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Waste governance and campus sustainability: Formal and informal waste systems at football tailgates in Michigan

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Abstract

Purpose

Football tailgating is a focus of campus sustainability in the United States because it produces large amounts of waste. In states where recyclables can be redeemed for cash, this waste also is a resource for earning income. University officials face the challenge of encouraging proper waste disposal, cleaning up efficiently and coexisting productively with income-earning recyclers.

Design/methodology/approach

This paper uses the institutional analysis and development framework to understand how different actors collaborate and organize for waste governance in the context of on-campus football tailgate parties. It combines observational data throughout one football season with semi-structured interviews with informal recyclers, tailgaters and campus officials. Data are analyzed using thematic analysis.

Findings

1
2
3 The case displays interaction between formal and informal waste management actors and
4
5 between formal and informal rules of interaction. Campus officials have largely succeeded in
6
7 encouraging proper waste management by tailgaters, who in turn loosely coordinate with
8
9 income-earning recyclers under unwritten rules. Officials tolerate recyclers, but waste
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11 management could be improved with better communication and coordination and more trust
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13 between them. Many recyclers conduct their work with a sense of environmental stewardship
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15 that could support waste management efforts.
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18 19 Originality

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21 Uncoordinated coexistence between formal and informal waste management systems is common
22
23 in the global South. With few studies in the global North, this is the first the authors know of in a
24
25 campus sustainability context.
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32 **Keywords:** athletics sustainability, inclusive waste management, informal rules, institutional
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34 analysis and development, recycling, tailgating sustainability
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40 **1. Introduction**

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42 American college football games, which take place in stadiums accommodating 50,000-100,000
43
44 spectators and draw many more to campus for tailgating parties, generate vast amounts of waste
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46 on university campuses (EPA, 2012; Gillentine, 2017). Tailgating is an American pastime in
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48 which large numbers of people gather prior to a large sporting event and hold parties outside the
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50 stadium (Wikipedia, 2022). Recent years have seen expanded efforts to reduce waste generation
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52 and increase recycling at football tailgates (Recyclemania, 2019; Zawadzki et al., 2016; Casper
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3 et al., 2014; Martin, et al., 2015). The focus of these efforts, and of the literature on campus
4 waste management after sporting events, has been on university officials' efforts to remove
5 waste as rapidly and efficiently as possible, and diverting waste from landfill and earning
6 revenue from recycling (Ebrahimi and North, 2017; MSU, 2022).
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12 In contrast, this literature has not examined the coexistence of formal campus waste
13 management systems and informal waste management actors who earn income by extracting
14 items of value (e.g., Sholanke and Gutberlet, 2022). Informal waste management is often highly
15 visible in the global South (Wilson et al., 2006; Dias, 2016). In the global North, informal waste
16 management is widespread, but it tends to be hidden and it remains under-researched (Porras
17 Bulla et al., 2021). People who collect waste for income tend to be invisible and their interests
18 and perspectives ignored (Peres, 2016).
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29 This paper focuses on the interaction of formal and informal waste management systems
30 in the context of football tailgating at Michigan State University, which has made a strong effort
31 over the past 15 years to promote responsible waste disposal during tailgating. Informal waste
32 management thrives in this setting because the State of Michigan has a 10-cent deposit bottle bill
33 for most beverage containers. This redeemable value is one of the highest in the US, and it has
34 attracted people who collect aluminum cans and bottles as a source of income at football
35 tailgates.
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45 In this setting, waste is a common pool resource in which management requires collective
46 action among different groups of actors (Ciechelska, 2021, Pires Negrao, 2014; Cavé, 2020).
47 This is true both for promoting responsible behavior that minimizes littering and cleanup effort,
48 and for determining access to waste items that have potential value. Enforcement of rules is
49 costly in the commons, so successful management requires a collaborative effort to work towards
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3 a mutually desirable situation (Ostrom, 2011). This perspective is also not found in the literature
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5 on higher education and campus sustainability.
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8 The study addresses the following main research questions: (1) What are the roles and
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10 relationships among different actors in the formal and informal waste management systems at
11
12 football tailgates? (2) How do these relationships affect waste management outcomes for
13
14 different stakeholders? The overarching objective is to understand how bridging formal and
15
16 informal actors and systems can yield improved waste management outcomes.
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19 **2. Literature review**

20 *2.1. Waste conceptualization and paradigms*

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22 According to Moore (2012), waste has been perceived in two main ways over the years. Firstly,
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24 in the sanitary paradigm, waste generated is viewed as a hazard, a “public bad” that is dirty and
25
26 has detrimental environmental impacts. Secondly, in the sustainability paradigm, waste is also a
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28 resource that has value i.e., an object to be managed and governed at different scales. For
29
30 instance, waste as recycled material is used in production inputs and is a source of livelihood for
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32 those able to collect and sell recyclables. Under both paradigms, waste can be considered from a
33
34 common pool resource perspective. From the sanitary paradigm, proper waste management
35
36 involves protecting the common landscape against littering (Kolodko et al., 2016). From the
37
38 sustainability paradigm, waste is subject to competition for access by different actors. There is no
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40 ownership once the waste is disposed of, and it is a highly moveable resource of a non-fixed
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42 quantity (Pires Negrao, 2014).
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49 The three major systems in managing waste are the formal waste management system,
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51 informal waste management system, and an inclusive waste management system (Oguntoyinbo,
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53 2012). The *formal waste management system* includes state, local government agencies, and
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3 private registered organizations involved in waste collection, transportation, and waste disposal.

