hand, nonprofits often use composting as a way to boost donations and grant writing potential, which in the case of Lexington, ultimately caused a financial burden on an important nonprofit organization leaving the nonprofit organization limping and the compost system fractured.

Due to the deep fondness many of the participants of this research study hold for composting, exploring the social, cultural, and generational changes involved in the urbanization of composting would be immensely interesting, however it is largely outside of the scope of this project. Instead, this project looks towards the concurrent attitudes of

compost system participants in Lexington, Kentucky and how composting interacts with broader conversations around the metabolic rift.

Chapter One: Introduction

Over the past decade, composting has been gaining the attention of businesses, educational institutions, residents, and private business owners in urban communities. This research investigates the intricacies of compost systems while exploring the barriers of composting in Lexington, KY. This project undertakes a critical analysis of the two prominent compost systems in Lexington, Kentucky: (i.) the University of Kentucky (UK), and (ii.) Treehouse Compost (TC). These two efforts differ in both scope and institutional setting but both, in their own regard, embody the growing national trend of urban composting in America. While composting systems are a better alternative to landfilling organic matter, they aren't sufficient to fully ameliorate the effects of the metabolic rift. However, composting can be an important first step to fostering broader socio-environmental change. Often, contemporary composting systems "discount" the true environmental impacts of organic waste, meaning the overall costs are not accurately accounted for (often because these expenses are paid much later for by future generations). Moreover, the lack of true accountability in composting systems leads to false confidence in the idea that composting's environmental impact is much more impactful than it is.

Simply stated, the metabolic rift represents a massive break in the human-nature relationship at a social and metabolic level. The metabolic rift is a larger symptom of capitalism and is operationalized in this compost systems-specific research. This research argues that because composting systems exist within inequitable systems of capitalism, they are not suited to fully mitigate human waste's influence on climate change and environmental degradation. In summation, this research project shows that implementing

composting systems to divert waste from landfills is simply not enough and must be accompanied by a multi-faceted community effort to re-envision our current systems and mentalities around consumption and waste.

This research's marrying of composting and Marx's critique of political economy makes sense in 2020 because composting is becoming a highly sought-after solution to global waste streams. As the demand for composting technology, regulation, and social/cultural participation is steadily increasing, asserting a critique of the political-economic aspects of composting is paramount. Although the limitations of this study are dense and wide-reaching, this project serves as an example of how critiquing political economy in the face of the sustainability era is not only beneficial but sorely needed. Therefore, many of the paradoxical components of urban composting programs are explored in this research.

This research project provides an intimate look at two of Lexington, Kentucky's food-waste composting systems in order to challenge larger structures of outdated waste collection systems. Composting is a growing trend nation-wide that most commonly operates within gray areas of local, state, federal and environmental laws. This research ignites a renewed conversation within academia and argues that urban governments such as Lexington, KY must support multiple types of composting initiatives to ameliorate the effects of the metabolic rift on a micro-scale rather than flock to a single contract or municipal composting program. However, interwoven throughout this project, the main focus of this thesis is not centered around urban government support or planning. Instead, this project focuses on the metabolic rift theory, a relatively recent theory that is steadily gaining popularity among a diverse range of academic fields. Although the metabolic rift

theory is complex and dense, briefly recounted, the metabolic rift is the break between humanity and nature (Foster et al., 2019:7). Contemporary capitalism ensures the rift between humans and nature is inherited through a complex and overwhelming global system of capitalism and social/cultural trends. The rift is a symptom of how capitalism is changing the metabolic relations between humans and nature and is the greatest threat to human existence such as global climate change, deforestation, mass extinction, etc. (Foster et al., 2019:7).

The metabolic rift is attributed to have been discovered within German philosopher, economist, and social theorist Karl Marx's work *Capital Volumes 1-3*. However, little was applied to the deep ecological considerations and writings of these works until the late 1990's. As evident through Marx's writing and journals, throughout his life he became increasingly concerned with ecological factors under capitalism, writing about things such as soil exhaustion, food deserts, consequences of the separation of town and country, and the metabolic rift. These considerations led scholar John Bellamy Foster to identify and extract some of the earliest concepts of ecological sustainability as written by Marx (Foster, 1994:13-14). The conception and reinterpretation of Marx's ecological theory stems mostly from contemporary arguments that Marx wore "blinders". Critics of Marx's ecological perspective often claimed that Marx was blind to the exploitation of nature, nature's role in the creation of value, the existence of distinct natural limits, nature's changing character and the impact of this on human society, the role of technology in environmental degradation, and the inability of mere economic abundance to solve environmental problems (Foster, 1999: 373). However, as Foster has written extensively on the topic for over a decade, Marx had in

fact understood these concepts all along. For this reason, it should be noted that the majority of the metabolic rift theory is John B. Foster's interpretation of Marx and not the direct words of Marx himself. Therefore, when available, Marx citations will be provided, when unavailable, Foster will be cited.

The metabolic rift is central to this research project and is explored in greater detail in chapters 2,3 and 4. Far from the environmental activism that is central to discussions of sustainability and environmental concerns, some of Marx's writings have long been criticized for its advocacy of "mechanistic Promethanism" (Foster, 1999*:*138). However, it is imperative to understand Marx's development of his ecological perspective detailing environmental concerns dominating conversations today so that we may grapple with the consequences of late-capitalism and find hope for a sustainable future. Throughout this literature review, these six points will be referenced in an attempt to validate Marx's ecological perspective and that of the metabolic rift theory.

Central to Marx's ecological perspective is that the development of materialistic thought is closely aligned with Lucretius's immortal death in which history (expressed socially and naturally) represents transitory processes. Foster claims that "The strength of Marx's analysis lies in its emphasis on the quality of the interaction between humanity and nature, or what he was eventually to call the "metabolism" of humanity with nature: through production" (Foster, 2000: 114). Moreover, in Marx and Engels' *The German Ideology* they began breaking away from Fuerbach's traditional thought surrounding simply contemplative materialism, naturalism, and humanism thus invoking practicality within these theses. Foster elaborates that, "For Marx and Engel, all of these abstract, speculative views of 'critical criticism' needed to be countered through the development

of a materialist conception of history." Marx and Engel's basis of their arguments begins from a realist perspective. This realist perspective is centered around a material world (nature) being a precondition of human's existence thus meaning production is also a precondition for human existence because it gives sustenance (Foster, 2000: 114).

Marx and Engel's theory and intellectual development led them to the understanding that poorer people, especially rural populations, are exploited and deprived under capitalism. This understanding is central to the town vs country component of the metabolic rift theory. Exploited through the depletion of soil fertility, physical health, and global connectedness and through this understanding, Marx began to understand the deeply ingrained division of town and country. Foster's interpretation of Marx insists that, "One of the first tasks of any revolution against capitalism must therefore be the abolition of the antagonistic division between town and country...antagonism between town and country was one of the chief manifestations of the alienated nature of bourgeois civilization." (Foster, 2000*:* 137). Foster claims Marx sought to reconnect agriculture with manufacturing industries because Marx theorized that through this combination, this mending of the rift between country and towns would bring life to wastelands.

Marx and Engel saw the importance of soil preservation and regeneration as a way to mend these urban wastelands. In essence, Marx's analysis of metabolics shows that materialist conception is drawn of nature rather than of history thus setting the stage for a metabolic rift theory. Marx employs metabolism within *Capital* to processes of humans and nature. During his lifetime, agricultural shifts led him to critique environmental degradation linked to the global climate change crises of today. Grappling with Malthusian ideologies, Marx tended to side with James Anderson's theories due to

Anderson's inclusion of differential rent, soil fertility, and understanding of soil composition. Anderson's earlier models of differential rent exhibited an understanding that humans could degrade the soil as they had the power to improve the soil through technologies and interventions. Moreover, Anderson understood that the growing division of country and town had led to the loss of natural fertilizers like manure. As city populations grew, horses filled urban commuter's needs rather than being rural farm horses which derived rural areas from an abundance of horse manure for fertilizer use (Foster, 2000: 137-145).

In connecting the production of capital to the commodification of lands and non-human actors, Marx's critique of capitalism was profoundly shaped by the second agricultural revolution because it brought with it an understanding of land fertility and the consequences of human action. Occurring between 1830-1880, the second agricultural revolution is characterized by the growth of soil science resources and the rapid development of the fertilizer industry due to the soil fertility crisis (Marx and Engels, 637-39). Inevitably, the differential rent theory became a prominent influence in Marx's conception of soil fertility's relationship to capitalism.

"These thinkers argued—with the presumed backing of natural law—that lands that were naturally the most fertile were the first to be brought into production and that rising rent on these lands and decreasing agricultural productivity overall were the result of lands of more and more marginal fertility being brought into cultivation, in response to increasing demographic pressures. Further, while some agricultural improvement was possible, it was quite limited, since the increases in productivity to be derived from successive applications of capital and labor to any given plot of land were said to be of

diminishing character, thereby helping to account for the slowdown in growth of productivity in agriculture. All of this pointed to the Malthusian dilemma of a tendency of population to outgrow food supply—a tendency only countered as a result of vice and misery that served to lower fecundity and increase mortality, as Malthus emphasized in his original essay on population, or through possible moral restraint, as he was to add in later editions of that work." (Foster, 1999: 374).

The relationship to soil fertility and rent prices under differential rent theory showcases Marx's understanding of the domination and commodification of nature under agrarian capitalism. Differential rent is simply mentioned here to showcase the historical implications of adding money value to soil and land quality and is extended no further in this project. However, the rift's theory connection to geographical and environmental studies could be a game changer in the fight against climate change because there is a growing body of academic literature that critiques modern "sustainability" rhetoric as frequently promoting individualism and prioritizing capital growth rather than fostering communal change and putting the environment first[1]. Despite the economic connections to the rift's continuation, conceptions of sustainability rhetoric still assert that we can, in

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[1] https://scholar.google.com/scholar?q=sustainability+promotes+individualism&hl=en&as_sdt=0&as_vis=1&oi=scholart

An overview of the academic literature showcasing sustainability and it's problematic assertion of individualism.

essence, buy our salvation when in fact, it does the opposite.

Although the potential for compost systems to mend some aspects of the metabolic rift is promising, large-scale compost systems can be costly, require extensive partnerships/capital investment and can take years or decades to become profitable, making the current state of compost-systems an undesirable option for many municipal solid waste (MSW) programs. Moreover, this research argues that we must not take sustainability-based initiatives such as composting at face value for they seldom address the overarching issues of capitalism. Furthermore, understanding composting systems is important because food waste is a major contributor to the global climate crises and often acts as a "solution system" implemented to mitigate growing concerns surrounding landfills and waste management. An analysis of Lexington, Kentucky composting systems illuminates numerous hurdles that large scale composting systems face in the Bluegrass Region.

1.1 Research Questions

This project focuses on the metabolic implications of two composting programs in Lexington, Kentucky. An investigation of UK and TC's composting program's system (operationally and structurally), capital investment, and program participant identity/managerial rhetoric. The research questions I developed to frame my research were as follows:

RQ1: Does composting ameliorate the effects of the metabolic rift in Lexington, Kentucky?

Central to this research project is the idea that composting could offer a more ecologically and socially conscious alternative to waste management systems in urban

areas. This research question will be answered by secondary quantitative compost research publications, archival research, and qualitative recorded interviews.

RQ2: How is composting conceptualized in UK and TC's compost systems?

This research question is answered in-depth in Chapters 3 and 4. By looking at two different compost systems in Lexington, KY, this research project illuminates the intricacies of launching composting systems to serve a local community.

R*Q3: How does personal identity and socioeconomic status influence composting systems in Lexington, KY?*

This research question is answered by qualitative interview data obtained from participants, managers, or administrators of UK and TC. Due to COVID-19 and time constraints, this research question is not explored as in depth as it should be. Rather, my decision to include this question in this project is to incite curiosity among the reader and inspire them to think deeply about composting systems as places of social, historical and cultural importance.

1.2 Methods and Recruitment

For this research project, I use two main methods of data collection for this project: qualitative interviews and second-hand data analysis. I use this section as a means of working through the complexities and power relations of field work, especially interpersonal fieldwork during a global health pandemic. I will also discuss recruitment methods and issues I encountered when collecting data (i.e.. redactions) and briefly explore sorts of materials that are important to this study but had to be omitted (give the reasons).

COVID-19 has been a beast for everyone, including researchers and community-composters. I, along with other metabolic rift researchers, argue that COVID-19 has deepened the metabolic rift. Moreover, in grappling with the realities of COVID-19 and the diverse applicability of the metabolic rift theory as a valuable tool for exploring global pandemics (Foster and Suwandi, 2020). However, this research project is not focused on COVID-19 or it's deep impact on everyone, like the urban composters who handle thousands of client's food scraps and collection containers each week. For instance, in New York City The Big Reuse community compost operations shut down for several months due to the pandemic and is now at risk of becoming a parking lot (Chittum, 2020) (#saveourcompost).

Moreover, the disruption in dining halls that COVID-19 has incited has deeply impacted the data collection and financial projections for UK's compost system. Due to the virus and social distancing mandates, it's hard to gauge how UK's financial projections for the compost system fared during its inaugural year. Looking at Treehouse Compost (TC), they had several subscribers cancel service due to economic concerns and job loss during COVID-19. However, TC reported an overall growth in the Porch Pickup program as dozens of Lexington residents found the company in their search to reduce their household waste at a time when urbanites were gardening and cooking at home more than ever before.

My intent for this research prior to COVID-19 was to recruit outside of the Champion's Kitchen dining hall and interview students, professors, visitors, and UK workers about their dining experience and compost system awareness. I scoured the weekly UK e-newsletter and reached out to student leaders, contributors, or recent award

winners and used LinkedIn to connect with UK undergraduate students. However, I was unsuccessful in finding enough undergraduate students that were living and eating on campus during this time and as the reality of COVID-19 being around for many months set in, I restructured my project to be centered around the compost systems themselves.

The social distancing restrictions made it especially hard to connect with my interlocutors during the interviews. To be candid, I am a differently abled student that thrives in one-on-one in-person social interactions and my technical abilities are quite limited in terms of graphic design and social media communication. Moving the interviews and recruitment to be conducted virtually made this research especially exhausting and anxiety provoking for me. At the time of this writing, COVID-19 seems to be far from over which will sustain that challenging nature of conducting qualitative interviews and campus-based surveys virtually. Despite numerous challenges with my initial recruitment plan, I was able to obtain eleven Zoom recorded interviews during August 2020- January 2020 (see Table 1: Research Participants). I interviewed four of UK's compost system partners, one of TC's owners, and six Porch Pickup subscribers. Of the eleven interviewees, all had some college experience, with nine holding a bachelor's degree or higher. Four of the participants self-identified as queer, and only two participants identified as environmentalists.

One of the major barriers I encountered during my research was the use of redactions. Due to the political and legal nature of composting, several redactions, word changes and pseudonyms were employed to protect the identities of individuals. Shortly before scheduling my thesis defense, one of the TC subscriber interviewees emailed me and asked to be completely removed from the study. This TC subscriber said that because

they were moving out of state and had only been a resident in Kentucky for a few months, they felt they could not contribute to the study in a way that fully captured the work happening in Lexington, KY but stated they supported the work of Kentucky composters. Therefore, their interview and information has been redacted and I did not use anything obtained during my interview with them.

The recruitment process for this research comes with its own concerns. First, is there a stronger presence of queer folk in this study because I, the interviewer, am queer. Moreover, the possibility that compost subscribers might have been more compelled to participate in the unpaid interview because of my position in the community could have influence over their responses. The extent to which my own personal identities and community standing impacted my research must be considered when analyzing Table 1 and the subsequent discussions about composting and personal identities.

Perhaps my identities as a queer composter from Kentucky created a unique feeling of safety and solidarity for my interlocutors to express themselves. For some of my interviewees, their participation in this research could have legal or professional ramifications, for others, their participation was relatively low stakes for them. We must take into consideration the varying degrees of risk and reward that each of the research participants were faced with, and how their own identities and community standing may have impacted their decision to participate in this project.

Table 1: Research Participants

Name/Pseudonym	Affiliation	Metabolic Rift?	Identity
Cirrus	UK/TC	N	32-year-old, grad student, queer, BS-Bio/Sustainability background
Shane	UK	N	Father, "citizen", community member, naturalist, BA Ecology-Sustainability Officer at UK
Rose	UK/TC	N	25-year-old vegetarian, queer, trans*, Architecture background, grad student
Charlie	TC	N	Family guy, father, trivia business owner
Dina	UK/TC	N	Woman, teacher, mother, advocate, BA in poli-sci, professor at UK
Sarah	TC	N	Business owner, queer female, rural upbringing, BA Fine arts
Jill	UK	N	Grandmother, activist, environmentalist, Chicago raised, Sierra Club member MA degrees
Carolyn	UK	N	Mother, BA in nonprofit admin, graduate student, Aramark's sustainability director at UK, sustenance/hobby farmer
Joanna	UK	N	UK recycling coordinator, BS in Environmental Science, youth mentor
REDACTED	X	X	REDACTED
Jennifer	UK	N	UK MA alumna, Lexington local, legislative aide for Lexington Vice-Mayor Steve Kay, Wife, Dog mom

After each interview, I coded the content into 4 themes: economic, personal/cultural identity, environmental awareness, and compost operations. Overall, I

was searching for trends and commonalities across participants, cues pointing towards indicators of strong social and environmental awareness around composting, and quotes to supplement my research.

In analyzing the data extracted from the Zoom interviews, I found support for the notion that institutions of higher learning play a positive role in ameliorating the metabolic rift. However, because I am a UK student and conducted this research on a university program, the influence of higher education institutions may be inflated in this study. Interestingly, despite the questions around the validity of the notion, the thematic results support the belief that the metabolic rift exists socially/culturally, spatially, metabolically, and theoretically (in academic writing and adaptations).

1.3 Project Overview

In Chapter two, I present the conceptual framework for my argument and exhibit how the metabolic rift is operationalized in composting systems. I first review literature on contemporary waste management systems with a focus on tracing the systemic barriers to implementing compost systems as it provides important background information on how waste is handled in Kentucky. I pay particular attention to "externalization", a concept I return to in chapters three and four. To conceptualize the major barriers to composting systems, I connect the metabolic rift theory to literature on contemporary waste management systems to demonstrate the relevance of the metabolic rift to waste system analysis. This research is associated with a growing body of academic discourse on the metabolic rift as it relates to composting and sustainability more broadly.

In Chapter three, I provide an overview of UK's compost system and demonstrate the social and operational dynamics of institutional composting. I argue that UK and more broadly, large institutions, can be effective leaders in mitigating climate change inducing greenhouse gases through composting but are ultimately hindered by economics and larger systems of capitalism. I analyze the economic and social conceptualizations of UK's compost systems as embodied in the Metabolic Rift theory and employing a micro-discourse approach.