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5 This is typically common in all countries where local authorities have the jurisdiction to manage
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7 waste and ensure a clean environment.
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10 Conversely, the *informal waste management system*, common in the global South, is a
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12 labor-intensive, low-technology, low-paid, unrecorded, and unregulated activity of people
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14 collecting and sorting recyclables to earn a living (Wilson *et al.*, 2006). Informal recyclers
15
16 provide recyclable material for production (Dias, 2016) and reduce the amount of waste
17
18 deposited to the landfill (Gutberlet, 2015b).
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21 In the global North, informal recyclers' activities tend not to be recognized, supported, or
22
23 acknowledged by formal authorities; indeed, they may operate in violation of authorities and
24
25 other actors. More generally, modernized approaches to waste management consider informal
26
27 waste systems as a nuisance, detrimental to modern city development and causing public health
28
29 risks (Nzeadibe & Ajaero, 2011). Hence, there has been an unwillingness to acknowledge
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31 informal recyclers in formal waste management systems, especially in wealthier parts of the
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33 world (Scheinberg *et al.*, 2016). Such perceptions lead to the exclusion, marginalization, and
34
35 exploitation of informal recyclers and their increased exposure to environmental health hazards
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37 (Binion & Gutberlet, 2012; Wittmer and Parizeau, 2018).
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42 Against this background, *inclusive waste management* is an emerging waste management
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44 system mostly in some parts of the global South (Dias, 2016). Inclusive waste management
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46 integrates the formal and informal systems, which complement each other, so that it is efficient
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48 as well as inclusive. In inclusive waste management, informal recyclers are viewed as critical in
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50 the circular economy (Gutberlet, 2015a; Sembiring & Nitivattananon, 2010), with recognition of
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52 their economic, social, environmental, and political roles (Dias, 2016; Gutberlet, 2015b). For
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3 instance, in Vancouver, Canada, informal recyclers have self-organized into a social enterprise
4 called United We Can, which helps retrieve recyclables, contributing to the formal resource
5 recovery value chain (Tremblay, 2010).
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8 9 10 2.2. *Waste management and campus sustainability*

11
12 Higher education institutions generate substantial waste, and waste minimization and how to
13 achieve it are now prominent in campus sustainability initiatives (Zen *et al.*, 2016; Ebrahimi and
14 North, 2017). An increasing number of universities across the globe are now part of a sustainable
15 campus movement by introducing initiatives that address waste management attitudes and
16 practices (Zhang & Zhao, 2019). In addition, most American universities have institutionalized
17 recycling programs (de Vega *et al.*, 2008), and sporting events have become a priority in
18 attaining campus sustainability (Casper *et al.*, 2014; Costello *et al.*, 2017; Martin *et al.*, 2015).
19
20 Gillentine (2017) calls for more widespread implementation of pro-ecological and
21 environmentally sustainable policies and practices at football tailgates. Universities also must
22 grapple with the best way to engage with community stakeholders in campus sustainability
23 initiatives that involve interaction with the public (Bilodeau *et al.*, 2014; Too and Bajracharya,
24 2015).
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40 **3. Institutional Analysis and Design (IAD) Framework**

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42 This study uses the Institutional Analysis and Development (IAD) framework (Ostrom, 2005) to
43 examine the roles and responsibilities of different actors and the formal and informal rules that
44 influence how they manage waste at football tailgates (Figure 1). The framework informs
45 exploration of how local actors formulate institutional arrangements that shape collective
46 decisions and individual actions over time (Ostrom, 2005; McGinnis, 2011). Additionally, the
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3 IAD framework guides analysis of the relationship between individuals and organizations in the
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5 governance of common pool resources in different contexts.
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8 The framework's core element is the *action arena*, consisting of the action situation and
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10 the participants (Ostrom, 2005; McGinnis, 2011). An action situation is a unit of analysis used to
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12 describe, analyze, and explain institutional arrangements. Within the action arena, actors enter
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14 the action situation with different roles, strategies, and a range of actions they may, must, or must
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16 not take to meet expectations. The action arena is influenced by *contextual variables* such as
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18 biophysical/material conditions, attributes of the community, and rules. The biophysical/material
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20 conditions are the physical environment in which an action situation is situated. Attributes of the
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22 community describe the socio-economic characteristics that influence the social environment of
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24 the action situation. Formal rules are regulations, and informal rules are based on socially shared
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26 beliefs about expected behavior. The actors develop strategies and different working rules that
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28 influence what is required, prohibited, or permitted in an action situation. Interactions among
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30 actors in different situations result in different outcomes; both the interactions and outcomes are
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32 assessed by various evaluative criteria (Ostrom, 2005).
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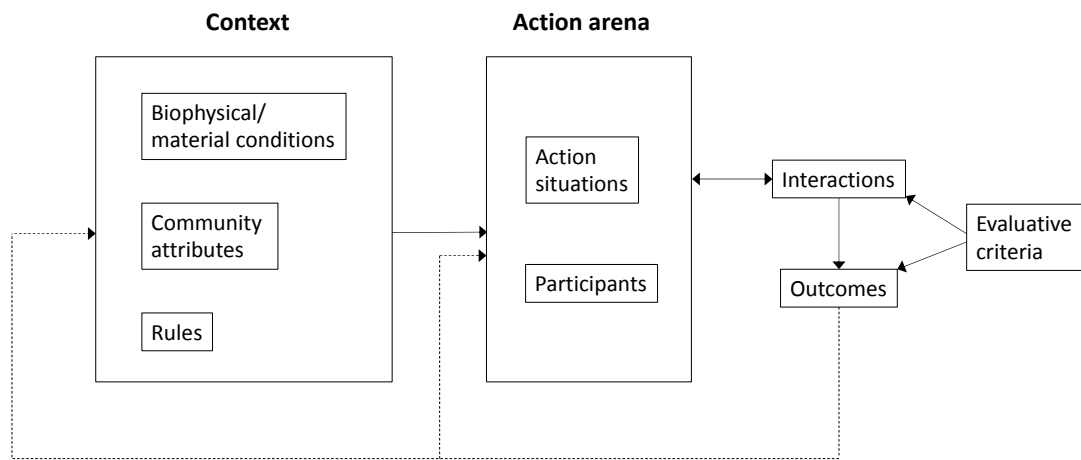


Figure 1. Institutional analysis and development (IAD) framework (Ostrom, 2005)

The IAD has been used mainly to understand how people collaborate and organize themselves across organizational and political boundaries to manage common pool resources. Recently, the IAD framework has been useful in understanding waste management initiatives in several developing-country contexts (e.g., Jiménez-Martínez, 2018; Zhang & Zhao, 2019; Oh & Hettiarachchi, 2020; Nguyen & Watanabe, 2020).

3.1. Waste governance at football tailgates conceptual framework

The waste management system at campus football tailgates is multidimensional as it includes different stakeholders and an enabling environment to attain campus sustainability. Different actors and institutions influence the effectiveness and efficiency of a waste management system. In a commons setting in which sole reliance on external enforcement is not feasible, collective governance based on a combination of formal structures and informal norms and understandings

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3 is required. The IAD framework was developed for such settings. In this study we focus the
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5 model on the following broad elements: the background context of on-campus football tailgates,
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7 the action arena, local actors, and the interactions and outcomes.
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10 The background context influences how waste is managed at football tailgates.
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12 Michigan's bottle bill or container deposit law requires a refundable deposit on beverage
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14 containers to ensure that the containers are returned for recycling. It creates an income
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16 opportunity for those who collect cans. Factors specific to each football game influence the size
17
18 of the tailgating crowd, which influences waste generation. Waste governance at football
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20 tailgates is the action arena where recyclable and non-recyclable waste materials are generated
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22 and managed by different actors, who interact with each other via formal and informal rules.
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26 The various actors that interact to manage waste at football tailgates – tailgaters, campus
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28 officials and canners – are driven by different roles, norms, and interests, which sometimes may
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30 be in conflict. Tailgaters generate recyclable and non-recyclable materials while they party
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32 before and during football games. Campus officials are responsible for efficient and cost-
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34 effective waste cleanup at football tailgates. Parallel to the campus officials, the canners operate
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36 in an informal, unregulated system in which they collect bottles and cans for income. The
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38 various interactions and strategies among the different actors result in waste governance
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40 outcomes at football tailgates.
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44 **4. Methods**

45 *4.1. Study Area*

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48 The study was conducted during the football tailgates at Michigan State University in the 2019
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50 season. Michigan State has an active campus sustainability program and is listed as one of the
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52 top 50 green campuses in the United States according to Princeton Review (2021). Football
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3 tailgates attract many fans, especially when popular teams are playing and when the weather is
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5 good. Quantitative changes in waste generation and disposal rates were beyond the scope of this
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7 study; however, in personal communication with university officials they estimated that football
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9 game days generate 50,000 lbs. of different types of waste material on average. They said that in
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11 2018, one well-attended football game generated 82,000 lbs. of waste. In the past, tailgaters
12
13 generated high volumes of waste leading to severe pollution of campus grounds. Over the past 15
14
15 years campus officials have made a concerted effort to encourage proper disposal including
16
17 recycling to reduce the mess resulting from football tailgates, and to quickly clean up afterward.
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20 21 22 *4.2. Direct observations*

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24 Observational data (Patton, 2015) are used to describe the physical environment under study, the
25
26 activities taking place, and the characteristics of participants. The authors conducted
27
28 direct observation at all home football games on campus during the 2019 football season. They
29
30 used an observational protocol guide to document interactions among the actors and augment
31
32 interview responses. The unit of observation was the behaviors and interactions among different
33
34 actors at football tailgates.
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37 38 *4.3. Semi-structured interviews*

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40 Twenty-nine canners, nine tailgaters and three campus officials were interviewed. Canners were
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42 sampled purposively to select people from diverse demographic backgrounds with experiences
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44 ranging from less than a year to a maximum of 20 years. These interviews were conducted in
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46 person from September through November 2019. Subsequent interviews were conducted during
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48 the covid-19 pandemic. Tailgaters were recruited through an online research participant
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50 platform, with selection criteria designed to ensure that they had substantial tailgating experience
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3 without revealing the study's topic. These interviews were conducted via Zoom in May-June
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5 2020. They were interviewed by phone in August 2020.
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8 Semi-structured qualitative interviews were used to gather information on the respective
9
10 roles of campus officials, tailgaters, and canners and how they interact with one another to
11
12 manage waste at football tailgates. Qualitative interviews result in "rich description and
13
14 explanation of processes occurring in local contexts" (Patton, 2015). They can be modified to
15
16 match the knowledge, experience, or comfort level of the participant, unlike survey methods
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18 (Rubin & Rubin, 2011). The interview questions for this study were designed to probe further to
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20 get honest and authentic responses rather than lead the participants' responses.
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24 All interviewees discussed their own role in waste management, their interaction with
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26 other actors in the study, and their perceptions of how waste management had evolved over the
27
28 years. Campus officials provided some details about changes in rules and management strategies
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30 over the years and their outcomes. All participants consented to participate in the study, and all
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32 interviews were audio-recorded and lasted 30-60 minutes. After each interview and observation,
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34 the authors developed memos, transcribed the audio recordings and field notes within 24 hours,
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36 and transferred the transcripts to MAXQDA for data organization and analysis.
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39 40 *4.4. Data analysis* 41