In Chapter four, I explore the dynamics of community-scale composters and provide an overview of Treehouse Compost's system. I argue community-scale composting systems bolster social awareness and are essential leaders in the community but are constrained politically and economically.

In Chapter five, I conclude with a summary of my findings. I provide discussion on how the UK and TC interact collectively within Lexington, KY. This chapter illuminates systemic issues within large-scale composting systems through a side-by-side comparison of UK and TC's composting systems.

1.4 Lexington, Kentucky

Now more than ever, it is important to examine the role geography plays in inducing the capabilities and benefits of compost systems. Lexington, and Kentucky more broadly, faces numerous hurdles to implementing city-scale composting programs. Carolyn, Aramark's Sustainability Director for UK Dining explains some of the hurdles to large-scale composting in Lexington, "There is a problem that it's cheaper to landfill in Kentucky. In Kentucky there are a lot of rural communities, if it costs money to landfill

then you're going to have a lot of people burning their trash in the country, that's where it's hard to talk about a state-wide composting program."

Lexington, Kentucky is a medium-sized semi-urban landscape situated in central Kentucky's Bluegrass Region. Notably, Lexington is surrounded by an "emerald necklace"—high dollar horse farms and stables that are collectively protected and provide various tourists attractions to the region. Lexington's area size is 285.5 mi^2 and according to United States census data estimates the total population of Lexington, Kentucky in 2019 was 353,152 (Census, 2020). Moreover, the racial demographic estimates show that the majority of Lexington residents are white, with only 28.7% of the total population being people of color (Census, 2020). Of the total residential housing in Lexington Kentucky, 54.5% are owner occupied and 90.9% of residents 25 years or older hold a high school diploma or G.E.D and 42.9% have a bachelor's degree or higher. The median household income is estimated to be $54, 918 with 17.8% of residents living below the national poverty line (Census, 2020).

According to a 2013 audit of Lexington's trash, 27% of the material could have been recycled instead of thrown in the garbage, while nearly 29% was compostable material such as yard clippings and food waste (Angel, 2013). Notably, in 2008, the city of Lexington introduced a zero-waste strategy in hopes to become more sustainable by 2020. The plan aggressively addresses all kinds of waste that typically enters the landfill, but this plan has yet to come to fruition in the face of a newly elected mayor and the COVID-19 pandemic.

The recorded histories of composting within the United States are scattered, incomplete, and in cases like Lexington, go largely unrecorded. Although there would be

much value to embarking on a research project focused on compiling and archiving the histories of composting in North America, this project is unable to take that on. Instead, this section focuses on the contemporary histories of composting in Lexington by beginning our historical timeline in 2008. This timeline is compiled by archival and newspaper data and updated with information discovered during qualitative interviews conducted for this project.

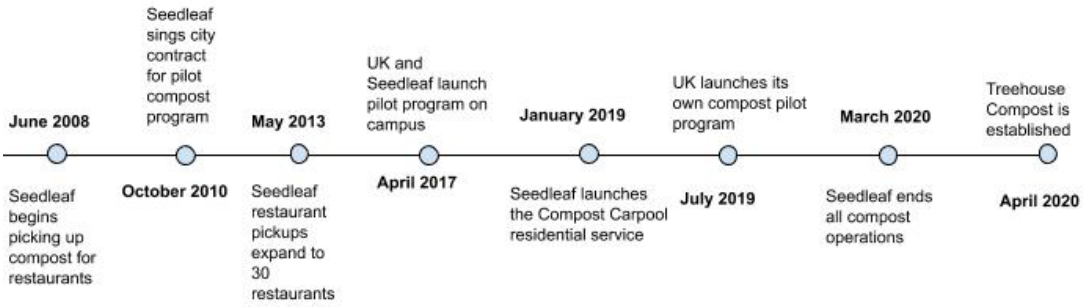
Prior to the announcement of a zero-waste plan, the city partnered with local nonprofit organization, Seedleaf, in 2008 to provide pickups for select restaurants as part of a pilot program (Fortune, 2010). In 2017, Seedleaf found themselves at the center of UK's initial waste diversion plans when they partnered with Uk to launch a small pilot compost program in their on-campus K-Lair and Freshii locations (Conner, 2017). UK estimated that through the Seedleaf pilot program, 200lbs of food scraps would be diverted from landfills into community gardens weekly (Conner, 2017).

UK's K-Lair and Freshii restaurant locations no longer exist in the new student center by 2019, UK announced it had implemented its own institutional pilot composting program in their newly renovated and expanded student center. Through an extensive partnership with UK Dining, UK Recycling, and the College of Agriculture, Food, and Environment (CAFE), the newly built student center has composting system components deeply embedded within its design, because of this, I suspect that planning for the new student center's compost system began in the early 2000's-2010's however I do not have confirmation of this timeline.

Figure 1 exhibits an incomplete historical timeline of Composting efforts in Lexington Kentucky created for this research project. This timeline was built around

news articles and press releases and did not include collaborative efforts with UK to construct. However incomplete, this timeline provides a brief snapshot of the composting landscape in Lexington over the past 12 years. This compost timeline is ever developing but serves as a starting point to writing the histories of composting in Lexington, Kentucky.

Figure 2: A Timeline of Lexington, KY food waste composting programs (June 2008-April 2020)



Chapter Two: Conceptual Framework

This chapter introduces the conceptual framework for my project and calls for environmental studies to integrate the metabolic rift theory, one that has been steadily gaining traction within the Academy (Stoll, 2014). The metabolic rift theory provides an important perspective that can inform and improve large and community-scale composting systems. Moreover, the theory can illuminate larger concerns around capitalism and commoditizing nature in relation to composting systems. As aforementioned in Chapter One, the MR (metabolic rift) represents a massive break in the human-nature relationship at a social and metabolic level. This chapter bridges the Marxist-ecological framework and my operationalized version of composting systems in Lexington, Kentucky. In operationalizing the metabolic rift theory through an analysis of composting systems, this project illuminates the theory's abilities to expose the varying degrees of rifts between rural and urban populations through specific case studies. Although the metabolic rift theory hasn't been aptly applied to assess contemporary composting practices, I argue that MR theory has the potential to:

- expose the importance of addressing the social rift between rural and urban populations.
- assist in the analysis of composting programs and strategies
- clarify the objectives of composting to both service providers and composting participants
- provide a basis for policy guidance at the regional level (across the urban-rural divide)

The metabolic rift is the fruition of the consequences of human labor and the alienation of humans from a cognitive relationship with nature. The rift is often used to depict complex and dynamic changes between humans and nature (Foster, 1999:105). Marx said it best in *Capital Volume One:*

"Capitalist production collects the population together in great centers, and causes the urban population to achieve an ever-growing preponderance. This has two results. On the one hand it concentrates the historical motive force of society; on the other hand, it disturbs the metabolic interaction between man and the earth, i.e. it prevents the return to the soil of its constituent elements consumed by man in the form of food and clothing; hence it hinders the operation of the eternal natural condition for the lasting fertility of the soil. . .. But by destroying the circumstances surrounding that metabolism . . . it compels its systematic restoration as a regulative law of social production, and in a form adequate to the full development of the human race. . .. All progress in capitalist agriculture is a progress in the art, not only of robbing the worker, but of robbing the soil; all progress in increasing the fertility of the soil for a given time is a progress toward ruining the more long-lasting sources of that fertility. . .. Capitalist production, therefore, only develops the techniques and the degree of combination of the social process of production by simultaneously undermining the original sources of all wealth—the soil and the worker." (Marx 1976, pp. 637–38)

Most recently, the metabolic rift has been applied to growing concerns around global climate change, urban pollution, and agricultural production. Although my research focuses on the metabolic rift, and subsequent "micro mending" phenomena, the metabolic rift theory has much potential for the emerging sustainability field.

Often sustainability initiatives such as composting systems assert capitalist ideologies and tend to employ a limited perspective when planning and implementing such systems. Despite the difficulties, problems, and hardships of composting, adding a metabolic rift-focused analysis can better inform planners and designers of their program's discounting, biases, and blind spots. Much like a Life Cycle Analysis (LCA), adding a supplemental metabolic analysis (social, environmental, and economic) and a robust educational update to regular composting maintenance and training would be beneficial to ameliorating a wider range of the effects of the metabolic rift. In summation, this chapter argues in support of the validity and value of the metabolic rift theory as a tool for sustainability initiative planning and maintenance, specifically in large or community-scale composting programs.

A preliminary understanding of the metabolic rift theory and its components is paramount to grappling with the core of this research project's assertion that composting is important and necessary, but it isn't fully equipped to address the complex systemic issues and attitudes around waste in central Kentucky. Despite the rift's contemporary conception in the late 1990's, there is a growing body of academic research and writing that is intricately connecting the metabolic rift to issues of global climate change such as capitalism, commodity chains, and even the COVID-19 pandemic. This research project is a contribution to this growing body of literature and for this reason, I will define the metabolic rift as it is understood for this project in section 2.1.

In my opinion, what constitutes the metabolic rift is dynamic, complex, and geographically influenced. In my research, I found a general lack of familiarity with "the

metabolic rift theory" by name was representative of a type of social rift. However, social awareness is not the only indicator of the rift. In example, agricultural production experiences soil exhaustion and social exclusion whereas urban communities may experience food deserts, urban manufacturing "wastelands", and social disengagement. As Fisher-Kowalski (1998) discussed, "the concept of metabolism is applicable to social systems." and has since been written about extensively in the social sciences. I argue that concepts of metabolism can be applicable to more than just social or environmental systems but economic and cultural ones as well. In short, one doesn't have to necessarily look hard to see the metabolic rift at work.

2.1 Prelude to Framework: Micromending

This section reviews literary calls for mending the metabolic rift and employs a term that I coin in this research, micromending. This term was created in part to explain some of the phenomena observed in this research project and partially to propel academic conversations around mending the metabolic rift further. In order to form a coherent understanding of micromending and its place within the metabolic rift theory, I explore three facets of micro-mending, namely, the social, ecological, and economic dimensions of micromending. To supplement the defining of micromending, I draw quotes from several interviewees who participated in this research project. Micromending contains embedded critique for systems of capitalism that perpetuate the metabolic rift. The totality of the significance of micromending is unknown at this time but the potential for micromending to be adopted within the metabolic rift theory is great. Micromending serves as a tool in which to critique and explore efforts to mitigate the effects of the rift. However, through a micromend analysis, the complexities and boundaries of capitalism

are revealed. Although micromending as a theory is in its infancy, this project invites researchers and academics to adopt the theory to their own research. To understand how current research falls short on conceptualizing a metabolic mending, I turn to Michael Dehaene and his framing the metabolic rift. Dehaene proposes a "mending of the metabolic rift" but ultimately fails to create a cohesive argument for the complexities of mending the metabolic rift.

"The image of the metabolic rift tends to provoke two counter imaginaries: one which argues for a technocratic fix of broken cycles, restoring an image of a world in which flows are monitored, managed and fully regulated; and the other which builds upon a radical critique of the agro-industrial complex that developed hand in hand with capitalist urbanization, and which explores pre- and even anti-urban imaginaries. Both positions are present within the Urban Agriculture debate; however, neither offers a singular solution to 'mending' the metabolic rift." (Dehaene 2016:3).

Dehaene argues that conceptualizing a mending of the rift is not "half baked" but rather a "radical proposition". He proposes that through urban agriculture and place specific preservation of biodiversity there lies a "revolutionary potential" of mending the metabolic rift (Dehaene 2016: 6-7). In closing he states, "Ultimately an urban agroecological perspective presents a vision of an enabling environment where human well-being is fundamentally connected to food production and where this cannot be left to uneven forms of market allocation, dictated by wealth, opportunism or profitability, but rather by a coherent agenda for social emancipation that recognize its constitution within ecological relations." (Dehaene, 2016: 9). Micromending, a term I coin in this research, takes a geographic meaning and is applied to show that compost can and often

does facilitate a small mending of the metabolic rift. This terminology further intends that the metabolic rift is not fully mended, in that it doesn't fully address all aspects of the metabolic rift (social, ecological, economic). A micromend to some may be insignificant or geographically confined, however, as aforementioned, the compost craze is spreading, making the power of the micromend worthy of our attention.

To envision the potential and scalability of micromending, I recall a compost pile and the microbial and macrobial life that facilitates the metabolic breakdown of that organic matter. Whether they be bacteria, fungi, spiders, worms, or actinomycetes they all work together in symbiosis to decompose matter that is millions of times bigger than they. Each organism within the pile has its own unique bodily structures and internal metabolic system that allows it to engage in different, yet complementary tasks within the pile. Applying this thinking to composting systems in Lexington, Kentucky, we see the diversity in compost systems, all vastly unique in their own regard yet working towards a common goal, reduce! Some systems aim to reduce economic loss due to high volume food waste, others may aim to reduce greenhouse gas footprints of their local landfill, whatever the case may be, the desire to reduce brings a diverse group of players to the table.

In the midst of COVID-19 "micro-geographies" have taken center stage within geographic writing as a way to grapple with the spatial changes the pandemic brought us as our world's became increasingly smaller during quarantine. Micro-geography's definition is rather intuitive, it defines distances as measured in meters rather than miles (Liu, 2020). Although micromending is not centered around units of spatial measurement

(as seen in pre-COVID studies focused on industry clusters), we take a similar attitude to micromending.

micromending (my-crow-men-ding) - small scale mending of one or more components of the metabolic rift (social, ecological, and economical). “Small scale” is inclusive to a few square feet, “home range”, or community-scale but excludes whole cities, counties, or states/countries.

The following subsections provide three core subcategories to identify and analytically explore micromending as it relates to composting systems in Lexington, KY. These subcategories embody a riftian perspective and inform this project’s main research question: “Can compost systems ameliorate the metabolic rift?”

2.1a. Social Micromending:

At its core, the metabolic rift is Karl Marx's notion of the "irreparable rift” in the interdependent process of social metabolism (Foster, 1999). This section explores the social metabolism involved in composting systems in Lexington, KY. Within the metabolic rift theory, a social and psychological rift occurs between the urban consumers and rural producers. In contemporary compost systems, mending the metabolism of society embodies the social engagement, education, and awareness of composting systems and practices to the general public. The movement of compost across urban and rural boundaries around Lexington and Central Kentucky can signal a social micromend, this is however, not explored in this research.

Based on the data collected for this study and preliminary research, I expect that mending social metabolism in Lexington, Kentucky is reliant upon several

socio-economic factors (gender, income, education level, etc.) and social media can play an important role in engaging a broader audience in composting systems and rhetoric. I further hypothesize that community compost workshops and collegiate college experience are the 2 most prominent tools to bolstering a social-micro-mend.

Identifying social micromending includes understanding where people purchase their foods, what influences their decision to buy those items, whether or not they compost or reuse food waste at home, their involvement in agricultural related workshops and organizations, etc. Moreover, one could look towards sustainability's social indicators (diversity, equity, empowerment/ community engagement, philanthropy, and volunteerism) to determine who is being engaged and who is being excluded in social micromending as minimizing the social exclusion of various peoples and places in their connection to food production and waste cycles is the goal of social micromending.

More broadly, to identify the presence of micromending effects in a neighborhood or community, one could rely on geographic indicators of sustainability such as recycle bins, compost tumblers in backyards, solar panels, gardens, etc. However, as we will explore later in this research project, composting systems often exist outside of the view of the broader public or hidden in citizen's backyards, making identifying social indicators difficult. Due to COVID-19 concerns and a limited timeframe for this study, I will not include social or geographic sustainability indicators in this study.

2.1b. Ecological Micromending:

Traditionally, ecological metabolism refers to the total energy processed by all individual organisms that comprise the ecosystem and is often conceptualized by analyzing production and respiration. In the spirit of taking a riftian approach, this

research project employs ecological metabolism as the "physical benefits of composting". In essence, exploring how composting changes the metabolics of the ecosystem.

Ecological micromending can be defined as the alleviation of ecological concerns on a small scale. Ecological concerns in the case of Lexington, Kentucky are water, air, and soil quality. My preliminary research consisted of a simple Google search, "compost ecological implications". I found millions of hits all boasting the environmental neutrality of composting but rely on the United States Environmental Protection Act to explain:

"By composting wasted food and other organics, methane emissions are significantly reduced. Compost reduces and in some cases eliminates the need for chemical fertilizers. Compost promotes higher yields of agricultural crops. Compost can help aid reforestation, wetlands restoration, and habitat revitalization efforts by improving contaminated, compacted, and marginal soils. Compost can be used to remediate soils contaminated by hazardous waste in a cost-effective manner. Compost can provide cost savings over conventional soil, water and air pollution remediation technologies, where applicable. Compost enhances water retention in soils. Compost provides carbon sequestration." (EPA, 2020).

At first glance, composting appears to be the answer to our waste problem, one that dates back to ancient Romans as early as 50 AD, as explored more in Section 2.4 (Ezband, 2012). However, the cynic in me compels me to note that composting can be just as detrimental to human and ecological health as landfills if they are executed improperly and without proper training. For instance, salmonella, e-coli, and pulmonary fungal infections are all immediate human risks for composters. Furthermore, mismanagement of the compost pile can cause anaerobic conditions similar to a

landfill— it emits methane instead of carbon dioxide and can contaminate the environment. Wastewater contamination is a major concern of any large-scale compost operation and must be addressed to EPA standards when designing and building a compost facility.

2.1c. Economic Micromending:

Here I lay the groundwork for the idea that the metabolic rift is a tool for capitalism to reinforce itself rather than a symptom of capitalism gone wrong. In this section, I briefly explore several US cities with MSW composting systems and discuss economic barriers to composting. Moreover, I explain how the placement of landfills in rural areas leaves the ecological and health effects of those spaces to disproportionately affect rural inhabitants (Gochfield, 2011).

Based on my preliminary research, I expected to find that the externalization of environmental costs in the landfill industry creates an enormous barrier to implementing an efficient large-scale composting system to service Lexington, Kentucky's waste streams. The findings of this research showcase that urban composting, whether it be for subscription fees or to achieve institutional goals, romanticizes and downplays ("discounts") food waste while minimizing the problems of capitalism. Ultimately, urban composting, and sustainability initiatives more broadly, trivializes the long term (Price, 2005). It is not my intention to explore whether or not composting is "truly sustainable" but rather to unpack some of the paradoxical components of composting programs. To do this, I investigated three lines of thought that follow a geographic framework for analyzing urban composting.