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43 Data collection and analysis were an iterative process through discussing and refining themes
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45 that emerged during the process. Using thematic data analysis (Braun and Clarke 2012), the two
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47 authors went through the process of familiarization with the data, coding, generating, developing,
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49 and reviewing themes that emerged from the transcripts. They developed a codebook to guide
50
51 the data coding process. Differences in assigning codes and grouping codes into categories were
52
53 addressed by reaching a consensus leading to finalizing the themes emerging from the data
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analysis. The themes included roles, relationships, and interactions of various actors in waste governance.

5. Findings

The characteristics of the study participants are as follows. The tailgaters interviewed include five women and four men, ranging in age from 24 to 48, all with several years of tailgating experience. Among the 28 canners interviewed, 17 are male and 11 female; 17 are African American and 11 are Caucasian. Their age ranges from 22-65 years with a mean of 43, and their canning experience ranges from less than a year to 20 years, with a mean of seven years. On average they earn about \$83 per game, with a range of \$20 to \$200. We do not share the characteristics of the three campus officials interviewed to protect their privacy.

5.1. Roles of actors governing waste at football tailgates

Actors at football tailgates occupy different roles in managing waste. Different actors – campus officials, tailgaters, and canners – deal with waste as a pollutant or as a productive resource, or both.

Campus officials are primarily responsible for cleaning up waste at football games. From the perspective of their role, waste is a nuisance to be managed to protect the environment and public health. The campus officials' main goal is to clean up the campus environment as fast and cost-effectively as possible. In recent years they have also launched a campaign to increase recycling during tailgating and inside the stadium by establishing new rules and making it easier to dispose of waste responsibly.

Tailgaters generate substantial waste, which significantly impacts the environment, with high costs of cleaning the campus after games. From the direct observations and interviews with MSU officials, most tailgaters minimize waste generation and properly dispose of their waste. In

our observations, tailgaters left little trash and properly disposed of the waste they generated.

This is an important change from 15 years ago, when littering was widespread before the campus officials launched the waste management campaign.

Lastly, the canners' role is to collect cans for income. Some of the canners are regulars as they have been collecting cans for as long as 20 years, and others are newcomers collecting for the first time to earn money during hard times. In collecting cans and removing them from the campus grounds, the canners also play a waste reduction role that is separate from the formal waste management system.

5.2. Relationships among the actors and their outcomes in managing waste

The rules-in-use are formal and informal rules on what actions are required, prohibited, or permitted, resulting in different outcomes (Ostrom, 2009). Formal rules are prescribed rules and regulations, and informal rules relate to a shared understanding of acceptable behavior or social norms at football tailgates. These formal and informal rules influence how the diverse local actors interact to influence waste governance at football tailgates. The findings from observational and semi-structured interview data reveal a shared understanding of how these actors interact. Four sets of interactions are discussed: between campus officials and tailgaters, between campus officials and canners, between tailgaters and canners, and among canners.

5.2.1. Interactions between campus officials and tailgaters

Campus officials highlighted a mix of formal rules and informal efforts to encourage sustainability-oriented behavior among tailgates. As mentioned above in the Introduction, in a commons situation enforcement is costly, thus calling for a more collaborative approach.

Many of the formal rules that the campus officials mentioned were introduced in the last fifteen years. Firstly, the new regulations included limiting tailgating hours to decrease the

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3 amount of waste generated. Secondly, the university began limiting access to some spaces that
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5 were previously used for tailgates; this helps streamline cleanup efforts. Similarly, other rules,
6
7 such as banning drinking games, were introduced to reduce disorderly conduct among some
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9 tailgaters.
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12 Efforts to encourage tailgaters to take direct responsibility for more sustainability-
13
14 oriented behavior complement the formal rules. For example, officials use their social media
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16 platforms and website to promote cost-effective ways to manage waste at football tailgates. The
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18 university has implemented a "green your tailgate" initiative accessible on its website to
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20 encourage waste reduction, recycling and proper waste management at campus tailgating parties.
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22 In all these efforts, the officials emphasized that they are cautious in their approach as they want
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24 football fans to enjoy their football tailgates without any interference. One official said, "...*The*
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26 *tailgaters are not focused on waste or recycling on game day...So if you can make it convenient*
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28 *and easy for them, they might follow the rules and regulations as far as recycling goes...."*
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33 Lastly, the campus officials mentioned that they have built relationships with some
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35 tailgaters who have been tailgating at the same spot over the years. The officials have raised
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37 awareness of proper recycling behaviors, and they have increased the accessibility of disposal
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39 facilities to promote proper waste disposal. Officials indicated that their efforts have been
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41 successful. They said that tailgaters have improved their waste disposal practices, with a
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43 decrease in littering over the years and increased use of recycling facilities. One official said, "*I*
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45 *think once tailgaters know what we're doing and what we need, they adapt...*"
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50 Formal rules governing tailgating introduced over the last fifteen years have translated
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52 effectively into social norms in support of responsible waste management at tailgates. Evidence
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54 for this comes from the responses of tailgaters we interviewed, who were largely unaware of any
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3 formal rules and communication from the university but said they aim to dispose of their waste
4 and recyclables responsibly as they enjoy their tailgating parties. One tailgater said, *"So our*
5 *responsibility is definitely to clean up because that's our campus at the end of the day, and we*
6 *don't want it to look dirty. So, my responsibility is to clean everything."*
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12 Tailgaters indicated that their only interaction with campus officials is when officials
13 hand out trash bags, and they are unaware of any communication with campus officials on
14 managing waste at football tailgates. Nevertheless, the tailgaters seem to follow the expected
15 rules on managing their waste. One tailgater explained, *"I don't know of any rules. It's a matter*
16 *of just cleaning up after yourself."*
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24 5.2.2. Interactions between campus officials and canners

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26 Fifteen years ago, at the time the university adopted a preventive approach to tailgate
27 cleanup by encouraging waste reduction and responsible waste disposal, one of the problems
28 they faced was that canners would overturn bins to locate removable cans, and sometimes they
29 would take trash bag liners from the bins to carry their cans. This would increase rather than
30 reduce the volume of waste to be cleaned up. Enforcing a ban on this practice was not feasible
31 due to the lack of resources. To address the problem, campus officials began giving out trash
32 bags to canners to collect aluminum cans to discourage removing them from trash cans. While
33 handing out trash bags they also made a point of expressing their appreciation to canners for their
34 role in helping clean up the campus. Also, during campus cleanup they leave returnable cans for
35 the canners to access. Since initiating these practices, they have seen a decrease in missing bin
36 liners and littering, though it still occurs to some extent.
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51 Campus officials informally acknowledge the presence of canners and their influence on
52 waste management at football tailgates. One official said, *"By the fact that they go around, and*
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3 *they pick it up off the ground...if you look at it from that perspective, they do help clean up the*
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5 *grounds at the university..."*
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8 Canners also reported a polite relationship with officials, though they indicated no
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10 interactions or communication with officials except when they receive trash bags. The canners
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12 confirmed that sometimes officials point canners to locations where cans are plentiful. One
13
14 canner said,
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17 *"My relationship with them (campus officials) is like the more I pick up, the less they*
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19 *have to pick up. So, they want you to get this stuff... they will help you, and they would*
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21 *tell you, look, man, there is a pile of cans over there. There are piles of cans over here.*
22
23 *Hey, go get that over there, man."*
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26 A few canners expressed concern that there might be a pending ban on collecting cans at
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28 football tailgates, threatening their livelihood. One canner stated, *"The cans and bottles help us a*
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30 *lot... I would hope the university allows that practice to continue."* However, the campus
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32 officials interviewed expressed that it is not their current position to stop people from collecting
33
34 cans and bottles at football tailgates.
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38 Many canners expressed that they see themselves as environmental stewards who help
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40 clean up the university and maintain the environment as part of their income-earning activities at
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42 football tailgates. One canner said, *"... we're doing a good thing for the planet. We're saving all*
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44 *this stuff from the landfill."* Another said, *"In a way, we are helping out... not only by picking*
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46 *cans, but also I separate cans from trash...if I notice trash on the ground and there is a garbage*
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48 *bin close by, I pick it up."*
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51 University officials acknowledge the role of canners in managing waste at football
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53 tailgates and expressed their appreciation. One official said, *"...Can pickers are somewhat that*
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3 *defense line because they are probably the earliest to pick up material on the ground...it works*
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5 *for us to that extent..."* Even so, officials commented that the problem of canners overturning
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7 bins and removing bin liners has not disappeared completely. Perhaps this can be attributable to
8
9 the fact that there appear to be many new canners on campus each week with no experience, no
10
11 relationship to campus officials, and perhaps no reason to be familiar with the norms that
12
13 officials are trying to establish against overturning bins and stealing bin liners.
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16 17 5.2.3. Interaction between tailgaters and canners

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19 Tailgaters and canners have been sharing the tailgating space for decades. There is a long history
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21 of middle-class people collecting cans during tailgating for fundraising purposes, as well as
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23 lower-income people collecting cans for income. According to our observations, the latter group
24
25 made up a large majority during the 2019 season; they are our focus here. Based on our
26
27 observations and interviews with both canners and tailgaters, they are guided by unspoken,
28
29 implicit rules that allow the canners to do their work without disrupting the tailgaters, who in
30
31 turn go out of their way to facilitate the canners' work.
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34
35 Tailgaters acknowledge and accept the presence of canners at football tailgates. One
36
37 tailgater said, *"Those people collecting cans are part of the community; everyone knows that they*
38
39 *need the money...."* Canners also expressed that tailgaters accept their presence and treat them
40
41 well. *"I give them all the respect and politeness, and 98% of them give it back,"* said a male
42
43 canner who has been collecting cans for five years.
44
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46
47 In our observations, most tailgaters consciously place their empty cans just beyond the
48
49 edge of their tailgating space, making it clear that canners are welcome to take them and that
50
51 there is no need to ask for them or otherwise interact with tailgaters. Canners, in turn, quietly
52
53 pick up the cans and move on. Most tailgaters and canners indicated that they have no direct
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3 interactions with each other, and we observed little direct interaction. Tailgaters and canners
4
5 alike described the informal rules that influence their interactions. One tailgater said,