First, from an economic standpoint. The rising costs of agricultural production, transport, and food costs result in over $750 billion worldwide going into landfills (FAO, 2013). The United States accounts for $165 billion of that total (FAO,2013). What's more is that the United States wastes an estimated 25% of total freshwater reserves in producing and ultimately landfilling that food each year (Gunders, 2012). With millions and even billions of dollars at stake here, it is no surprise that economists and large corporations/institutions are routinely involved in conversations and research about waste streams and efficiency

The metabolism between humans and nature is the basis of life itself and the metabolic rift is a symptom showing the depth to which capitalism is squeezing the life out of this planet. As global climate change, social and economic inequity, endless wars, COVID-19, and mass extinctions are concurrent at this very moment, humans are vigorously searching for a solution to end our suffering and anxiety of the future. Whatever the solution we are searching for, be it a vaccine, a sustainable innovation, social justice, socialism, ending climate change, saving the bees, we are all after one thing, to mend our relationship with nature albeit, we are looking to mend the metabolic rift but are failing to address that capitalism is the puppet master behind the suffering.

In the case of food waste, composting appears to be a magical solution for many of our metabolic and environmental woes. Broadly, composting takes organic material and repurposes the metabolic nutrients into a usable agricultural product that also addresses soil degradation concerns. However, there is a side to composting that many outsiders to the composting industry never see or are exposed to. Despite its magical exterior, composting can be a deeply flawed solution that negates larger issues around

food waste, commodity chains, and paves way for a broad abdication of responsibility when it comes to the effects of food waste.

In this chapter, I employ literary reviews and build upon theoretical discourses that are centered around the metabolic rift and Karl Marx's understanding of ecology. In applying Marx's understanding of the metabolic rift to composting through a life cycle analysis, this chapter asserts that the metabolic rift theory is actually a viable analysis for sustainability initiatives like composting. This chapter provides a preliminary understanding of various theories that engage with composting and geographic analysis.

The metabolic rift is operationalized as a break between rural and city spaces (town vs country). This break between urban and rural people and geographical locations is both social and environmental. Food producing spaces now face pressure to become increasingly reliant on patented chemicals and genetically altered seeds to grow more food on a diminishing amount of land that's quickly crumbling to the "wasteland" (Foster, 1999:138). In this study, the metabolic rift theory is applied as the overarching conceptual and analytical tool in which to think about composting systems in Lexington, Kentucky. Employing the metabolic rift theory serves as a tool for analytically improving and critiquing food waste composting systems in spaces outside of Lexington, Kentucky.

By asserting the metabolic rift theory as the core academic theme, this research project shows the enormous potential the metabolic rift, and Karl Marx more broadly, has to inform community-scale composters in their efforts to provide 'micro-mend' solutions that heal, or at least ameliorate, this long-standing rift.

Furthermore, this project serves as an example of critical analysis through a geographic perspective but applies to a growing body of literature that pairs global

climate strife with contemporary capitalism. This project serves as an example of how capitalism is remaking global ecology and fueling human and non-human suffering. However, in applying the metabolic rift theory to composting, this project challenges contemporary ideas around sustainability and waste reduction efforts. My research shows that large scale composting efforts act as servants of capitalism and are poorly equipped to address larger concerns around global climate change and food waste.

Waste systems are intertwined within the town vs. country (TVC) aspect of the metabolic rift because our waste requires vast land; these lands are often situated outside of densely populated areas leaving rural populations with the burden and consequences of living near landfills. Throughout this research project, I will answer how TVC is operationalized and conceptualized in composting systems by exploring where compost systems are stationed and where large amounts of waste are produced. My research shows that although composting is becoming the new face of waste management in America, it replicates some of the old issues that have brought us to where we are today, during a game of chicken with the metabolic rift.

Although TVC is an important and recurring concept throughout this framework the metabolic rift theory more broadly. Marx and Foster's conception of TVC are dense and complicated and wading through the morphosis of the metabolic rift concept is outside the scope of this project. Instead, TVC is interwoven throughout the conceptual framework as one point to be discussed throughout each piece and is explored in detail in the conclusion. In this section, I begin by reviewing the core concepts of the metabolic rift with an eye towards the economic and environmental aspects as key to conceptualizing composting systems.

2.2 Understanding the Metabolic Rift

The metabolic rift has been written as an unavoidable crisis intertwined with the tides of global climate change and socio-economic injustices. John Bellamy Foster claims that the metabolic rift theory can illuminate a larger distinctive crisis of capitalism that is "brought on by the fundamental transformation of socio-ecological conditions to satisfy capital's perpetual thirst for profits and its ability to foster sustainable, human development." (Foster, 2019).

Capitalism (and the metabolic rift it creates) has brought with it profound changes to human bodies and health. Energy dense diets have exacerbated the reality that human metabolism is failing to effectively balance energy input-output for many bodies (Dehene, 2016). Consequently, levels of non-communicable disease such as those associated with overweight, and obesity have risen alarmingly, and governments are increasingly worried about rising healthcare costs. Rayner and Lang (2012) argue that the obesity crisis is simply one amongst many of the complex and inter-connected urban challenges of the twenty-first century." (Dehaene, 2016: 1). Diabetes, obesity, and other debilities give rise to a deeper understanding of the modernized 'urban question' present in the continued division of town and country but is largely outside the scope of this research. However, this discourse can inform us as to how to mend the metabolic rift, for instance, in re-framing the metabolic rift, Dehaene states:

"The image of the metabolic rift tends to provoke two counter imaginaries: one which argues for a technocratic fix of broken cycles, restoring an image of a world in which flows are monitored, managed and fully regulated; and the other which builds upon a radical critique of the agro-industrial complex that developed hand-in-hand with

capitalist urbanization, and which explores pre- and even anti-urban imaginaries. Both positions are present within the Urban Agriculture debate; however, neither offers a singular solution to 'mending' the metabolic rift." (DeHaene 2016: 3).

Dehaene argues that conceptualizing a mending of the rift is not "half baked" but rather a "radical proposition". He proposes that through urban agriculture and place specific preservation of biodiversity there lies a "revolutionary potential" of mending the metabolic rift (Dehaene 2016L: 6-7). Ultimately, mending the metabolic rift evokes a vision of an environment where human health is fundamentally connected to ecological health and where uneven forms of market allocation, dictated by wealth, opportunism or profitability are rejected and replaced by a coherent agenda for social emancipation that recognize and honors ecological relations, this vision is central to this project's analysis of composting systems in Lexington, Kentucky (Dehaene 2016: 9).

Another conceptualization of "mending the metabolic rift" argues we must expand the metabolic rift to include a "knowledge rift" and this inclusion will ultimately deepen our understanding of the metabolic rift theory (Schneider 2010: 466). Moreover, using urban metabolism as a boundary metaphor to reinvigorate research in Marxist theories, political ecology and geography is not a new revelation that political and urban ecology can greatly contribute to our understanding of the metabolic rift.

"As cities and their global impacts grow in importance and urgency, a broad framework that captures the energy and material flows related to an individual city is critical. The urban metabolism methodology is sufficiently robust, standardized, and practical to allow quick uptake by cities and ease of continued monitoring. The framework is also well anchored in existing academic literature and is consistent with

related efforts now underway by cities and their respective agencies. So, it is time for more cities to start measuring their metabolism." (Kennedy 3).

2.3 The Riftian[2] Perspective:

The term rift appears nearly 100 times in this research, it is a central theme of this research project. Foster's recent transition from "metabolic rift" to "ecological rift" seemingly makes the metabolic rift theory more relatable and adoptable to a broader audience and fields of study. For the purposes of this study, I will use metabolic rift and ecological rift interchangeably.

At the heart of the metabolic rift theory is the call to address major environmental problems urgently and succinctly. However, current rhetoric in mainstream society is noticeably concerned less with saving the planet and more focused on saving capitalism- the system at the root of our environmental and metabolic problems (Foster, et al. 2019:7). Within mainstream discourse, we see a socio-economic rift between how we view capitalism in the face of global climate change. One must not search long to find marketplaces selling us "sustainable" products that alleviate the anxiety we feel around the reality that our personal consumption is deeply affecting the environment and our ability to survive long-term. Moreover, we find ourselves in the never-ending search for how we can fight climate change without inconveniencing our lifestyle in any profound way- meaning we are not looking to fix or address the problem of capitalism but rather

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[2] A playful word to describe interjecting a metabolic rift-centered perspective into one's own field of study.

prefer to bandage the symptoms one at a time. As we are beginning to see, our collective efforts to combat climate change since the 1980's has been but a drop of water in the bucket as greenhouse gases steadily pour into the atmosphere and landfills continually filling and expanding but alas! We cannot give up because our survival is at stake.

To grapple with the complexities of the metabolic rift, this project takes a three-pronged approach to addressing the rift, social, ecological, and economic. This project is concerned with the break in relations between various communities and social groups in central Kentucky and is explored in this project's research interviews by asking "Where do you buy your groceries?", or "What's your level of education?", "Where did you grow up? Was it in a rural or urban setting?" etc. The metabolic rift is operationalized in this research as the return of nutrient-rich soil amendment from consumers to nutrient deficient soils as well as the return of social interest and engagement with closed-loop food systems. Closed-loop food systems means that food is acquired directly from local farmers or through grocery partnerships with local farmers and then composted to become soil amendment that is utilized in food producing spaces. The metabolic rift is addressed in my research by exploring what happens with the finished soil amendment produced by both compost systems, where it goes and how it is applied to soils.

This research takes a metabolic rift (MR) perspective and provides an intimate look "behind the scraps" and challenges larger systems of outdated waste collection systems like landfilling and incineration which are known to cause human and non-human suffering. The riftian perspective is deeply rooted in Eco socialism, which refers to a transformed society balanced with nature and is focused on finding alternatives to all socially and ecologically destructive systems (patriarchy, racism, homophobia, etc.). This

research adopts core understandings of Eco socialism into the analysis of composting systems in Lexington, Kentucky. Moreover, applying resources from a growing body of Eco socialist academic research and taking a riftian perspective presents a new way to conduct research on issues of social and ecological injustices or, as I do here, to analyze composting systems.

Ultimately, the riftian perspective is one way to define this project's epistemic perspective. Looking at the broader scope, composting is engaged in conversations around major issues such as global climate change, declining biodiversity, mass extinctions, and global human and non-human suffering; because of this, the riftian perspective can help guide us in understanding what we can and cannot expect from composting systems under capitalism.

My preliminary research suggests that the Metabolic Rift theory is confined to an academic niche and remains relatively unknown among professionals in the composting and waste management field. The following sections broadly address the gaps in the academic literature.

2.4 Life Cycle Analysis: A Riftian Approach

As a life cycle analysis (LCA) is standard in analyzing systems in the environmental and agricultural field, this research proposes a rethinking or restructuring of LCAs based on the metabolic rift theory. Taking a "riftian approach"[3] can help to

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[3] Riftian approach is a term coined in this research to assert that the analysis recognizes and accounts for the metabolic rift as written by Foster.

ameliorate the various metabolic rifts that are occurring. For instance, in exploring how a riftian approach can enrich LCA's for composting systems, we begin with the understanding that the production of food accounts for between 20 and 30% of anthropogenic greenhouse gases globally -- from livestock to agrarian lands to fuel for resource distribution, food production has a huge impact on the environment (Kulak 2013, 68). However, the EPA states that 24.1% of landfill mass is actually compostable food and organic matter, making composting a viable alternative to reduce the mass and size of American landfills[4]. With the mass amounts of resources needed for growing, storing, transporting, selling, consuming, discarding food products, this project must take into account the life cycle of compost. As composting is one potential destination for organic materials, tracing the life of those composted materials will provide a deeper understanding of the intricacies of the agricultural and waste industries that outsiders may not be privy to. Through this example, as we peel apart the complex layers inherent in contemporary waste systems, we reveal social, environmental, and economic rifts that can impede or hinder the longevity and efficiency of any planned sustainability initiatives for the system.

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[4] https://www.epa.gov/facts-and-figures-about-materials-waste-and-recycling/food-material-specific-data#:~:text=The%20estimated%2035.3%20million%20tons,percent%20of%20all%20MSW%20landfilled.

The EPA's 2018 study on landfill materials.

As sustainability and “mending the rift” gain attention on a global scale, we see life cycle assessments (LCA) becoming a growing trend in agricultural industries. LCA’s are a formalized quantitative approach to understanding food chains and supply streams and one of the tools producers and distributors use to track their own environmental impact. Life cycles are the tracking of products from inception to production to consumers that are often used to research impacts of a product or market trench or applied to massive food recalls and food-related health epidemics. “Over the years, LCA’s have been used extensively to assess agricultural systems and food processing and manufacturing activities, and compare alternatives "from field to fork” and through to food waste management.”(Notarnicola 2016, 399).

Traditionally, LCA’s were common tools used in industrial production systems to streamline production while curbing non-essential costs. Today, LCA’s are fundamental to identifying and addressing safety and sustainability concerns within a food system that feeds over 7 billion people worldwide. This section briefly reviews LCA research in academia and instills essential background information in terms of where compost research currently stands and how it can be improved by this research project.

More recently, LCA’s have been adopted by the agricultural industry as “sustainability assessment”. However effective, agricultural LCA’s can often be complex and intermingled as farmers and consumers typically have “co-products” associated with each consumer product. Assessing and tracking these co-products is vital to appropriately assessing the environmental impacts and the product’s by-products (often emitted into nearby waterways or into the atmosphere). Many times, emissions and outputs paired with animal medical care, insecticides and infrastructure maintenance are omitted from

LCA's due to the lack of data for these activities. Most studies of LCA's in agriculture used a "cradle-to-farmgate" geographic boundary that discounts for a true accounting of the farm's actual footprint and sustainability grade (Harris, 2009: 2-5).

LCA's have extended away from food production in recent years, for the purposes of this research, I turn to the work of Julia Martinez-Blanco who used the LCA food model to identify how composting can benefit agricultural LCA. Martinez-Blanco asserts that composting systems should engage and participate in routine LCA-type analyses. In applying an LCA perspective to compost, Martinez-Blanco identified 9 environmental benefits of composting: nutrient supply, carbon sequestration, pest/disease suppression, soil workability, preventing soil erosion, moisture management, fostering biodiversity, increasing crop yield, and better crop quality. As most of the benefits are quantitatively supported, the ability of compost soil amendment to ameliorate some of the negative effects of industrial farming is not in question (Martinez-Blanco, 2013: 720). However, one of the major drawbacks of composting identified in this study is the potential for gaseous/leachate emissions and an increase in salt/heavy metal content in soil and nearby water systems (Martinez-Blanco, 2013: 721). These drawbacks are heavily dependent upon the quality of compost that is applied to the surface area (Martinez-Blanco, 2013: 722) and reliant on stringent education and licensing/permitting.

Although using a LCA model to assess effects of land-application compost, the researchers did not consider the full life cycles of the produce that comprised the compost-- as it has surely lived a full life before finding its way into a compost facility. Contextually, the LCA and other methods of compost system analysis should consider and adopt the riftian perspective that I lay out in this conclusion of this section. For

instance, using compost can reduce the need to use fertilizers and pesticides which ultimately reduce the production and transportation/ carbon footprint of that crop which can ameliorate several ecological effects embodied within the metabolic rift such as soil degradation, plant fertility, resource shortage, changing climate, more intense and frequent natural disasters, etc. Martinez-Blanco's research exhibits the power of composting and compost use in LCA's. The public is becoming more educated on the fact that the use of finished compost compliments agricultural production. Overall, the application of compost has a tri-fold effect on agriculture in that the need to produce, transport, and store synthetic chemicals is eliminated, compost use increases soil workability, a reduction in the fossil fuel usage by farm equipment and blue water usage can be reduced up to 50 % (Martinez-Blanco, 2013: 727-729).

There exist calls for improved LCA modeling because assessments that include compost, the metabolic characteristic of the compost is prioritized while environmental parameters are seldom, if ever, considered. Moreover, the linear modeling of physical flows typically present in an LCA insinuates that these systems are steady-state models. However, the metabolics of soil, compost, and pollutants are never linear and fluctuate regionally and seasonally. Moreover, the amount and frequency of compost application is typically guesstimated for averaged out. The imprecise nature of these models showcases one major flaw when quantifying compost within an LCA perspective. Another issue with the current coupling of LCA's with compost is the assumption that the nutrients (P, K and N) compost provides is unilaterally beneficial. However, when compost is excessively applied to crops, the plants may "burn" due to high volumes of these

nutrients. Moreover, the environmental impacts of excessive P, K, and N should be considered in an LCA model.

Lastly, Martinez-Blanco asserts that the ambiguity of system function definitions dealing with compost application do not create a full analysis of compost application. Economic value, environmental impacts, and nutrient content of yielded products must be accounted for (Martinez-Blanco, 729). LCA's are a common tool in bio management projects and research and because soil loss is considered an ecological ailment stemming from erosion, these impacts and considerations are less regarded in LCA's. Martinez-Blanco summates that the data available for LCA models on the long-term effects of compost applications were "particularly scarce" and asserts that there is a growing need for long-term studies. Like Martinez-Blanco, I agree that there is a growing need for long-term studies of composting systems through a riftian perspective.

This research project argues that compost system analysis, and sustainability-centered analysis more broadly, must adopt a riftian approach if they are intended to be accurate and sustainable. For the purposes of this research, I created four criteria for taking a riftian perspective shown in Appendix 1. Ideally, this riftian analysis would be conducted in tandem with a product specific LCA and used as a supplemental analytical tool to employ as needed or routinely. These appendices serve as a condensed overview of both composting systems and includes suggestions for improvements and changes. However, it must be understood that the information I rely upon for these reviews is incomplete and it is strongly suggested that UK and TC conduct internal metabolic reviews using Appendix 1.

2.5 The Metabolics of Urban Composting Systems:

As explored earlier in this chapter, urban composting is relatively high-stakes in terms of ameliorating the effects of the metabolic rift. By teasing apart the density of the metabolic rift theory we find three metabolic rifts existing within the realm of urban composting. This section asserts a specific breakdown of how the metabolic rift is manifested within large or community scale composting systems. First, a spatial (Town vs Country) rift where food is produced in rural areas and shipped to urbanites. Urbanites then consume and send their waste back to rural dwelling landfills leading to a social or psychological rift wherein people are not concerned with or engaged in their personal consumption and waste. The third rift is the economic rift which can be seen in the pricing differences between landfilling waste vs. composting or recycling waste. However important and interesting, due to the time constraints of this paper, the intricacies of how these rifts interact with one another is not explored in this paper. Instead, this paper focuses on the economic aspect of the metabolic rift.

Waste systems inherently involve Town Vs Country (TVC) because they often expand industry into the country as these industrial waste sites require vast land and are often situated outside of densely populated areas. Although (TVC) is an important and recurring concept throughout the metabolic rift theory, Marx and Foster's conception of TVC are dense and complicated and wading through the morphosis of the metabolic rift concept is outside the scope of this final project. However, landfills present an exemplary case in which to view the economic implications of the metabolic rift. This section builds upon this research project's assertion that composting can facilitate a mending of the social and ecological aspects of the metabolic rift. However, I argue the mending

potential of composting is impacted and impaired by deeply embedded issues such as global capitalism and hegemonic colonialism. In this section, I present composting as a growing global trend that often operates within gray areas of local, state, federal and environmental laws as a community or institutional response to growing concern surrounding that anthropogenic waste exacerbates global climate change.