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7 *"It's like there is a certain understandingso it's almost like the natural order of*
8
9 *things... people that are collecting cans are doing a service...not just to the campus itself*
10
11 *and the university staff, but they are helping the people that come to tailgate because they*
12
13 *are part of the cleaning team."*
14
15

16
17 One male canner said, *"...I pick them up (the cans) as they are left on the ground. I don't make a*
18
19 *point to start a conversation with tailgaters... I'm not going to invade their privacy...."*
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21

22 On the other hand, the authors also observed quite a bit of courteous interaction,
23
24 particularly among tailgaters who vocally thanked canners for their work or directed them to
25
26 cans they might otherwise have missed. Most canners indicated that some tailgaters hand over
27
28 their cans or collect cans to give to them. *"There are some people who help you. They go and*
29
30 *grab cans and pass to you or put them in your cart,"* a male canner highlighted. A few canners
31
32 said that some tailgaters keep cans for canners to collect later. *"...They tell me to come back for*
33
34 *more in a while...they say we will keep them beside the table for you...they are doing me a*
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36 *favor...."* Another male canner revealed that some tailgaters also keep cans for canners that they
37
38 have known over the years: *"...the tailgaters can tell you that they are saving them for someone*
39
40 *around the corner. They actually keep [them] for different people that's been there for*
41
42 *years...they know the same people..."* Other canners highlighted that sometimes tailgaters drink
43
44 on their way to the football stadium as they know that the canners will come and pick up the cans
45
46 for income. One male canner described, *"Sometimes when you walk, somebody drinking will say,*
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48 *I got one for you, you can have this."* We also observed a few tailgaters sharing food with
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canners.

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3 Several canners expressed a good feeling from feeling appreciated for their role in
4
5 keeping the campus environment clean. One male canner said, *"I actually got good comments*
6
7 *from the tailgaters like you're doing a good job picking these cans, and this made me feel good –*
8
9 *it feels warm inside here (beats his chest). At times tailgaters will come and talk to you, which*
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11 *made me feel better."*

12 13 14 15 5.2.4. Interactions among canners

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17 Canners also have their own informal governance arrangements among themselves, although
18
19 they are better understood among the experienced canners than the newcomers.

20
21 Most canners revealed that there is some competition to access cans at football tailgates.
22
23 One man who has been canning for the past five years said, *"If you see (the cans) first, it's yours,*
24
25 *first come, first served."* Nonetheless, the competition generally does not lead to tensions or
26
27 conflicts among the canners. In our observations we never witnessed any tension among canners.
28
29 A male canner said, *"It's competition. But it's not to the point that we're fighting...no."*

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33 The more experienced canners revealed that new canners tend to encroach on their
34
35 regular space that they collect from, and they restrict other canners from accessing cans from
36
37 their territory. The experienced canners expressed that the presence of other canners in their
38
39 regular spaces reduces the cans available to them. One female canner said, *"All regulars, we*
40
41 *have respect for each other when it comes to canning...everybody has their area...everybody*
42
43 *already knows that..."*

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47 Still, most less-experienced canners interviewed indicated that they try to avoid tensions
48
49 and conflicts. A male canner revealed, *"If I notice that there is another canner, I try to find a*
50
51 *different place...I hate conflicts..."* However, most canners mentioned that they respectfully give
52
53 each other access to cans to avoid conflicts and tensions amongst themselves. *"I just try to steer*
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3 *clear not to step on anybody's toes,"* said a female canner. Most canners said that they minimize
4 interactions with each other.
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7 8 **6. Discussion** 9

10 This study examines the roles of different actors in waste governance at campus tailgate parties,
11 the relationships among them, and how those relationships affect waste management outcomes.
12 It explores how formal and informal rules guide different actors' waste management behaviors
13 and interactions with each other, as well as how formal and informal actors interact with each
14 other in waste governance.
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21 *6.1. Interaction of formal and informal rules* 22

23 Campus officials have been successful in transforming waste management at football tailgates
24 over the past 15 years from a situation that generated a vast amount of litter and very high
25 cleanup costs, to one in which tailgaters largely clean up after themselves and separate
26 recyclables from other waste. Officials imposed formal rules to get littering under control and
27 promote responsible waste management; they appealed to tailgaters to reduce their waste,
28 recycle, and dispose of their waste responsibly; and they improved facilities to make waste
29 disposal and recycling easier. An interesting finding is that tailgaters and canners interviewed
30 were largely ignorant of formal rules and communications governing tailgating and waste
31 disposal, but they follow the rules anyway and make their own effort to dispose of waste
32 responsibly. This suggests that social norms in support of responsible waste management have
33 spread widely.
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49 Interaction between formal and informal rules is a common theme in the literature on
50 collective action for common pool resource management and in applications of the IAD model
51 (Ostrom, 2011). Informal rules with wide buy-in play an essential role in managing the
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3 commons, where rules are not easily enforceable. This is the situation in football tailgating
4
5 because there are thousands of tailgaters spread all over campus but only a handful of officials,
6
7 making enforcement unrealistic. When rules become accepted as a matter of social norms,
8
9 enforcement becomes unimportant and the rules become far more effective as a result (Ostrom,
10
11 1990). Rules also are most likely to be accepted in situations where those affected by them have
12
13 a hand in developing and shaping the governance arrangements or feel that they have a stake in
14
15 them (Ostrom, 1990).
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19 *6.2. Interaction between the formal and informal waste management systems*