I expected to discover that large-scale urban composting ultimately reinforces the social-metabolic rift. This section is supported by literature focused on green space and gentrification and infused with quotes from this research project's interviews. UK's composting system represents a shift in institutional responsibility towards environmental sustainability whereas TC's compost system represents a shift in how food scraps and paper are commoditized, it should be noted that TC is a queer Appalachian owned business. The identities created through urban composting distinguishes itself from "garbage men" and challenges the structures of contemporary waste collection.

Although composting has been most commonly practiced in rural settings, for the purposes of this research, we will only be exploring large urban composting (large meaning that it serves 90+ people). As replicated in urban spaces, composting, especially in large metropolis' such as New York City or Boston, is part of urban agricultural spaces and systems of food production. For this reason, it must be noted that urban agriculture is constructed around what Laura-Anne Minkoff-Zern calls an "agrarian imaginary".

The "agrarian imaginary" tends to lean towards a showman-like spectacle rather than the production of anything of material consequence and serves this research in several ways. First, composting in urban (or institutional spaces) represents an "imaginary" in that it is a road less traveled, it is imagining a new way of processing

waste, it is imagining a life where there is truly no "away" to throw things to. Although the agrarian imaginary is not central to this research, it is important to spend a bit of time here. For unsurprisingly, the agrarian imaginary is one of the most prominent means of marketing and branding compost systems like UK and TC (Debord, 2012).

In this research project, I broadly explore the agrarian imaginaries at play through the lens of the metabolic rift but will not focus on writing about agrarian imaginaries. In the case of Lexington, Kentucky, interviewees for this research assert that a "local culture" dominates the local region, meaning the "buy local, shop local, Kentucky Proud" marketing campaign has successfully bolstered local sales, particularly in the agricultural realm. Taking a metabolic rift perspective is intended to challenge the larger structures of contemporary capitalism that bind (agrarian) compost identities, networks, and marketplaces. Although briefly explained above, the Metabolic Rift theory takes to fore of this research. The construction and representation of the "agrarian imaginary" is an extension of urban composting that can lead to the exclusion of marginalized populations. However, valuable this theory may be, it is not developed succinctly in this project because it is largely out of the project's scope. This project's use of the agrarian imaginary and the presence of it within community composting systems seeks to draw boundaries around who and what is included in representations of farmers and agrarian workers and is simply presented in this research as something to think about (Minkoff-Zern, 2014).

Analyzing branding and marketing materials, social media posts, public interviews, and press releases communicated by both programs greatly contributed to the construction of this project's conceptual framework to assist in the exploration of how

these composting programs participate in ameliorating the metabolic rift. Overall, I expected to find that these narratives have profound effects on the ways urban composting develops and grows over time and space.

In the last decade, urban composting has been gaining the attention of businesses, educational institutions, residents, and private business owners alike. Urban composting is a growing trend nation-wide that most commonly operates within gray areas of local, state, federal and environmental laws. This research investigated the intricacies of such programs while igniting a renewed conversation about composting within academia. Although "urban" many urban compost systems rely upon rural areas to process and distribute the compost as is explored throughout this project.

Composting is diverse in scope and practice and has no uniform definition. James McSweeney defines composting as, "The return of organic materials to a rich, stable, humus-like material through a managed oxidative decomposition process mediated by microbe metabolism" (McSweeney, 2019: 4). Metabolism is in McSweeney's definition, but the Metabolic Rift is not mentioned by name. To fully grapple with the importance of including and naming the Metabolic Rift in compost rhetoric is partially explored in food waste data.

Globally, one-third of all food produced is wasted resulting in around 1.3 billion tons of food annually (Kocker, 2018). This wasted food, when landfilled, creates unnecessary atmospheric greenhouse gases that contributes to global climate change and rising global temperatures (Geis, 2016). Methane is produced from anaerobic bacteria (able to live without the presence of oxygen), as a greenhouse gas, methane is roughly 26 times more potent than carbon dioxide (U.S Energy Information Administration, 2019).

President Obama's former EPA director, Gina McCarthy, stated in 2016 that in reducing food that reaches the landfill, we cut harmful methane emissions that are fueling climate change while simultaneously conserving natural resources and protecting our planetary resources for future generations (Geis, 2016).

As composting is often a community or institutional response to the growing concerns around food waste and climate change reporting, understanding the rising popularity of composting is paramount. In the United States, roughly 40 percent of food scraps are landfilled rather than composted (Brown, 2019). This frivolous food waste results in around 3.3 gigatons of methane being produced and emitted by landfills annually (Kocker, 2018). However, according to the Environmental Protection Agency (EPA 2020), American's food composting rose from 1.84 million tons in 2013 (5.0 percent of food) to 2.6 million tons (6.3 percent of food) in 2017. Also in 2017, Americans diverted almost 27 million tons of food scrap through composting. Moreover, food composting curbside collection programs served 6.1 million households in 2017, that number is expected to increase every year (EPA 2020).

As we discovered in section 1.6, Kentucky's landfill rates are the cheapest in the US. Kentucky's. In fact, in 2012 building debris from the East coast's Hurricane Sandy were shipped to a landfill in Ashland, Kentucky. Moreover, neighboring states routinely ship their garbage to Kentucky landfills to save money. The systemically low landfill rates makes rural Kentuckians particularly vulnerable to the health disparities associated with toxic landfills. There is a robust collection of literature on health disparities and landfills, therefore that information is not explored in this research project.

However, large educational institutions, like the University of Kentucky, are recognizing these disparities and systemic issues and are responding in various ways. For UK, they decided to fund and manage their own waste streams through grants and extensive capital partnerships with plans to continually grow and expand their system abilities. The association for the Advancement of Sustainability in Higher Education (AASHE) reports that over 750 US college campuses have composting programs. Of those 750, around 350 stated that they compost an average of 491 tons per campus per year (US Composting Council, 2019).

The results of implementing a compost system often have immediate benefits as the general public often applaud composting efforts, moreover the long-term benefits in years to come are often endless as composting systems often become cheaper to manage and maintain overtime. Arguably, composting is one of the easiest and most accepted ways for individuals, households, companies, large institutions, and legislative leaders to curb greenhouse gas emissions, meet or exceed internal waste reduction goals while simultaneously recycling organic materials into ecological beneficial and marketable products (Mu, et al. 2017).

Cities lacking municipal compost programs and systems, such as those in Lexington, Kentucky, often become home to guerilla-style compost networks and subscription-type businesses like Bootstrap Compost. As a young academic and community composter, I struggled to find high-quality sources to cite information that community composters experience firsthand in my profession. Rejecting the idea of utilizing auto-ethnographic methods, although as an Appalachian, I do engage in storytelling from time to time, I was relieved to find James McSweeney's book entitled,

*Community-Scale Composting Systems: A Comprehensive Practical Guide for Closing the Food System Loop and Solving our Waste Crisi*s. McSweeney's book is by far the most inclusive and comprehensive book to date.

Although it is still considered the "gold standard" for composting to happen on-site or nearby places of food waste production, therefore community-scale composting is a rising trend (McSweeney, 2019: 3). Community-scale composting defines either one composter or a network of composters that gradually grow to meet the needs of communities. From the latter, self-proclaimed "community composters" have risen. The concept consists of 4 components: compost, community, infrastructure, and education. Community composters also adhere to 6 core principles: Resources recovered, locally based and closed loop, organic materials return to the soil, community-scaled and diverse, community-engaged, -empowered and -educated, community supported (McSweeney, 2019:5).

The definition of "local" is not uniform and is an area of debate among many. For instance, the 2008 Food, Conservation, and Energy Act defined "local" as less than 400 miles from a product's origin or within the state in which it was produced. Alternatively, FINE's metrics team shows that institutions and key players across the value chain define local in a number of ways ranging from "within 50-mile radius" to "within New England." (Leighton, 2017). A more regionally specific program in Athens, Ohio's, the 30 Mile Meal program defines "local" as being within 30 miles of the city (DeBruin, 2019: 65). For the purposes of this study, we will assert local meaning within 30 miles of the city.

2.6 Landfills and Externalization

To understand the current barriers to implementing city or statewide composting systems, one of the central conversations within contemporary urban composting systems, we rely upon both systemically and economically upon the destabilization of landfill cultures. Within this section, there are three subsections that are interconnected to my research's main argument: the Lauderdale paradox, toxic landfills, and externalizing environmental costs. Simply put, to replace landfilling with composting, much social, political, and economic leg work is needed. This section further explores the ecological and economic implications of landfills thus providing a rudimentary context in which to view the metabolic rift and composting systems. Framing the environmental conceptualization of landfill-centered waste systems as toxic and inefficient, this section uses secondary professional testimony and research to support my project's main argument.

The process of externalizing the "true" costs of landfilling present paramount barriers to implementing a large-scale compost system in Lexington, Kentucky. Integral to this argument is providing brief historical information on landfills and landfill regulation. Grounding this section to central Kentucky landfills is imperative to grappling with the systemic barriers to Lexington, Kentucky's composting systems ability to offer an affordable alternative to landfills.

2.6a. The Lauderdale Paradox:

To understand how the metabolic rift, and Karl Marx's work more broadly relates to landfilling and composting, we must first understand how capitalism thrives on scarcity. To explore scarcity, we look towards the Lauderdale Paradox that asserts in

order for goods to have a marketable value for exchange, there must be a demand due to scarcity (Foster, 2010:55). Scarcity is especially troublesome when dealing with life sustaining goods (such as food, water, air, and shelter) and deepens all aspects of the metabolic rift (Clark, 2009). However, in terms of Kentucky, a place with plenty of empty land and many economically crippled rural communities, we offer a solution to land scarcity in dense cities like New York, D.C and Boston- all cities that routinely truck their garbage to Eastern Kentucky landfills.

However, the rift results in not only the robbery of nature but the suffering of millions of humans that find themselves without their basic needs being met. The Lauderdale Paradox brings us to the realization A) one of the major conditions of sustainability is that no one owns the earth B) nature is not to be treated as wealth and C) that sustainable relations between humans and nature must be rationally regulated with consideration of the needs of current and future generations (Foster, 2010: 58-61).

Second, Foster asserts that "rather than acknowledging metabolic rifts, natural limits,

and/or ecological contradictions, capitalism seeks to play a shell game with the environmental problems it generates, moving the problems around rather than addressing the "root cause" for we see today developed nations outsourcing much of their carbon footprint to developing nations while claiming to have "made progress towards sustainability goals" (Foster, 2010:74). The commodification and monetization of mending the metabolic rift has long been an economic phenomenon and with the recent rise in the "sustainability" industry, we look to explore how capitalism reproduces the metabolic rift.

2.6b. Toxic Landfilling:

In 2013, Hurricane Sandy devastated the East Coast, particularly New York City and resulted in the destruction of many buildings. Due to the high costs of landfilling waste in that region, much of the NYC debris from the disaster was shipped to a landfill in Eastern Kentucky where it still resides to this day. Despite the geographical distance from New York City to Ashland, Kentucky, the ecological and human health impacts of storing those hazardous building materials in our landfills has been left to remain unseen in the hills of Eastern Kentucky[5]. This is just one of the millions of examples of how capitalism and externalizing the true environmental costs of landfilling impacts potential for businesses and governments to invest in composting systems, everyday Kentucky receives various types of waste that's trucked hundreds, sometimes thousands, of miles away from the large, densely populated cities that created that trash. The waste is silently dumped near the mountainous peaks of rural Kentucky and slowly becomes a toxic hotspot that is deeply impacting the health of humans and nonhumans living in these areas. The disconnectedness between large US metropolises and small-town rural populations within the production of contemporary waste, it is imperative to understand the economic and social barriers to implementing food composting in Lexington, Kentucky. First, from an economic standpoint, the rising costs of agricultural production, transport, and food costs result in over $750 billion worldwide going into landfills (FAO, 2013). The United States accounts for $165 billion of that total (FAO, 2013). What's

[5] https://www.waste360.com/disaster-preparedness/sandys-wake

more is that the United States wastes an estimated 25% of total freshwater reserves in producing and imminently landfilling food products each year (Gunders, 2012). With millions and even billions of dollars at stake here, it is no surprise that economists and large corporations/institutions are routinely involved in conversations and research about waste streams.

The habit of landfilling waste was bequeathed to us by ancient Romans. The oldest known landfill, the Monte Testaccio is believed to have been constructed around 50 A.D. An official date has yet to be obtained from Monte Testaccio for the eldest remnants are inaccessible, nestled at the bottom of the 115 ft mound (Ezband, 2012). Archeologists further speculate the space had no organized disposal practices in place until 150 A.D (Ezband, 2012). Contemporary landfill regulations and laws (1940-1970) stem from a centralized concern for public and environmental health and safety (Hickman, 2016). Compacting trash and increasingly regulated landfill laws and permitting processes became standard in the 1930's and 1940's (Hickman, 2016). Although "sanitary landfills" were gaining attention as a new way to define spaces of waste, it lacked a cohesive standardization system. The lack of consistency resulted in a continued struggle to fully conform to public demands. Public awareness and engagement in the environmental and human health concern surrounding landfills and waste streams arose in tandem with the environmental revolution of the 1970's and helped shape the environmental landfill regulations of today (Hickman, 2016).

Kirstie Pecci, the director of the Zero Waste Project and a Senior Fellow at Conservation Law Foundation is actively engaged in waste reduction and opposing the expansion of landfill and incineration capacity. Pecci asserts "all landfills leak...it is

impossible to keep landfill cells dry." Although landfill liners have been implemented, many US landfills (and incinerators) were "grandfathered" in— meaning contemporary requirements intended for ecological and public health are not required to be retrofitted onto older landfills. Some of these grandfathered landfills have been operating for decades while leaking toxins into public water systems and impacting other ecological systems in the process. Pecci reminds us that "the technology meant to keep our groundwaters safe from contamination was never expected to last." (Pecci, 2018).

From the 1950s through the early 1980s, an era of landfill expansionism in America, some of the largest landfill facilities were first built. To address the demand for developing safer landfills, landfills built during this era were lined with compacted soil and clay to reduce and prevent leaking contaminants from entering water systems (Pecci, 2018). Overtime, this design was proved to be a failure when studies began to illuminate the inefficiency of even twelve inches of clay. The studies found strong evidence that soil and clay liners would begin leaking within 5 years. This realization makes it easy to fathom these landfills, lined or unlined, are leaking toxic contaminants in 2020 (Pecci, 2020). By the late 1980s landfills had ditched the clay/soil liner and focused their attention to plastic liner systems. Today, a dual-liner system is required for landfills. Pecci states, the plastic-liner system is but another temporary solution as the liners are often damaged during installation and are prone to wear and tear damage over time (Pecci, 2018). Another reason these liners are a temporary solution is that when these liners are exposed to be compromised or damaged, they can't be fixed (Pecci, 2018).

Today, federal and state agencies regulate all landfills in the US and with the attention paid to organizing and executing these regulations, you would assume that these

landfills maintain a high level of oversight and inspection. Yet the facade of "safe" landfills is enforced by landfill owners insisting they follow regulations and donning their various government issued certifications and evaluation results (Pecci, 2018).

Pecci explains, "The theory behind landfills is that once waste is buried, the contamination remains inert in landfill 'cells.' To keep the waste dry and contained, landfill cells today are required to have two plastic liners, each backed with synthetic clay, putting a few inches between decomposing trash and the soil beneath it. Once the landfill cell is full, gravel, a flexible plastic cap, and some sods are then built on top of the cell." This process is known as "capping" a landfill, the EPA often oversees permit requests for grandfathered landfills to uncap and expand a landfill cell. However, the uncapping and recapping of toxic landfills, specifically ash from incinerators, brings with it a plethora of environmental and health concerns, such as cancer and respiratory disease.

2.6c. Externalizing Environmental Costs:

The externalization of costs is not directly related to the metabolic rift as Foster lay before us. In the case of Lexington, Kentucky, it is a very important concept to delve into for this research. Although this section asserts a landfill specific perspective, this section is really about economic practices of externalization in terms of the metabolic rift. Capitalism's habit of externalizing the true environmental costs of products is a core theme of environmental economics and social theory but appears much less in sociological and geographical studies (Fairbrother, 2016: 375). Adopting a riftian perspective that focuses on the externalities of capitalism allows geographers and sociologists to further address environmental problems that are intrinsically social, and

often highly political, rooted in relations of injustice and/or distrust (Fairbrother, 2016: 375-76). For the purposes of analyzing Lexington, Kentucky as a geographically and economically unique landscape within the community-scale composting industry, we must understand externalization and how it relates to the price people pay for trash removal. In exploring externalization, we see that even the most "sustainable" solutions to environmental problems ultimately embody a balance of market liberalism and strong institutional regulation that marginalizes certain identities. Because of the problematic embodiment, externalities should be a constructively unifying concept for environmental research across the social sciences and is explored in this research as a review of landfilling costs and practices.

To explore how externalities influence waste systems, we look to landfilling. Although the true external (environmental and social) costs of landfilling--emissions to air, soil and water-- are difficult to quantify in monetary terms and are therefore not generally reflected in waste disposal charges or taken into account in decision making regarding waste management options (Nahmen, 2011: 10). The externalization of the "true costs" of landfilling waste products results in a bias against recycling and composting systems which, from a purely financial viewpoint result in these alternatives being much more expensive than landfilling(Nahmen, 2011: 10).

According to the Environmental Research and Education Foundation (EREF) the national average for municipal solid waste (MSW) landfill tipping fees increased from 2018 to 2019 by $2.74, or 5.2 percent, to $55.36 per ton. EREF's Data & Policy Program's recently released their "2019 Landfill Tip Fee Report" analyzing 398 American Landfills. These demographics of the surveyed landfills were 15 percent large

landfills that accept more than 390,000 tons per year, 44 percent medium-sized landfills accepting between 390,000 and 65,000 tons per year and 41 percent were considered small landfills that accept no more than 65,000 tons per year (EREF, 2019).

The study found that the national average tip fee had increased from $52.62 per ton in 2018 to $55.36 per ton in 2019 (EREF, 2019). The EREF report noted that Alaska, Arizona, California, Hawaii, Idaho, Oregon and Washington have the highest tipping fee, averaging $73.03 per ton, demarcating a $4.57 increase per ton from the previous year (EREF, 2019). On a state-basis, MSW landfill tipping fees vary substantially. Kentucky had the lowest landfill tipping fee of all surveyed landfills at $29.82 per ton. Alternatively, the highest national average was Alaska, bringing in an average of $154.92 per ton. A 1998 municipal solid waste survey found the average cost for municipal composting programs was $50 per ton and little to no revenues were recovered via tipping fees or sale of finished amendment (Renkow, 1998: 339). Little has changed in terms of compost tipping-fees, a 2019 community-based survey of green-waste landfills or public composting facilities found a national average tipping fee in American ranges from $30 to $65 per ton with prices projected to steadily increase overtime(McSweeney, 2019: 14-15). However informative, the community-based survey did not disclose the survey size or state averages illuminating the need for such a survey. All three studies indicated that very few if any facilities received revenues from the sale of compost to offset operating costs.

2.7 Conclusion

Throughout this research, I take a riftian perspective by creating an analytical framework in which to compare UK and TC's compost programs and close with a

discussion on each program. The framework utilized in this research propels the Metabolic Riftt beyond geographic thought and illuminates a plethora of research materials ripe for researchers of all backgrounds.

Chapter 3: Composting Systems Analysis

To explore composting systems in Lexington, Kentucky, I rely on data collected during my Zoom interviews. I asked each participant several socially indicative questions to grapple with the social involvement of both TC and UK's composting systems. First, I asked each participant if they currently or ever had composted at their place of residence. Second, I asked what identities they held close to their heart. Third, if not named, I explicitly asked my interlocutors if they identified as environmentalists. Fourth, I asked participants to recall the first time they learned of composting, or the first time they engaged in it.

Cirrus, a resident of Lexington, KY and graduate student who grew up in the southwest said, "I didn't grow up composting… I vaguely knew about it from just being in environmental science [in college]. I first started composting with a friend who attended a rural college on the coast and lived in a co-op house there." Cirrus is a graduate student and TC compost subscriber who spent most of their twenties living in large densely populated cities and had used a compost subscription service before.

When Cirrus learned about TC, they asked their roommate Rose, if they would be interested in participating and splitting the service cost. Rose revealed they had heard of composting but never had the opportunity to participate in composting. Rose explained to me, "I learned about composting in college...from a friend who was co-running the sustainability club, I never composted until a month ago, so I am new to it." She is a 25-year-old queer transfemme person who grew up in suburban Connecticut and received their undergraduate degree in Architecture.

UK's sustainability officer, Shane Tedder, has a similar mindset, "I grew up in a

farming community where nothing was wasted, and the nutrient cycle was pretty closely managed. So, understanding that organic waste can be turned into soil amendment was part of my cultural foundation." However, Shane's upbringing seemingly shaped his professional career path, "As an undergraduate student, I worked with waste reduction as a residential recycling coordinator, and I've played a role in every incarnation of composting on UK's campus since 2003." Joanna Ashford, Recycling Coordinator for the UK mentioned, "Shane, for as long as he has been here [at UK] has been dreaming and dying to have a compost program."

Sarah, a queer local coffee shop-night cap bar owner, EKU alumna had a similar experience, "Growing up in rural Madison County, when I was a kid we composted a lot at home...When I worked at Berea Coffee and Tea, they had a partnership with Berea College's composting program, it's just known in the coffee shop world that [composting] is what you do." Their coffee shop began composting with Seedleaf four years ago when they opened and now pay a small fee to continue composting with TC.

Jill, Chicago-born environmentalist, Sierra Club leader, MA degree holder, grandmother, and TC subscriber states, "[Growing up] my family didn't compost, although they gardened. I was in a meeting with friends where we were discussing climate change… one of my friends brought up composting… I didn't think much about it then, but I started a Zero Waste Team for the Sierra Club. So, I talked to my now husband about composting ourselves. We started a backyard compost project...we were not doing it very stringently [due to] just plain old time and space."

Joanna, UK's Recycling Coordinator at UK states that in terms of environmental stewardship, college brought about a different awareness for her. "I've always had a

passion for the environment, and it was part of my upbringing. It was really eye opening for me when I went to college and realized that this was not how everybody grew up. I just thought everybody was mindful of the environment."

However, college is not the only place where composting can be introduced. Family and geographical upbringing can play a huge role in social engagement with composting. For instance, Dina, a mother, UK professor and TC subscriber states it's a family affair. For her family, their love of reusing and reducing household waste comes across many countries and generations, "My grandma's parents come from Minnesota and Wisconsin from farming communities, Swedish or Norwegian immigrant farming communities, and my husband is Greek and came to the US when he was about 14 and come from a small village in Greece. To me, it is much more of a, I would say, a lot of values with what we consider Appalachian values around food culture and growing food."

To further extend an analysis of the social awareness of composting, we explore the interviewee's attitudes towards being asked if they are an environmentalist. Merriam Webster defines environmentalism as "one concerned about environmental quality especially of the human environment with respect to the control of pollution." (Merriam-Webster, 2020). Oxford Languages furthers this definition by adding that, "An environmentalist is a person who considers that environment, as opposed to heredity, has the primary influence on the development of a person or group." (Oxford, 2020).

UK's Joanna explains, "Environmentalists take on ' two hats' where you are an activist and an educator where you can make a cognitive decision to say, 'Right now I'm fighting for what I believe and this is what I need to do to change legislation.' and then

also recognize that sometimes we need to take that hat off and put on the educator hat and say 'I'm not going to tell you what to think, I'm just going to give you all of the facts and you make whatever opinion you want.'" She goes on to explain that for her, "I've always identified as an environmental educator. I feel like personally I am more of an activist on certain issues, but when talking and communicating with people who may have less knowledge and understanding than myself, I lean towards being an educator…"

When I asked each interviewee if they identified as an environmentalist, I discovered a clear generational divide between the answers. Most interviewees over the age of 40 either stated they did in fact identify as environmentalists or stated that they aspired to be environmentalists but felt they had progress to make before rightfully identifying as such. When we revisit Jill's interview, the grandmother-activist states "Well certainly, being an environmentalist [is an identity I hold close]." Charlie, a TC subscriber and local business owner and father states, "Yes, [I identify as an environmentalist] because the earth is super important, and I think we have to be concerned with the environment in order to save the earth and the fragility of the thing we are spinning on."

But many of the interviewee's did not identify as environmentalists. Dina explains that for her, "I feel like I wish I could [identify as an environmentalist] but I'm not sure I'm good enough, I aspire to be a better environmentalist." Carolyn Gahn, Aramark's UK, and hobby micro-farmer stated, "I don't know if I would call myself an environmentalist...my lifestyle is one of a small community, raising my own food, engaging with neighbors, it's more local economy oriented." Whereas 25-year-old Rose stated "I don't identify as an environmentalist, for some reason I think it just makes me

uncomfortable…" Rose clarified later that, "It's not a lack of interest or concern for the environment, it's just that my priorities lie elsewhere... for queer issues, and trans issues especially." (Rose, interview, 2020). Moreover, local coffee shop owner Sarah, in her early thirties mentioned, "I wouldn't consider myself an environmentalist but I'm aware of my usage of things." (Sarah, interview, 2020). Jennifer Sutton echoes such sentiment, "I'm hesitant… I care deeply about the environment and the environmental issues but it [environmentalist] is a term that is so polarized that it's hard for me to identify with it. If I'm trying to have a constructive political conversation with somebody...it changes the conversation [to identify as an environmentalist." (Sutton, interview, 2020).

Addressing the metabolic rift should not be reliant upon college experience or the socio-economic ability to access and pay for a private compost service, all of which are commonalities between the interlocutors of this research project. Instead, these findings constitute a micro-mend of the social rift in regard to composting. Although problematic, the ability of marginalized and lower-income populations to be exposed to collegiate-level compost-oriented educational materials is somewhat alleviated by UK's extension program. However, the existent barriers of rural access to technology, the internet and even a printer is seemingly not addressed in UK's extension office programs. In many communities, nonprofits, like Seedleaf, address these concerns by hosting free community compost workshops and K-12 level educational programs. These community-led programs are essential to arousing the community environmental awareness necessary for addressing large-scale issues that surround waste streams.

TC subscriber Cirrus previously worked as head of a large-scale composting system in one of the US's densest cities and asserts, "Education is key, you cannot roll

out a program and expect people to just do it...I didn't know UK composted, so I feel like shame on them [for not making it more known]." But Aramark's UK dining Sustainability Director says, "It is hard to educate everyone on where it all goes after it leaves and then how it comes back to campus as finished compost. They don't necessarily see the whole part of the program. The ones who do know all of that are more excited because they are like 'oh wow! That is really cool'...We don't want to have a system that only works if [they] are jazzed about doing it. We want a system that works that anybody can do."

In summation, as explored in greater detail in Chapters 4 and 5, it takes just a handful of deeply committed and passionate individuals to engage unlikely audiences in composting systems. Moreover, the findings of my research show that a social micromending within the broader context of the metabolic rift can have a ripple effect. As more people are engaged with composting, the greater the chances that other community members will be inspired and join the growing trend and ultimately, together, create larger social and environmental change necessary to mending the metabolic rift.

Chapter Four: The University of Kentucky

This chapter analyzes the metabolic rift's relationship to UK's composting system through the lens of my new theory, micromending. I assert that UK's composting system engages in varying degrees of micromending in Lexington, Kentucky because composting can encourage more sustainable on-campus behavior, engages a broader audience in learning about composting, and the composting system fosters a ecological mend as it mitigates a relatively large amount of organic waste from landfills into a useable soil amendment. However, UK's composting system exists mostly behind the scenes— in that it mostly exists away from the gaze of its participants— and relies on large capital investments and does not fully address larger issues of capitalism and accessibility to composting systems in Lexington, Kentucky.

This chapter explores the University of Kentucky (UK) as representative of the rising trend of Educational Institutions investment in composting systems as seen in this analysis of UK. UK's compost system's operations and infrastructure and is one of two empirical chapters in this research project. To answer the research questions of this research project, this section I present a 4-pronged analytical framework in which to view UK's compost system. I examine Zoom interview data through a metabolic rift perspective with internal documents provided to me by UK to inform how composting can ameliorate the effects of the metabolic rift.

According to the UK website, UK is a land grant university founded in 1865 adjacent to downtown Lexington. UK's campus spans more than 716 acres and is

home to over 30,000 students and 14,000 employees. The UK also has an extensive Cooperative Extension program in all 120 counties in Kentucky (UKY, 2020). According to data collected during the interviews of UK's compost managers and partnered administrators, their on-campus dining services serve over 1 million meals every year.

Shane Tedder, UK's Chief Sustainability Officer asserts a continued commitment to sustainability and as revealed in my interviews with Joanna Ashford, a compost system is a personal pipedream of Tedder. The inspiration of a few dedicated compost advocates resulted in a signed contract between Aramark, The Fresh Food Company, and UK that ultimately minimized the barriers to large-scale composting on-campus. The partnerships removed numerous barriers to implementation such as purchasing washable dishware and cutlery, eliminating single-use plastic items in on-campus dining halls, and the implementation of an expensive compost pulper, paid for and maintained by Aramark. UK's compost system won a substantial Sustainability Grant and allowed them to acquire a brand-new dump truck for their compost transportation needs.

The dump truck allows for sanitary movement of food scraps from one location to another and greatly eliminates the chances of on-the-job injuries. Moreover, the implementation of a 4 wheeled rolling bin in which to transport compost from the dish room to the waste bay for pickup reduces the incidence rates of ergonomic-related injuries (Tedder, personal interview, 2020). The compost pulper shreds foods and napkins and helps remove excess liquids, ultimately speeding up the decomposition processes (Tedder, 2019). Steve Higgins of UK states that the university was able to employ and outfit existing facilities in Woodford County to handle a large volume of compost. This

pilot program is intended to help UK gather data that is invaluable in planning for the future of the university's composting program (Tedder, 2019). ´

4.1 Operational and Logistical Framework

This section explores the UK's operational and logistical structuring of their compost system through an analysis of UK's sustainability and waste reduction goals. This section looks at the operational training, goals, policies, and designs that comprise their composting system. Exploring the scope of UK's composting operation is supported by discursive coding of operational documents, primary interview data, secondary interview data, and field observations and visual maps.

Examining UK's Extension Program's compost-related materials and mapping the spatiality of UK's compost system inform how UK's composting has the potential to ameliorate the TVC aspect of the Metabolic Rift. UK, and larger institutions in general, "have power with their contract" UK alumna and compost analyst Jennifer Sutton explains. "The UK and Aramark contract had issues at the beginning because there was supposed to be a certain percentage of locally produced food and in Aramark's mind… they were counting Coca Cola that is bottled in Kentucky… and that financial benefit was not impacting our local economy, especially the local agricultural economy." (Sutton, interview, 2020).

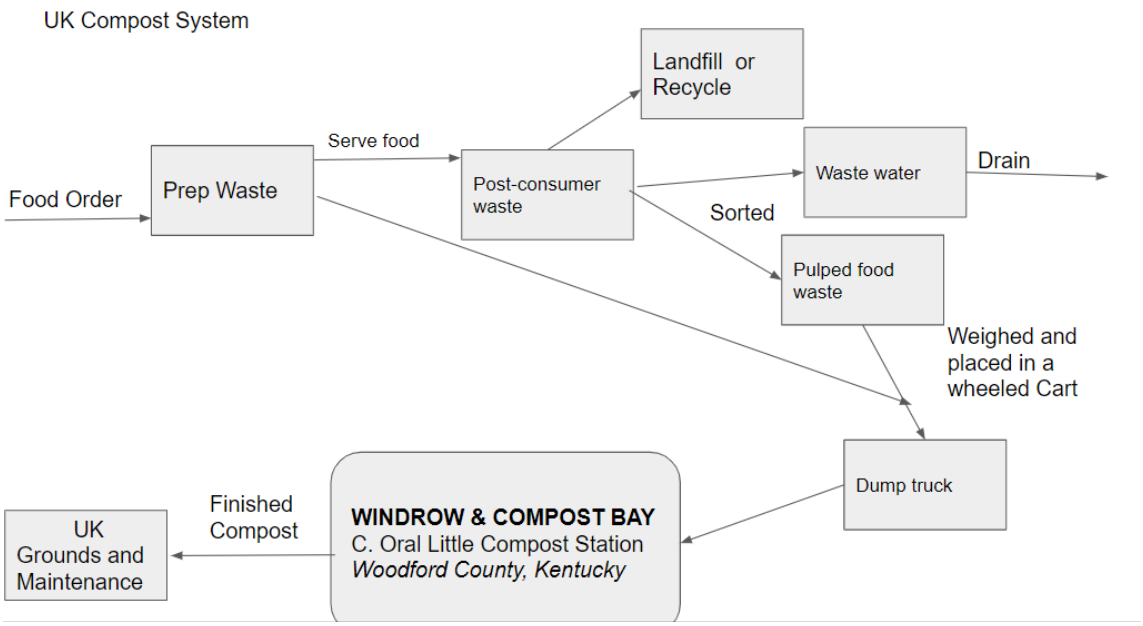

Figure 3: UK's Compost Feedback System

As shown in Diagram 2, the UK's compost system is not considered a "cradle-to-cradle" closed-loop system where the finished compost product is used to grow food on campus for campus dining. However, the system is a "true" closed loop in that their diversion of post-consumer waste results in a usable product that has ecological benefits when applied at or near the site of waste production.

Joanna Ashford, Recycling Coordinator and Shane Tedder, Chief Sustainability Officer for UK explains that there was a deep design process for the compost system. During their investigative planning stages, Joanna explains that "Other Universities, before we were composting, were like 'Don't you have an Ag program? Can't you feed it to the pigs? 'We knew it wasn't an option… there are so many napkins [to compost on campus] that it wouldn't be nutritious or ethical to feed to pigs." The EPA

classifies feeding animals' food as a Tier 3 waste reduction strategy, which comes before composting (a Tier 5 strategy). Feeding animals is historically how large institutions handled waste while curbing overall costs for animal feed. Now, universities often find it cheaper to feed to swine than landfilling and can result in a reduced net greenhouse gas footprint as food waste often travels much less further to animals than to compost facilities.

As discovered in my interviews with UK's compost partners, we see that the logistical framework for UK's compost system revolves around the mentality of "changing behaviors through design" (Tedder, interview, 2020). UK has made clear that although education is important, they want a system that works regardless of if people are aware of, knowledgeable, or even excited about their composting system. Instead, their compost system is deeply integrated into the physical and logistical design of their new student center and dining halls. Although this mentality is quite effective on a small scale as it reduces contaminants in the system thus streamlines compost production, the longevity of the changing behaviors is questionable. If students are not given the opportunity to see and understand the composting system on campus, their behavior changes are a fallacy rendered through innovative design but do little to foster a broader social understanding off-campus. Although UK has plans to better engage students without encouraging frivolous food waste, the lack of geographical indicators in and around campus' composting system components is a missed opportunity for UK that will be explored in greater detail in the conclusion of this chapter.

The composting system begins with meal ordering and preparation planning. Carolyn Gahn, Aramark's Sustainability Director states, "Aramark uses a meal planning

software and uses historical data to plan our meals for the day, telling us how much we need to make for that day. It will consider that same day the previous years and how much was served then so we're not making excess food." (Gahn, interview, 2020).

UK's compost is collected in two Aramark-run dining halls, several coffee shops, and through their grounds and maintenance tasks. Joanna Ashford and Esther Moberly with UK's Recycling and Trucking office gave me a socially distanced tour behind the scenes in November 2020. We met at the bottom of the "Social Stairs" located inside the heart of UK's Student and Welcome Center. We walked a few hundred feet east through the glass doors leading down a few steps into Champion's Kitchen. Normally packed shoulder-to-shoulder with students, faculty, and visitors, the quietly emptied dining hall was a strange sight indeed.

Where stacks of washable trays, bowls, and plates once sat, hundreds of white Styrofoam containers take their place. We rounded a wall on the left and entered the final stop for most diners, the dish drop. Normally, a line of 10-15 diners would await their turn to deposit their dining tray and waste into a vacant collection cubby on the conveyor. The waste trolley moves around the corner behind a wall where it is eventually retrieved by Aramark employees. Most diners are intentionally unaware of the processes that happen after they leave the dining hall. Joanna Ashford explains, "We don't want to push a model of 'fill up your plates, whatever you can't eat, that's okay we compost it'. That is not the way we handle the resource of food. So we wanted to make sure we handled it [compost pilot program] in a way that we don't see more waste being generated...That's why we label our dining halls 'all you CARE to eat'..." (Ashford, interview, 2020).

Figure 4: Image used for the food waste mural at The 90 Dining Hall. photo courtesy of Carolyn Gahn

Directly behind the turnstiles, gloved employees listening to music in their earbuds sort the compostable waste and place recyclables in a nearby blue bin. As they swiftly brush food and napkins into a gutter system that feeds into the compost pulper, water flows up and moves the waste into the mouth of the compost pulper. The compost pulper is one of the most expensive parts of the compost system and UK has two: one at Champion's Kitchen and one at The 90 Dining Hall. Both pulpers are funded and maintained by Aramark's dollar and are integral to the system's success and scalability. During my interviews and field observations, I learned that the pulpers shred food and paper with steel tines and remove the excess water. These delicate yet sharp tines can be very expensive to replace therefore, a magnet system is installed above in hopes to capture any rogue forks or knives that happen to make it that far. "But if the magnet fails…. You'll need another savings account to get it repaired." says Carolyn Gahn,

Aramark's UK Sustainability Director. The pulped compost product is ejected into a 60-gallon rolling waste bin lined with a plastic trash bag. "It looks like coleslaw without the sauce!" Joanna exclaimed. With the water mostly removed from the compost, it is much lighter and safer for employees to haul and can help expedite the decomposition process when it reaches the Woodford County farm.