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21 Like common findings in the literature (Jiménez-Martínez, 2018; Guibrunet, 2019), we found co-
22
23 existence between the formal and informal waste management systems, but with minimal
24
25 interaction and a modest, low-key effort to establish a more productive relationship between
26
27 university officials and canners.
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31 The interactions between the formal and informal actors have positive outcomes
32
33 regarding how waste is managed at football tailgates. University officials tolerate canners, and
34
35 the canners interviewed in this study engage in their activities without feeling threatened. This is
36
37 a sharp distinction from some spaces where informal recyclers' work is considered illegal and
38
39 prohibited (Wittmer & Parizeau, 2018), and they are often criminalized and harassed (Sembiring
40
41 & Nitivattananon, 2010).
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45 Despite the university's recent success in reducing waste generation and littering during
46
47 tailgating, their relationship with canners is not completely smooth, with missed opportunities for
48
49 improving waste governance. For example, university officials hand out new trash bags to
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51 canners to discourage them from emptying trash containers as they search for bin liners to use. It
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3 is now much less common for officials to find overturned trash cans than previously, but the
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5 problem occasionally persists.
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8 Due to lack of communication, most canners interviewed are not even aware of why the
9
10 university provides them with trash bags to use. A stronger communication effort, perhaps
11
12 involving reaching out to more experienced canners, could help all actors develop a common
13
14 understanding of how waste and recyclables can be managed at football tailgates. The university
15
16 has engaged in social marketing (Martin et al., 2015) and environmental education (Casper et al.,
17
18 2014) to improve tailgaters' waste management practices, but it has not done so with canners. A
19
20 few studies have documented other cases where local municipalities share expectations with
21
22 informal recyclers while facilitating their work to collect waste in urban areas (Guibrunet, 2019;
23
24 Katusiimeh *et al.*, 2013), and the same could be done in the tailgating setting.
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28
29 Experienced canners interviewed for this study regularly expressed that they perceive
30
31 themselves as environmental stewards who help clean the campus and increase resource recovery
32
33 of aluminum cans. However, the campus officials were not aware of these sentiments among
34
35 canners despite acknowledging the role of canners and showing appreciation to them in some
36
37 cases. Meanwhile, during data collection the authors encountered numerous canners with no
38
39 experience, suggesting that there is likely a large presence of transient canners who will not have
40
41 received messages from university officials communicated informally over the years. A
42
43 concerted effort to partner with experienced canners might yield a system to spread the word
44
45 about acceptable canning practices and eliminate the practice of overturning trash bins. This
46
47 would be consistent with Ostrom's (1990) argument that rules are more likely to be followed if
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49 those affected by them have a hand in shaping them.
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3 Currently, the canners appear to be in the dark about their place in waste management
4 governance in tailgates and are uncertain about the future of this part of their livelihood. Several
5 canners interviewed expressed concern that they might soon be banned from collecting cans
6 during tailgating. Such uncertainties and speculation are common in places where informal
7 recyclers are marginalized and considered illegal. Gutberlet (2015b) asserts that informal
8 recyclers rarely participate in public discussions or debate forums about their work, and they
9 remain marginalized. In cases where a partnership is built between informal recyclers and other
10 actors, it results in the implementation of more feasible strategies in resource recovery for the
11 benefit of all actors involved (Tremblay *et al.*, 2010).
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24 Inclusive waste management does not necessarily require formal inclusion. Many authors
25 comment on the challenges that informal waste pickers face in efforts to incorporate their work
26 into the formal waste management system (e.g., Sholanke and Guberlet, 2022; Marelo and
27 Helwege, 2018). Establishing a formal role for canners in tailgating waste management might be
28 very challenging and not yield clear advantages for any party. Rather, a simple effort to engage
29 with experienced canners, express appreciation for their work and assure them that they are
30 welcome to continue it and ask for their assistance to spread the word about responsible waste
31 management practices would likely be very productive. Opening lines of communication among
32 the actors would legitimize the role of canners in campus sustainability. It could build trust
33 among the actors, resolve some of the challenges highlighted by both sets of actors, and increase
34 the efficiency of the waste management system.
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49 **7. Conclusion**