The 4 wheeled trash bins, chosen for their ergonomics and worker's compensation saving design, are wheeled into a large warehouse-style garage bay. The area for the compost bins is taped off and labeled in both Swahili and English. "We have Swahili as the primary language spoken right now among our staff… We try to make our signage clear...there is a lot of turnover in our staff and we want to make sure they have everything they need when they start on day one…"

The compost, typically collected daily pre-COVID, is only picked up once a week now due to the reduction in post-consumer waste due to COVId-19 restrictions. The waste is hauled in UK's brand-new Hino flatbed truck and Perkins lifter are the backbone to UK's compost system and was purchased with a Recycling/Sustainability grant and UK match. The truck stays nearby the student center, behind the UK recycling and Sustainability offices are located. During the pickup day, Metabolic Rift. Raglin, long-time UK employee cheerfully drives from the Champion's Kitchen to the 90, visiting several coffee shops in between.

The Perkins lifter is equipped with a lift arm that hooks onto the bottom of the 30-gallon compost bins and lifts the compost container high into the air where it is dumped. "The plastic liners actually stay attached so when the compost is dumped, Raglin doesn't have to climb up there and dig it out." Joanna explained as they demonstrated the lifter.

Figure 5: UK Hino flatbed and Perkins lifter with UK's Mr. Raglin. Photo courtesy of @UKrecycles on Instagram.

After Raglin has retrieved all of the compost for UK, he makes the 15-mile trek to the C. Oran Little Farm in Woodford County where the truck is weighed upon arrival and departure. The farm is equipped with a weigh station that's used for the compost system and serves as a key tool to waste tracking. Raglin drives over the metal grate, the weight of the vehicle is displayed in bright red numbering and the number is recorded on a preprinted sheet. The truck then winds along the paved driveway to the West-Northern corner of the farm. Tucked away, there are 2 barn-like structures and a concrete pad lined with several small windrows. Dr. Steve Higgins, Director of Environmental Compliance, Assistant Adjunct Professor, is already busying around the compost piles.

Figure 6: UK's Animal composting bin

Joanna and I walk over to a small concrete bin, he is pulling animal bones out to dry. "WOAH!" I exclaim, as I've long desired to see an animal compost pile and here it is, right before my very eyes! I immediately begin grilling him with questions about the metabolic differences and learn there are absolutely no differences in the metabolic content of animal vs non-animal compost. He pointed to the right of the bin to 2 large compost piles, and explained they contain 2 animals that recently died on the farm. He pulls out a large bleach-white horse skull and explains that his colleague wants one and he throws it in the back of his vehicle.

At one point during the tour I inquired if there is a wastewater collection system at the bottom of the concrete pad and I was unable to get a clear answer on how waste water is contained and stored to prevent the compost water from entering local water systems. I learned that the angle in which the UK compost pad is situated is not ideal for their operation, "If I dump something wet here at the top, it will beat me down to the bottom. The 20-degree angle is too steep, we need like 2 degrees." Steve explains. "How

do you water the compost?" I asked, Steve explained that Kentucky rain provides a sufficient amount of water for the compost and that they do not need to use potable water for the compost pile management and that the finished compost is stored in a covered bay to protect it from the elements.

The second barn structure appeared to be storage, there large windrow turning equipment store, Steve pointed to the windrow turner and explained that it's a self-propelled machine that requires a tractor equipped with a "creep" setting to ensure a slower speed necessary for the equipment to operate without damage. Dozens of large water storage bins were stacked inside the barn, "OH! I need some of these." Joanna said as she pointed to a stack of large plastic bins. Joanna explained that much of the stored surplus farm equipment will be used for their incoming compost tea brewing system, an addition to their compost system that has them beaming with excitement.

Oftentimes, Metabolic Rift. Raglin will load up the Perkins loader with finished compost and weigh the truck on the way out. The finished compost is taken to various on-campus locations where UK Grounds Management will make use of it in non-food producing ways. Due to the interrelated nature of the composting system, if one component such as the pulper or truck is out of commission, UK relies "heavily on landfilling", a counterintuitive plan indeed (Tedder, interview, 2020). However, UK's system has had very little, if any, compost system downtime during 2020, partially due to COVID-19 and partially due to the success of their employee training and maintenance plans. UK's composting serves as a wonderful example for executing a sustainable and efficient system for a large community, the remainder of this chapter will explore the

micromending potential of UK's compost system and conclude with suggestions and final remarks.

4.2 Social Micromending Criteria

In this section I build upon my argument that engaging a broader audience is paramount to addressing systemic issues in our current waste management systems. Here I argue that higher education plays an important role in compost awareness and education. Moreover, I argue that higher education's role in composting awareness, as explored through the UK, is representative of a growing interest in composting systems. Utilizing interview data, thematic coding, University publications and documents, my preliminary research suggests that the participation of institutions of higher learning are essential to fostering compost awareness among urban students.

As briefly explored in chapter 2.3A, bolstering the social awareness and engagement with compost programs in Lexington, KY, and urban places more broadly, are inextricably linked to institutions of higher education. In example, Shane Tedder states, "Learning about it [composting] for a household setting for, especially in an urban environment, our space constraints are different, and the nutrient cycling is not handled on the property you own [or rent], that was probably a college discovery".

Moreover, to help alleviate the socio-economic barriers of Kentuckians who are not able to attend UK, their extension cooperative program offers dozens of comprehensive compost-related free-to-access educational pamphlets and brochures. In fact, during my preliminary research I searched UK's website using the keyword "compost", there were 100 hits for compost. Ranging from "How to build your own compost bin" to "Compost Bedded Pack Barns". I asked Shane Tedder why UK's compost system was not the first result in the search, "We are a land grant with an extension service, the top six hits from the website are curated where information about

our operations fits on a website host, it is balanced with that kind of educational and service mission that our cooperative extension has."

However beneficial to mending the social rift between college and non-college citizens, Shane clarifies that, "I would say the social side, so social justice, that component of sustainability is maybe underrepresented in our composting program… We are operating with a little bit of a blind spot about where social injustice is relative to the materials management and composting side. As we gain visibility and learn, we would certainly adjust our system so that it wasn't contributing to some type of systemic injustice." Shane clarifies, "[The current UK system] is NOT going to a facility that is right behind a low-income neighborhood that would cause odors or dangerous conditions on roadways because of trucking, we're watching those sorts of things and maybe just not aware of acute social injustice issues relative to the direct touch points with our compost program." (Tedder, interview, 2020).

A second point to explore in UK's system is the design itself. Shane Tedder recalls that he knew with UK serving over 1,000,000 meals a year on campus, they had to design the system to work at a municipal scale. Due to the design requirements to make this system work efficiently and without large amounts of contamination, the compost aspect of the buildings and facilities is "a little bit invisible and the shortcomings is that it doesn't reach beyond our two main dining facilities." Despite the invisibility of the system, Shane states that, "We've got a great system right now, but it is humming along in the background and didn't require a lot of behavior change because of the way we designed the facility. So, it was kind of a systems level solution where the behaviors we wanted were promoted by the design we put into place." (Tedder, interview, 2020). As an

educational institution, UK has a unique population at the tips of their fingers, with a state-of-the-art architecture program, a developing environmental studies and sustainability program, and millions of American dollars for investment, it's unclear how much their academic institutions benefitting the design process or how the design was paid for, planned, and executed.

As aforementioned in the introduction to this chapter, the lack of geographic indicators at on-campus components of their composting system would be a welcomed addition to their social micromend. For example, by flower beds or trees that have been amended with UK finished compost, an educational placard could be placed to explain how campus food waste was captured to create a high-quality soil amendment or near the dish room at Champion's Kitchen where students line up to place their dirty dishes, a educational diagram or wall mural could be placed that explains the benefits of composting and why UK choose to invest in a composting system. Since conducting this research, UK announced that their residence hall dwellers may sign up to receive a "grubby" compost container free of charge, this allows on-campus students to compost the food waste from the meals prepared in their dorms, a welcomed and celebrated addition to their ever-growing composting system.

4.3 Ecological Micromending Criteria

UK's finished compost product is a "low grade soil amendment", low-grade doesn't mean low quality, it means that the nutrient contents and decomposing matter have been settled long enough for the nutrient levels to be leveled out. The potential of properly decomposed and aged finished compost soil amendment has been well researched and recorded. For that reason, this project focuses on the potential of UK's

finished compost to ameliorate the effects of the metabolic rift explored earlier in this chapter. Although it is not entirely clear the full scope of use for UK's finished compost, this research suggests hosting a annual "compost giveaway" to UK staff, students and faculty members who will transport the finished compost back to their home residences where the ecological benefits of UK's composting program can be shared across rural and urban boundaries.

4.4 Economic Micromending Criteria

This section reviews the economics of the UK compost system as listed in UK's cost-benefit analysis conducted by a former UK Alumna. This analysis is reinforced with primary and secondary interview data that provides personal context from the UK compost partners. This section grapples with the "wealth generating characteristic of capitalism" as demonstrated in the metabolic rift (Foster, 2009: 139). This section poses the argument that money and market value is a major concern for UK's compost system and partners. The geographical location and internal hierarchical structures of UK makes commercializing their composting system, at this time, particularly challenging (landfill prices, etc.).

The economic micromending potential of UK's compost system differs between partners. As aforementioned in the introduction of this chapter, Aramark purchased the compost pulper, utilized time and resources maintaining the equipment and training employees to participate in the program efficiently. Whereas UK's Sustainability and Recycling offices utilize their resources to write grants, form the program rhetoric, forge new partnerships, and plan compost expansion like the incoming compost tea

aeration system slotted for installation in Spring 2021. To review the economic micromend, this project divides the compost system into two parts, Aramark and UK.

4.4a Aramark's Economic Involvement

To further grapple with the economic portion of this research, we look to Carolyn Gahn, Aramark's UK Sustainability Director. She states that Aramark has "a direct interest in managing waste for financial reasons...We buy food and it costs money and then you throw that away, you are essentially throwing that money in the trash can." There is power in economizing food waste, it allows a broader audience to care because there is a financial value, in the case of dining out, a financial premium attached to the food waste. As climate change and environmental concerns have become highly politicized, it is increasingly difficult to rally together to address food waste's contribution to those concerns. Gahn explains, "I think it is good that it [food waste] is looked at as a financial thing because it shouldn't require everybody to embrace sustainability to know you shouldn't waste food… It's really very simple for the general public who may not care about the earth at all, they do care that they are throwing money away." (Gahn, interview, 2020). This line of thinking corresponds with the UK's goal to "change behavior through design".

However, it's not all about dollars and cents for Aramark, Gahn says "It is all part of our responsibility within the food system…We're finally getting to a point where corporations need to report out their climate impact and show reduction strategies so I think the conversation is definitely moving forward to get sustainability as something that is part of the corporate management structure." (Gahn, interview, 2020). To kick off the UK's compost system and help inform students about their food waste on campus, Gahn

planned a “Weigh the Waste” event in Spring 2019, Gahn stated that the average food waste per person during the event was .13lbs. It must be mentioned that this number may be skewed as more environmentally conscious students might be more likely to A) take and waste less food and B) participate in Weigh the Waste events, however, the number shows that UK and Aramark are doing their part to waste less food. Nationally, the EPA Corporate Cafeteria food waste estimate the median per meal is 0.625 lbs. with an estimated range between 0.5 and 0.75 lbs. per meals (EPA, 2020).

Here, we take the UK's quoted statistic of 1,000,000 meals served on campus per year”. To calculate the potential, if every UK student wasted .13 lbs. per meal they had on campus, the post-consumer waste for the UK dining halls would be around 130,000lbs. The EPA’s food waste calculator tool found on their websites estimates that the median cost across all food categories is $1.17 per pound, if we multiplied 130,000lbs by $1.17, we find the estimate annual food waste cost from post-consumer waste to be around $152,100 (EPA, 2018). Notably, Aramark is tackling economic loss through food waste in 6 ways, local sourcing, production planning, tray-less dining, Weigh the Waste events, food donations, and composting (Gahn, email, 2020).

Figure 7: “Weigh the Waste” 2019 student dining hall event. Photo courtesy of Carolyn Gahn.

Gahn states, “There is a discrepancy here in the way that our food system functions. And to me it is, part of that conversation of what we’re all doing collectively as a society and how we need to operate so that our communities are taken care of.” Gahn reiterates that their participation in the UK's compost system isn’t purely economic, “We did this because there is no municipal solution for composting. So if this could serve as a model for, you know, either the city to see or the other institutions around central Kentucky to see, there is the potential for scalability, which is pretty high.”

4.4b UK’s Economic Involvement

Examining UK’s economic participation in a micromending is explored in Jennifer Sutton’s, capstone project, “Cost-Benefit Analysis of Composting at the University of Kentucky”, grant tables sent to me by Esther Moberly, UK’s Waste,

Recycling, and Trucking Manager, and interview data collected for this research. The documents sent to me by Esther Moberly, the information is from fiscal year 2016 through 2020 and is depicted in Table 2. The total funding that the UK brought in through grants or contributed is $796,673 and most of the funds were used for infrastructure and individual system components (i.e.: collection bins, recycling bins, crumb rubber, and labor costs for UK employees. Of the total funds, only $2,629 were shown to be used for direct student engagement which consisted of 2 projects, one was a Resource Recycling Map project for $397 and the other was a $2,232 which went to fund a student lead project for handing trash cans. Based on the report I received, none of the funds were funneled into bolstering and growing the UK's extension program or community outreach efforts.

Table 2: UK's 2016-2020 Grant Funding

UK's Contribution (USD)	Grant funding (USD)	Total (USD)
197,663	599,010	796,673

Notably, Sutton identified the UK's "break even point" for the recycling and compost program to be in 2029. However, this does not mean that at that point, the program will have cost UK $0.00. Instead, Sutton surmises that the program will still have cost UK $142,479.44, this study however does not take into account COVID-19 and the effects it has had on the system and data projection. "The one thing I can say with surety relative to the economics of this, is that it is currently costing us more to compost the material than it does--then it would cost to landfill it but, you know there are a lot of

costs that are externalized and that are not included in tipping fees [at landfills].” says Tedder (Tedder, interview, 2020).

The composting system, for UK, is about setting the precedent, being the example Kentucky needs to challenge the larger, less sustainable systems of waste. “The environmental benefits of composting, I would love to see that reflected in the economic bottom line of financing the system.” Sutton echoes this desire during our Zoom interview, “I was really disappointed that I was not able to get some of those intangible benefits because they are so much harder to calculate.” (Sutton, interview, 2020).

4.5 Conclusion

Serving a large portion of Lexington’s population, UK’s compost program is arguably one of the largest in the state of Kentucky. UK’s “design behavioral changes" approach is backed by a whopping $800,000 investment in equipment and labor. Revisiting the original research questions, we see that overall, UK’s compost system represents a micromending of the metabolic rift’s effects in that finished compost yields a usable soil amendment product and their system engages a broader audience in central Kentucky.

Furthermore, UK’s conceptualization of composting is situated at the nexus of economic sustainability and environmental sustainability. In forming the extensive partnerships that have made the UK's compost system possible, we see composting takes on an economic or “good dollars and sense” conceptualization. Here, we see that in reusing kitchen waste, there is economic potential for the UK to create a new stream of revenue through their compost system. This conceptualization serves to aid in the expansion and success of the program’s longevity and scope.

In terms of personal identities within the UK's composting system, there seems to be a direct connection to the socio-economic background of a person that determines whether the UK's compost system is accessible to them. One of the largest problems with UK's compost system is that it serves visitors of UK's campus, meaning they most likely either work on campus, attend UK or have a relative that attends UK. With this being said, UK's composting program relies, partially, on privilege. Although exploring the personal identities within contemporary composting systems such as UK's would be academically beneficial and interesting, due to time constraints, this project was unable to dive into the identities involved. However, I wish to impart on the reader that composting systems are often inspired, informed, and implemented by a handful of passionate problem solvers that excel at bringing people to address an issue. In years past, composting in the city has been a taboo, "hippyish", or queer thing to do, however, with shifting social awareness and a growing sense of accountability for our ecological footprint, composting is becoming a new norm in cities. UK's composting program is part of the "culture" shift happening in Lexington, Kentucky and is a hard-fought win for UK and Lexington more broadly.

Chapter Five: Treehouse Compost

This chapter explores Treehouse Compost (TC) as representative of the rising trend of community-scale composting systems around in America. Although TC's system relies on subscription fees and extensive CompHost partnerships to exist and grow and offers little in terms of a long-term solution for Lexington food waste, TC engages in micromending in Lexington, Kentucky because their business model actively challenges systems of waste. Moreover, TC's system micromends the social rift by engaging a broader audience in composting operations and systems across rural and urban boundaries and encourages ecological micromending by mitigating a minute portion of organic waste from landfills into a usable soil amendment.

TC's compost system's operations and infrastructure and is the second of two empirical chapters in this research project. To answer the research questions of this research project, this section I utilize the same 4-pronged analytical framework employed in Chapter 3 and build upon the timeline explored in Chapter Four. This chapter examines TC's system through a metabolic rift perspective and provides analysis to inform how composting can ameliorate the effects of the metabolic rift.

5.1 Operational and Logistical Framework

According to the TC website, TC is a women-owned Appalachian-based compost transport service established in 2020. TC serves Jessamine, Madison, and Fayette Counties in Kentucky with Lexington being the largest urban area within their service range. TC serves around 100 businesses and residents and charges a monthly "subscription fee" for residents or a "per bucket" charge for restaurants and cafes (TC, 2020).

As depicted in diagram 3, TC is considered a cradle-to-cradle life cycle as the finished compost is used for regenerating food producing soils and, in many ways, is distributed directly to places of locally produced foods.

TC practices a "CompHost" network wherein volunteer farmers can adopt household and restaurant organic waste. The farmers receive extensive compost management training and TC performs regular monthly checkups to ensure the compost is properly maintained and healthy. When the finished compost is ready for distribution, the volunteer farmer is entitled to half of the total finished compost while the other half is taken to TC headquarters where it is weighed, sieved, and distributed to subscribers. "We've got a small compost bin here at our headquarters that we manage for our personal employee use.

However, not all subscribers need or want to receive their finished compost amendment share, unclaimed shares are added to a "donation bank" and given to lower income hobby gardeners and public community garden spaces as requested. Co-founder and operations manager, Kayla Paynter states that "In the grand scheme of things, our program isn't necessarily unique, but it is a new concept to this region, to pay for composting." Riding on the coattails of Seedleaf's Compost Carpool, "Most of Seedleaf's subscribers got to know us over the 18 months we operated under their budget, when Seedleaf decided to cut our program funding the community was really receptive to us turning the program into a family-owned business." (Paynter, interview, 2020). Paynter discovered her love for compost while visiting me in Boston. My previous employer, Bootstrap approved her to ride along with me during her visit and she was immediately hooked.

As discovered in my interviews with Paynter and TC subscribers, we see that the logistical framework for TC's compost system revolves around the mentality of "creating a world that no longer needs our service" (Paynter, interview, 2020). TC makes clear that successful participation in their program takes household communication and commitment, "We've lost some subscribers because they forget to deposit scraps into their bucket, or they often forget to set their bucket out for pickup. It takes a deep personal and household commitment to get the most out of our service and due to our "no contact" pickup style, we're not able to really correct habits and behaviors in our participants unless they reach out with particular questions or concerns." (Paynter, interview, 2020). Education is an important component to their system's structure however, COVID-19 has prevented them from hosting free community workshops and educational seminars. TC primarily relies on Instagram to convey environmental information and statistics, "Mitigating organic waste's contribution to climate change takes the forefront of our marketing platform. We understand many people feel helpless because of the lack of municipal composting options available here and we offer a simple and affordable solution." (Paynter, interview, 2020).

TC conducts pickups 4 days a week, Monday, Wednesday, Thursday and Friday in the F-150 truck equipped with a camper top and roll-out bed. "We drive into town and try to do everything we can to make the most of our trip, we rescue bagged leaves by the side of the road, wood shavings from a local hand tool maker, and any other trashed materials we think we can use." The bed of the truck has a shelf installed where the clean buckets are stored during the route, as the bucket swaps occur in route, the full buckets are placed on the lower part of the bed. "The roll out bed isn't ideal, but it's much safer

than having to climb up into the bed to remove the heavy buckets." (Paynter, interview, 2020). The truck can hold around 1 ton of food scraps which is typically equivalent to the weight of 80 five-gallon buckets. The buckets are unloaded at a shaded stall area at their headquarters and the cafe buckets with 90% coffee and paper are sorted and stored separately. "We have a farmer who only wants to accept coffee and yard waste, to remain in good relations with one another, we happily save those buckets for them.

Figure 8: Treehouse Compost's Transportation Truck

On a typical weekend, TC distributes the food waste to the volunteer farms where they add the compost to their family bins or windrows, the farmers "foster" the compost until it's safe for garden use. "We use rubber cleaning gloves, HEPA filters and rubber suits when emptying the buckets into windrows and we train our farmers to practice the same health and safety procedures. Composting can be dangerous, so it's important that we equip our farmers with the knowledge necessary to not only make a top-quality product but to also protect their body and lungs from harmful bacteria and microbes." (Paynter, interview, 2020). The containers are pre-washed on-site with rainwater we collect and then the buckets and lids transported back to headquarters where we scrub and sanitize each bucket and lid.

TC has their own inventive compost wash system, "Cee took a mortar paddle drill attachment, a cracked Rubbermaid storage container, and a broken milk crate we had

lying around and used self-tapping screws to create an automated low-contact bucket wash system." (Paynter, interview, 2020). Paynter guesstimates that the bucket wash system cost them less than $14 and has reduced their weekly wash time from 4 hours down to 1 hour, "it greatly reduces the chance of injury or illness that may occur during the wash process" (Paynter, interview, 2020). After the buckets are scrubbed and rinsed, they air dry on large metal grates. "We disinfect the buckets and let them air dry for a few minutes and then we use a terry cloth to hand dry. Ultimately, the sanitation and drying process reduces the bucket odor and makes the service a clean and sanitary process for everyone while using as little potable water as possible." (Paynter, interview, 2020).

Figure 9: Cee's Bucket Cleaner

The finished compost is sieved manually on a "compost table"— large, screened structure the size and height of a picnic table that is manually shaken and scraped. Any large organic scraps sieved out are then reintroduced into the compost system. The compost is bagged and delivered to subscribers who "opt-in" to receive the

complimentary soil amendment. The service is relatively low-scale, “We often say our design is ‘scale-able’, we take it one subscriber at a time, one restaurant or cafe at a time and let things happen organically, no pun intended.” (Paynter, interview, 2020).

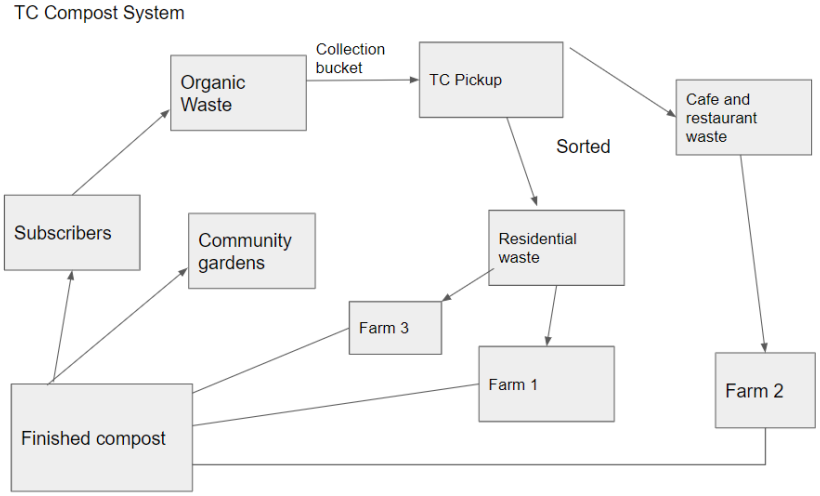

Figure 10: Treehouse Compost System Diagram

5.2 Social Micromending Criteria

TC's compost service heavily relies on social media to communicate and connect with central Kentuckians. "We've built a pretty strong network on Instagram and Facebook, I don't think we realized how visible we would be to the broader public, it's really a social movement." Paynter explained. The majority of TC subscribers are homeowners who want to compost and maybe have tried to compost but aren't able to maintain a home compost bin. The minority of subscribers are condo owners, co-operative houses, and renters. Paynter recounts that the downtown Lexington neighborhoods and large apartment complexes usually come in dense clusters and can rapidly grow but growth comes with learning curves. "We've got a great community of folks that enjoy our service but there can be a lot of frustration as property managers throw away the compost bucket or homeless folks take the clean empty ones for their needs. With more people around, there's a higher chance of the bucket walking off and customers getting frustrated and canceling the service." (Paynter, interview, 2020).

Rose, a newer TC subscriber states, “The biggest obstacle for me to compost at home was, I didn’t know where to start! So, there is a convenience factor, but I’ve never encountered a service like this before and I didn’t know I could do this where I’m living.” Despite convenience, TC’s Porch Pickup service is an educational experience. Charlie, a longtime TC subscriber, local business owner and “family guy” says he has been composting all his life, and he enjoys watching his kid’s curiosity and reaction to the compost program. “It’s been great, they like the science of watching stuff decay, they are always asking us which bin I put this in, etc. So, it’s been very educational and fun. They will open it [the compost bin] and get a big whiff of the stuff decomposing and we’ll laugh about the organic smells of it all.” (Charlie, interview, 2020).

Dina, UK professor and TC subscriber recounts how the composting subscription has opened her eyes, “I do think composting has helped us maybe rethink a little bit more about using things and what we are using and being mindful we’re not just throwing it in the trash, we SEE it, I think we are a little more mindful of what we are using so that’s been cool.” (Dina, interview, 2020). Cirrus echoes Dina in their excitement to be more aware of their consumption and waste, “I think composting makes me aware of my consumption… it is important for me to see it, be close to it, understand where it is going and so, having compost makes me feel kind of closer to my own consumption cycle personally. I feel like I am just in a little bit of my own bubble, my own queer bubble, where everyone is into composting and so it’s been very interesting to learn.” (Cirrus, interview, 2020).

When TC launched in March 2020, COVID-19 dampened their dreams of hosting community compost workshops and other educational events. Paynter expresses her

frustration, “We really want to get out there and talk to neighbors of our subscribers, talk to business owners, plan free pumpkin pickups after Halloween, all of that. But COVID-19 has really hindered our ability to connect to people beyond the screen, beyond social media.” TC is adamant that community service is at the core of their business, “Despite COVID-19, we were able to donate a significant portion of our 1st quarter profits to a local nonprofit that builds bicycles for physically disabled children, we donated some blankets, compost, and were able to deliver a few bales of hay to folks without a truck in the Fall but all of that was no contact and facilitated over Facebook.” (Paynter, interview. 2020).

Relying on social media and email to communicate with potential subscribers can be problematic as not everyone is on social media. Working with a “shoestring budget” has its pitfalls when it comes to media and marketing, aside from being a cofounder, Paynter is the head marketing director and utilizes her graphic design background to create Facebook and Instagram ads. “We always wonder who we are leaving out, who could really benefit from learning about our project? What other community members could be inspired to start a similar program in their hometown? Connecting with a broader audience is the biggest challenge we face right now, aside from being a ‘environmentalist biz’ in Trump nation.” (Paynter, interview, 2020).

As explored in Chapter 3, implementing, and maintaining successful composting systems in Kentucky is an expensive uphill battle both economically and socially. The economic implications of TC’s program will be explored in greater detail in section 4.5. However, it is important to mention that the economic barriers to encouraging businesses

and residents to pay for composting in Kentucky define many of the social barriers TC faces.

5.3 Ecological Micromending

In this section, I explore the ecological implications of TC's composting system and review UK's finished compost sample results and the EPA's Policy and Program Impact Estimator (PPIE). Based on my preliminary research, I expected TC's finished soil amendment would be diverse in metabolic content and will, overall, be medium quality with a small amount of contamination and that due to TC's scope and scale will result in a low PPIE. The PPIE diversion scores are automatically converted into various categories such as CO2 and CH4, which give indication to the ecologically mending potential of TC's system.

As a startup community-scale composter, TC's scope and potential to grow is yet undefined. To reiterate, the validity of scientific evidence of compost's ecological benefits is not tested nor reviewed in this research project. Between March 2020 and December 31, 2020, TC collected a total of 946 five-gallon buckets of food and paper scraps. The 946 buckets weighed 23,650 lbs. and was equivalent to 21,850 lbs. of CO2 emissions that would have been created if that waste had been sent to a landfill. Due to being a new business established during COVID-19, it's hard to estimate the ways in which data collection had been impacted during 2020 and what the full potential of this system would have been in a normal year. However, most community-scale composting systems publicize their year-end ecological impact reports on their websites, making a larger research project on the mending potential of American compost systems possible.

5.4 Economic Micromending Criteria

This section reviews the economics of the TC compost system as listed in UK's cost-benefit analysis conducted by a former UK Alumna. This analysis is reinforced with primary and secondary interview data that provides personal context from the UK compost partners. This section grapples with the "wealth generating characteristic of capitalism" as demonstrated in the metabolic rift (Foster, 2009: 139). This section poses the argument that:

TC makes their money from transporting compost and connecting urbanites with rural farmers in need of large amounts of soil amendment. Central Kentucky is a prime location for a CompHost network like TC's. For TC, making money from the sale of compost is not something they want to focus on, "We shy away from centering the selling of compost products because there is another large-scale compost company that sells their products at almost every landscaping store in the area. Their product comes from rescued horse bedding and manure; we just can't compete with their prices." Paynter explains. Furthermore, during my interview with Paynter, she stated that for them as a company to compost, it is costly and requires extensive EPA regulation and permitting, something they don't have the time, interest or money in doing. Paynter explains, "We stick with strictly pre-consumer waste because that's not garbage, it's an agricultural byproduct that we have a need for here in rural Kentucky."

5.5 Conclusion

Despite being a company in its infancy, TC has taken advantage of the unique rift between rural and urban Kentuckians living around Lexington, Kentucky to create a regionally unique composting system. The lack of monetary investments makes the

program unable to fulfill the needs of thousands of clients, although this system is not a band aid, it is a steppingstone to a greater social change in Lexington. However, in my experience as a compost hauler in Massachusetts, community composters have proven to be resilient in their ability to scale-up and transform their businesses into diverse ventures that ameliorate the varying effects of the metabolic rift[6].

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[6] Such as education, workshops, free garden supplies, city pilot programs, compost equipment retailers. etc.

Chapter Six: Concluding Remarks

In this thesis, I have outlined two pre-consumer compost waste systems serving Lexington, Kentucky and broadly explored the metabolic mending potentials of composting waste. In doing this, I identified how contemporary urban composting systems work to combat some of the ecological and social divisions between human and nature under capitalism. The finding of this research suggests that because of the existing metabolic rift, capitalism is redefined and replicated in urban compost systems and services. Capitalism's competent abilities to contain and define acts such as composting ultimately diminishes the mending potential of compost. Furthermore, the particular confluence of large institutions and locally conscious citizen entrepreneurs investing in composting systems in Lexington represents a larger ripple effect of sustainability education and legislation that has gained prominence since the 1980's. In Lexington, KY for example, TC and UK's compost systems are invoked and informed by a small handful of people who are passionate about what composting represents, or in many cases, what or who composting reminds them of. This project presents the idea that instead of viewing compost as an offshoot of "waste management" or "sustainability" we instead see composting as existing within the spaces in between. This research shows that composting sits at the nexus of remaking social and economic space in Lexington, Kentucky while attempting to address our current systems of injustice while existing within the confines or urban-contemporary capitalism.

Through my research, I found Foster's conception of the metabolic rift's diagnosis of environmental problems invokes a need for powerful social awareness, advocacy for institutional and political changes and a deepening of the literature and

discourses that have brought us to the “sustainability movement”. Furthermore, the interindustry relationships within the compost world are dependent upon social media and conferences. Exploring the trend wherein independent compost haulers (like TC) often act as the “first responders” to community waste but are excluded from larger government-based contractual agreements resulting in them pushed out by larger corporations and systems.

This project explored the idea that while composting systems are a better alternative to landfilling organic matter, they are not sufficient to ameliorate the effects of the metabolic rift. The insufficiency is not in composting itself but is because contemporary composting systems "discount" the true environmental impacts of organic waste, composting systems exist within inequitable systems of capitalism. Furthermore, large scale composting systems are a symptom of late-stage capitalism and are not suited to fully mitigate climate change and environmental degradation in the organic waste sector.

My research asserts that the metabolic rift theory provides soil and environmental metabolic perspectives that can inform and improve large composting systems and other environmental system analysis. The metabolic rift theory illuminates larger concerns around capitalism and commoditizing nature, it exposes the importance of addressing the social rift between rural and urban populations, and the metabolic rift theory reveals dualisms within the sustainability rhetoric and industry.

In terms of the University of Kentucky’s composting system, it exists mostly behind the scenes and relies on large capital investments, it does not fully address larger issues of capitalism and accessibility. However, it does engage in varying degrees of

micromending in Lexington, Kentucky because UK's composting system encourages changes in on-campus behavior, it mends the social rift by engaging a broader audience in composting, and the composting system fosters a ecological mend as it mitigates a relatively large amount of organic waste from landfills into a useable soil amendment.

Although Treehouse Compost's (TC) system relies on subscription fees and extensive CompHost partnerships to thrive, TC offers little in terms of a long-term solution for Lexington food waste. TC engages in micromending in Lexington, Kentucky because the business model actively challenges systems of waste and engages a broader audience in the act of composting. Moreover, TC's system micromends the social rift by engaging a broader audience in composting operations and systems across rural and urban boundaries and encourages ecological micromending by mitigating a minute portion of organic waste from landfills into a usable soil amendment.

This project has shown that the metabolic rift is reparable within a micromending scale. Theorizing how these micromends, across various geospatial planes, translate into a larger mending of the metabolic rift, only time will tell. However, this research project supports the notion, laid out by Marx and Foster, that capitalism is the ultimate hindrance to mending the metabolic rift. Global climate change is so large and insurmountable that we may never fully dig our way out of it, not with capitalism in the mix.

Revisiting the research questions laid out in Chapter one, this conclusionary chapter will attempt to answer each question based on the findings.

RQ1: How does composting ameliorate the effects of the metabolic rift in Lexington, Kentucky?

Composting ameliorates the effects of the metabolic rift in Lexington, KY in a micromending way. Currently, the scale of compost systems in Lexington remains relatively small and the compost collected per capita does little to impact the amounts of organic waste sent to the landfill each day. Socially, these compost systems have an enormous amount of potential to inspire people to reconsider the way in which they buy food, store food, cook food, and throw away food. However, navigating the environmental rhetoric and conversations necessary for social change in a conservative state without resulting in the "guilt free" frivolous composting of perfectly good foods presents a major hurdle for each system.

TC can learn much from the UK's less "in your face" marketing about compost and UK could learn from TC's social engagement and social media methods to increase non-student and faculty outreach. However, both programs have their strengths and weaknesses, they both represent the growing social concern of life beyond the landfill.

RQ2: How is composting conceptualized in Lexington's compost systems?

As explored in this research, within UK's extensive partnerships lies a diverse conceptualization of composting systems. On one hand, it makes financial sense to encourage a reduction in food waste and a repurposing of nutrient rich organic waste. On the other hand, at the heart of UK's compost system, there is a deep concern for the environment's wellbeing and UK's responsibility to address these concerns. Within UK's compost system, we see political finesse in its most important form, bringing unlikely partners to the table and demanding a deepened commitment from them. More broadly, UK has power within local politics and could utilize their experiences planning and

implementing their compost system to inform local policy and planning in a more meaningful way.

TC's conceptualization is a bit more troublesome in the long term. TC markets their services as an easy way to fight global climate change. Although they are correct in some sense, they do little to address the reduce and reuse aspect that comes before the compost bucket. Moreover, the scalability of their services is a bit less limited than UK's as they employ a CompHost program with local farmers, an innovative way to ameliorate the urban and rural rift that is brought about by capitalism.

R*Q3: How does personal identity and/or socioeconomic status influence composting*

systems in Lexington, KY?

In both cases, capital, or access to money, is a defining factor of both compost systems as they each have potential to scale up over time. Both programs utilize some second hand or found/engineered equipment to help curb costs while increasing system efficiency. Moreover, both programs, at this time, are proving to not be profitable-despite there being great potential for each program to be a money-making machine in years to come.

For community-scale composters like TC, there is a potential for marginalized populations to enter the hegemonic world of composting. However, without access to land or capital, there is a cap to how many clients you can take on, to how many lbs. of compost you can accept in each month.

In close, I would like to state that history has shown that as composting continues to be a dominating conversation and consequently, we find that community-scale efforts

often pave the way for large corporations with capital investment to trivialize and monetize composting. As we move forward as a global community, we must not simply write off composting as matters of “waste” or “dollars and sense”. For the compost fanatics like myself, it is our community, histories, voices, and stories that make the compost movement so beautiful.