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51 This study expands the campus sustainability literature with its focus on campus waste
52 governance characterized by the coexistence of formal and informal waste management systems
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3 and the interaction of formal and informal rules guiding actors in the system. The specific case in
4
5 question is driven by Michigan's bottle bill law, which turns empty cans into a source of income
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7 for those willing to collect them. Campus tailgate parties prior to football games bring huge
8
9 numbers of people to campus and generate a tremendous amount of waste, including empty cans
10
11 and bottles redeemable for cash. The large volume of waste generated makes tailgates a priority
12
13 for the formal campus waste management system, and the redeemable cans and bottles make it a
14
15 priority for informal recyclers.
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19 The study offers both practical and theoretical contributions. Of interest to researchers,
20
21 the study expands the literature on informal waste management in the global North (e.g.,
22
23 Sholanke and Cutberlet, 2022; Porrás Bulla et al., 2021). This literature has focused mainly on
24
25 the global South, where informal waste collection is more common as a livelihood strategy and
26
27 more visible. Yet informal waste management by people who can earn income from waste
28
29 collection is also an important phenomenon in the global North. This study helps make informal
30
31 waste collectors visible and demonstrates a case in which they can co-exist with the formal waste
32
33 management system.
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37 The study also highlights the interaction and coexistence between both formal and
38
39 informal waste management systems, and formal and informal rules that guide interactions
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41 among key actors in the waste governance system. Informal waste collectors are marginalized
42
43 worldwide as their work is perceived as incompatible with a modern economy. In contrast, this
44
45 study contributes to the literature demonstrating the benefits of an inclusive waste governance
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47 approach in which the formal and informal systems coexist. In addition, coexistence of formal
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49 and informal rules and consistency between them is a common theme in successful commons
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51 management and in research using the IAD framework. The current finding supports the
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3 importance of encouraging the emergence of constructive informal rules supporting better
4 management of the waste management commons.
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8 From a practical perspective, the study has implications both for specific concerns around
9 waste management and more general implications for campus sustainability cases involving
10 interaction between campus officials and the public. In this case study, there appears to be an
11 opportunity for a more inclusive approach regarding the informal waste management system to
12 improve the performance of the overall system. Regarding campus sustainability and solid waste
13 management more generally, the study demonstrates benefits from embracing the role of
14 informal actors and the combined power of both formal and informal rules and social norms to
15 strengthen overall governance.
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26 The study also provides a useful case for teaching critical perspectives in waste studies.
27 Parizeau (2022) highlights the importance of teaching a governance perspective on waste
28 management as well as the power differentials across actors in waste management. The case
29 presented here highlights the power differential between formal waste management officials and
30 informal actors along with a path for bridging that differential to improve waste governance.
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38 It is important to note that this research is based on a single case study in the context of
39 waste management at football tailgate parties. In addition, the analysis is based on a relatively
40 small sample size. As a qualitative study, it does not aim for generalizability but rather to
41 understand the key relationships in the case in question and generate ideas for further
42 exploration. The case in question is characterized by a particular culture among relevant actors
43 that has evolved over time, and it is not known whether the same conclusions would be drawn in
44 another tailgating case with a different culture of interaction among the key actors. It is also not
45 known how the interaction of formal and informal systems and rules might play out in other
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3 campus sustainability contexts involving interaction between campus officials and the public.
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5 Additional research in other contexts is needed to further explore the findings of this study.
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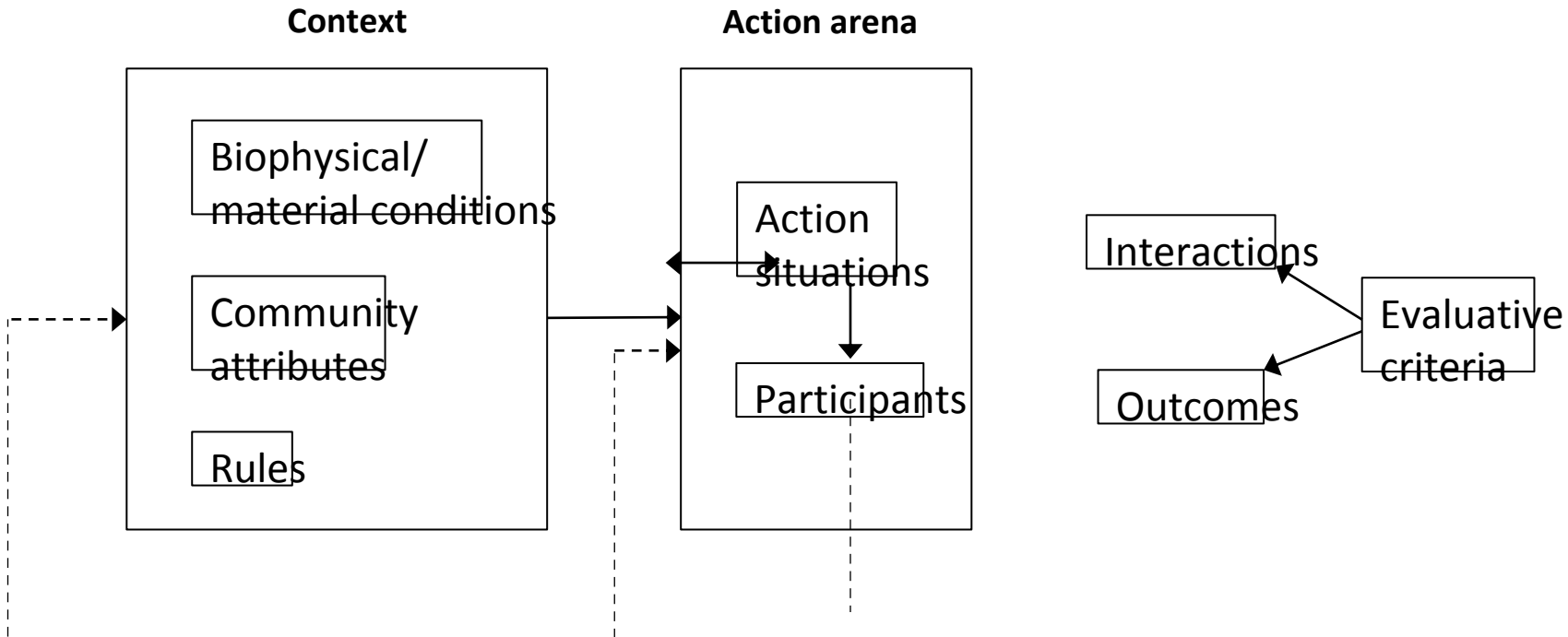
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