Thank you for reading.

Appendix 1: Metabolic Rift (MR) Analysis

Town VS Country Criteria

1. How does this system operate between "town and country"?

2.. In this system's structures, how does energy or product move across spatial boundaries?

3. Does this system address any geographically exclusive rifts between town and country?

Metabolism of Society Criteria

1. How does this system engage a broader audience?

A. What manners and methods does this system apply to engage a broader audience?

2. How is this system navigating socio-political spaces?

3. Are socio-economic concerns addressed in this system? If so, how? If not, why not?

Metabolism of Nature Criteria

1. What are the ecological outputs of this system?

2. Does this system test their outputs for nutrient contents? If so, what are the results? If not, why?

Capitalism Criteria

1. Does this system benefit from the "wealth generating characteristic of

capitalism" (Foster, 2009: 139)? How or how not?

2. How does the system navigate the spaces and places of capitalism? How is it Commoditized?

Review

1. What are the identified benefits or strengths identified within this system?

2. What are the identified negatives or weaknesses identified within this system?

3. What are the potential goals for this system? What is a timeline for these goals?

4. When will a follow-up review be conducted?

Appendix 2: Example for UK's Metabolic Analysis

Town VS Country Criteria

1. How does this system operate between "town and country"?

UK's compost system operates over 20 miles from urban Fayette county to rural Woodford county setting. The system spans across two counties in central Kentucky and provides some information to rural populations via the University Extension program. Furthermore, many UK students and faculty members are from or currently live in a rural setting, the sharing of information has the potential to extend across rural and urban boundaries with the help of social media and other modes of interpersonal communication.

2. In this system's structures, how does energy or product move across spatial boundaries?

This system brings in food and other products from all over the world and from local rural farms. The food is consumed in an urban setting and trucked to a rural setting where it becomes a usable soil amendment that is then trucked back to the urban area of Lexington and used in garden beds and around trees on campus. It does not appear that employees or students have access to the finished compost and therefore do not play a role in helping the benefits of the finished product be shared among non-UK owned rural and urban properties.

3. Does this system address any geographically exclusive rifts between town and country?

Although there exists a rift between town and country in central Kentucky and a rift between urban citizens and access to compost services and fresh foods, UK's compost system doesn't appear to explicitly address existing rifts between town and country.

Metabolism of Society Criteria

1. How does this system engage a broader audience?

Due to the large population that frequents campus during non-COVID times, UK's ability to engage a larger and more broad audience in composting and composting systems is extremely high. UK is willing to share information and data and has given tours to Toyota and other industrial leaders in the region. Social media, sustainability grant challenges, eco-reps, weigh the waste, and informational imagery are all tools the UK employs to engage a larger audience in matters of compost. Furthermore, UK's extension program offers educational compost materials that are general in nature but could be restructured to provide a "tour guide" or supplemental information for K-12 students to tour the compost facility.

2. How is this system navigating socio-political spaces?

UK's compost system is a EPA approved facility that is bound by permitting laws and other licensing laws. However, UK is steadily expanding their compost system within their own network and are currently unable to accept compostable products from non-UK vendors and businesses. Based on my time interviewing UK's compost partners, it seems that most if not all of UK's compost managers and administrators are Lexington residents and somewhat involved in local politics as Lexingtonians. However, it doesn't appear that the personal political preferences and happenings of the compost managers

influences or impacts the compost systems or the socio-political nature of composting in Kentucky.

3. Are socio-economic concerns addressed in this system? If so, how? If not, why not?

UK is setting the stage to challenge the issues around landfilling costs and the inequities associated with landfills but are currently not directly addressing social and economic barriers to the broader public accessing large-scale composting systems in Kentucky. Furthermore, the current discourse surrounding UK's compost system is less involved in socio-economic concerns of sustainability-initiatives and more concerned with operating smoothly and efficiently. Ensuring the longevity of the composting system at UK may be a tactic to segue talks around access and privilege in composting but there has yet to be a formal and public discussion of this for the UK.

Metabolism of Nature Criteria

1. What are the ecological outputs of this system?

Moderate to large quantities of low-grade compost, fossil fuels from storing and trucking compost, and greenhouse gas emissions to run farm equipment to manage and move compost are the most apparent ecological outputs of this system[7].

2. Does this system test their outputs for nutrient contents? If so, what are the

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[7] Low-grade compost is ideal for soil amendment so that ecological systems are not stunned with unnatural amounts of nutrients.

results? If not, why?

Yes, see Table 3.

Capitalism Criteria

1. Does this system benefit from the "wealth generating characteristic of capitalism" (Foster, 2009: 139)?

Yes. This system relies on an exorbitant amount of capital investment and corporate partnership to exist at the size and scale that it does. Privilege is a major player in this compost system, one must have the privilege to work at UK, attend UK, or live nearby UK to benefit from their composting program. Moreover, the compost system is projected to become a stream of income for UK by turning waste into a valuable soil amendment that will save the university money.

Review

1. What are the identified benefits or strengths identified within this system?

The scope and efficiency of the system is a major strength. This system has the potential to grow into their sports events and healthcare system which would help break barriers while increasing the breadth at which the system operates.

2. What are the identified negatives or weaknesses identified within this system?

The social equity aspect of 4 pillars of sustainability is lacking in the system. Moreover, the compost is generated in urban spaces to benefit urban spaces and does not extend the benefits of the finished soil amendment to smaller rural farmers and food producers.

3. What are the potential goals for this system? What is a timeline for these goals?

UK's extension program offers educational compost materials that are general in nature but could be restructured to provide a "tour guide" or supplemental information for K-12 students to tour the compost facility. A compost share program could be a good way to share the benefits of the compost system. By donating finished compost to urban gardens, school garden projects, and rural farmers in need of compost could be a socially conscious way to move the compost system forward while engaging a broader audience in the benefits and money making abilities of composting. Partnering with local FFA or 4-H club members for internships, work study summers, and other involvement could be another way to reach middle and high school students who may be interested in studying at UK or pursuing a profession in agriculture or sustainability. Compost research grants would be a good way to further engage current UK students of all levels. In offering money to help UK students offset the costs of researching compost could encourage more students to pursue a profession in the compost industry or find a career as a compost academic.

The timelines for these potential goals are largely reliant on the internal politics at UK and the labor and time available to plan and pursue them. In my opinion, one of the most important things for UK's compost system is to invest in hiring several full-time workers for UK's Sustainability Office. In hiring outreach, recruitment, funding and K-12 programming leaders, UK could become a major player for sustainability and compost education while bringing in more grant and research money for UK students.

Bibliography

Alvesson, M., & Karreman, D. (2000). Varieties of discourse: On the study of organizations through discourse analysis. Human relations, 53(9), 1125-1149.

Barton, E. (2001). Design in observational research on the discourse of medicine: Toward disciplined interdisciplinarity. Journal of Business and Technical Communication, 309-332.

Beattie, A. (2014). Cost-Benefit Analysis of Food-Waste Composting Program at UMM. Scholarly Horizons: University of Minnesota, Morris Undergraduate Journal, 1-14.

Biernbaun, J. (n.d.). Compost for Small and Mid-Sized Farms. Retrieved from Michigan State University: https://www.canr.msu.edu/uploads/236/79117/Compost_for_Midsize_FarmsQuickCourse8pgs.pdf

Biernacki, P., & Waldorf, D. (1981). Snowball sampling: Problems and techniques of chain referral sampling. Sociological methods & research, 10(2), 141-163.

Brooksbank, K. (2018). Composting to avoid methane production. Retrieved from Department of Primary Industries and Regional Development: Government of Western Australia: https://www.agric.wa.gov.au/climate-change/composting-avoid-methane-production

Brown, S. (2016). Greenhouse Gas Accounting for Landfill Diversion of Food Scraps and Yard Waste. Compost Science & Utilization, 11-19.

Brown, Lester R. Full Planet, Empty Plates : The New Geopolitics of Food Scarcity. First ed. 2012.

Castellano, Mayka. "Garbage Is a Man Thing! Gender Issues in the Subculture of Trash." Intexto (Porto Alegre), no. 25 (2011): 282-303.

Chaz, Miller. "The Politics of Garbage." Waste Age 31, no. 9 (2000): 38.

Chittum, Morgan. “Trash is Treasure Again”. NY Daily News. October. 2020

Cho, Yoon-Na & Thyroff, Anastasia & Rapert, Molly & Park, Seong-Yeon & Lee, Hyun. (2013). To be or not to be green: Exploring individualism and collectivism as antecedents of environmental behavior. Journal of Business Research. 66. 1052–1059.

Conner, Blair. (2017). “UK Dining, UK Recycling Implement New Composting Program”. Lexington Herald Leader.

Conrad, Zachary, et al. "Relationship between Food Waste, Diet Quality, and Environmental Sustainability." PLoS ONE 13.4 (2018): E0195405.

Crouch, P., 2012. Evolution or gentrification: do urban farms lead to higher rents? Grist, 23 October.

Debord, G. (2012). Society of the Spectacle. Bread and Circuses Publishing.

Dehaene Michael, Tornaghi Chiara, Sage Colin (2016), “Mending the metabolic rift-placing The ‘urban’ in Urban Agriculture”, Urban Agriculture Europe.

Dongyan, E. a. (2017). Environmental and economic analysis of an in-vessel food waste composting system at Kean University in the U.S. Waste Management, 476-486.

Dooling, S., 2009. Ecological gentrification: a research agenda exploring justice in the city.

Duží, Barbora, et al. "The Geography of Urban Agriculture”.

EPA. (2010). Discounting Future Benefits and Costs. Retrieved 2020, from Guidelines for Preparing Economic Analysis: https://www.epa.gov/sites/production/files/2017-09/documents/ee-0568-06.pdf

EPA. (2018). The Social Cost of Carbon. Retrieved 2020, from United States Environmental Protection Agency: https://19january2017snapshot.epa.gov/climatechange/social-costcarbon_.html

FAO. (2013). Food Wastage Footprint: Impacts on Natural Resources. Retrieved 2020, from Food and Agriculture Organization: http://www.fao.org/3/i3347e/i3347e.pdf

FAO. (2014). Mitigation of Food Wastage: Societal Costs and Benefits. Retrieved 2020, from Food and Agriculture Organization: http://www.fao.org/3/a-i3989e.pdf

FAO. (2015). Composting: Let's Give the Soil Something Back. Retrieved 2020, from Food and Agriculture Organization: http://www.fao.org/soils-2015/news/newsdetail/en/c/280674/

Fortune, Beverly, 2010. “Lexington restaurants recycle leftover food into compost, with Seedleaf’s help”. Lexington Herald Leader. May 22, 2010.

Foster, J.B. Marx's Ecology: Materialism and Nature. NYU Press, 2000.

Foster, J.B.and Fred Magdoff. What Every Environmentalist Needs to Know About Capitalism: A Citizen's Guide to Capitalism and The Environment. Monthly Review Press New York.
2011.

Foster, John Bellamy. , et al. "Making Space in Critical Environmental Geography for the Metabolic Rift". Annals of the American Association of Geographers. Vol 109, number 6.
November 2019.

Foster, John Bellamy. "Marx and the Rift in the Universal Metabolism of Nature". Monthly
Review. December 1, 2013. 1-24.

Foster, John Bellamy. "Marx's Theory of Metabolic Rift: Classical Foundations For Environmental Sociology" The American Journal of Sociology. Volume 105. September, 1999. Pp 366-405.

Gainza, Xavier. " Culture-led Neighbourhood Transformations beyond the Revitalisation/gentrification Dichotomy" Urban Studies 54.4 (2017): 953-70.

Geis, E. (2016). Landfills Have A Huge Greenhouse Gas Problem. Here's What We Can Do About It. Retrieved from Ensia: https://ensia.com/features/methane-landfills/

Greenwalt, M. (2015). Toyota's Kentucky Landfill Gas-to-Energy Project Now Online. Retrieved 2020, from Waste360: https://www.waste360.com/emissions/toyota-s-kentuckylandfill-gas-energy-project-now-online

Gunders, D. (2012, August). Wasted: How America Is Losing Up to 40 Percent of Its Food from Farm to Fork to Landfill. Retrieved from Natural Resources Defence Council: https://www.nrdc.org/sites/default/files/wasted-food-IP.pdf

Hall, Kevin D., Juen Guo, Michael Dore, Carson C. Chow, and Thorkild I. A. Sorensen. "The Progressive Increase of Food Waste in America and Its Environmental Impact (Food Waste in America)." PLoS ONE 4.11 (2009): E7940.

Heynen, Nik, Harold A Perkins, and Parama Roy. "The Political Ecology of Uneven Urban Green Space: The Impact of Political Economy on Race and Ethnicity in Producing Environmental Inequality in Milwaukee." Urban Affairs Review 42.1 (2006): 3-25.

Hindley, Jane. "Reclaiming the Good Life (Now!)." Capitalism Nature Socialism 19, no. 2 (2008): 115-18.

Ikerd, John "The Economic Pamphleteer: The Urban Agriculture Revival." Journal of Agriculture, Food Systems, and Community Development 7.3 (2017): 1-4.

Katz, S. M. (2002). Ethnographic research. In L. Gurak & M. M. Lay (Eds.), Research in technical communication (pp. 23-46). Westport, CT: Praeger.

Kennedy, Christopher, and Daniel Hoornweg. "Mainstreaming Urban Metabolism." Journal of Industrial Ecology 16.6 (2012): 780-82.

Kocker, N. (2018). A Cost-Benefit Analysis of Food Waste Processing in Massachusetts. Retrieved 2020, from Digital Access to Scholarship at Harvard: http://nrs.harvard.edu/urn3:HUL.InstRepos:37945110

Liu, Christopher C. & Matt Marx (2020). Micro-geography: a fundamental organizing attribute, Industry and Innovation, 27:8, 837-841, DOI: 10.1080/13662716.2020.1822153

Martínez-Blanco, Julia, et al. "Compost Benefits for Agriculture Evaluated by Life Cycle Assessment. A Review." Agronomy for Sustainable Development 33, no. 4 (2013): 721-32.

Marx, Karl. Capital, Vol 1. 323; Lucretius, On the Nature of the Universe (Harmondsworth: Penguin Books, 1994) 13-14 (I.I45-60).

McSweeny, James. “Community-Scale Composting Systems: A Comprehensive Practical Guide for Closing the Food System Loop and Solving our Waste Crisis. Chelsea Green Publishing. 2019.

Minkoff-Zern, L.A. (2014). Challenging the agrarian imaginary: Farmworker-led food movements and the potential for farm labor justice. Human Geography, 7 (1), 85-101.

Moore, Jason W (2011). "Transcending the Metabolic Rift: Towards a Theory of Crises in the Capitalist World-Ecology" . Journal of Peasant Studies . 38 (1): 1–46.

Newell, Joshua P, and Joshua J Cousins. "The Boundaries of Urban Metabolism: Towards a Political–industrial Ecology." Progress in Human Geography 39.6 (2015): 702-28

Notarnicola, Bruno, Sala, Serenella, Assumpcio, Anton, McLaren, Sarah J., Saouter, Erwan, and Sonesson, Ulf. "The Role of Life Cycle Assessment in Supporting Sustainable Agri-food Systems: A Review of the Challenges." Journal Of Cleaner Production 140 (2017): 399-409.

Noy, C. (2008). Sampling knowledge: The hermeneutics of snowball sampling in qualitative research. International Journal of social research methodology, 11 (4), 327-344.

Oatman, Maddie. “In Trump’s America, Immigrants Are Afraid to Apply for Food Stamps”. Mother Jones. November 16, 2018.

Oliver, D. G., Serovich, J. M., & Mason, T. L. (2005). Constraints and opportunities with interview transcription: Towards reflection in qualitative research. Social forces, 84 (2), 1273-1289.

Price C. (2005) How Sustainable is Discounting?. In: Kant S., Berry R.A. (eds) Economics, Sustainability, and Natural Resources. Sustainability, Economics, and Natural Resources, vol 1. Springer, Dordrecht

Schneider, Mindi and McMichael, Philip. "Deepening and repairing the metabolic rift". Journal of Peasant Studies . 37, 2010, 461-484.

Risse, M., & Faucette, B. (2017). University of Georgia Extension. Retrieved from Food Waste Composting: Institutional and Industrial Application: https://secure.caes.uga.edu/extension/publications/files/pdf/B%201189_4.PDF 33

Rynk, R. (2001). Cost-Benefit Analysis: Exploring the Economics of On-Farm Composting. Retrieved 2020, from BioCycle Magazine: https://www.agriculturexprt.com/articles/cost-benefit-analyses-exploring-the-economics-of-on-farmcomposting-2215

Seedleaf Inc.(2020). "Announcement Regarding Seedleaf's Compost Operations".

Siddique, Kadambot H.M. Food Loss and Food Waste: Causes and Solutions by Michael Blakeney , Cheltenham, Edward Elgar, 2019, Xi 224 Pp. Developing Economies 57.3 (2019): 274-76.

Smith, D. (2012). A 2012 Survey and Economic Assessment of Composting and Anaerobic Digestion Options for Miami University. Retrieved from OhioLINK: https://etd.ohiolink.edu/!etd.send_file?accession=miami1344965351&disposition=inlin e

Srivastava, P., & Hopwood, N. (2009). A practical iterative framework for qualitative data analysis. International journal of qualitative methods, 8 (1), 76-84.

Tedder, Shane. (2019). "UK Turns Food Waste Into Useable Material". UKnow Campus News.

Teddlie, C., & Yu, F. (2007). Mixed methods sampling: A typology with examples. Journal of mixed methods research, 1 (1), 77-100.

Treehouse Compost. Homepage.2020. https://www.treehousecompost.com/

Tuijl, Erwin Van, et al."Opportunities and Challenges of Urban Agriculture for Sustainable City
Development." European Spatial Research and Policy 25.2 (2018): 5-22.

UNESA, United Nations Department of Economic and Social Affairs. (2007). World urbanization prospects: The 2007 revision population database.

U.S. Composting Council. (2019). Our Campus Composts: A 2018-2019 Review of Current Practices. Retrieved 2020, from US Composting Council: https://cdn.ymaws.com/www.compostingcouncil.org/resource/resmgr/produce/our_ca mp us_composts/uscc_white_paper.pdf

U.S. Energy Information Administration. (2019). Biomass Explained: Landfill Gas and Biogas. Retrieved from U.S. Energy Information Administration: https://www.eia.gov/energyexplained/biomass/landfill-gas-and-biogas.php

UK Sustainability. (2018). University of Kentucky Sustainability Strategic Plan. Retrieved 2020, from University of Kentucky: https://www.uky.edu/sustainability/sites/www.uky.edu.sustainability/files/UK%20Susta i nability%20Strategic%20Plan.pdf 34

Weitzman, M. (2007). A Review of The Stern Review on the Economics of Climate Change. The Journal of Economic Literature, 703-724

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