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# *Reasonable Motivations and Barriers for College Students to Effectively Sort Household Waste*

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***Abstract***. The amount of trash generated by college students on campus is enormous, with the average college student generating up to 640 pounds of trash per year, most of which accumulates at the end of the year when they move out of school. It has become a very wasteful annual tradition for many students to choose not to sort their trash and simply concentrate on throwing away most of their personal items and start over the next year to repurchase them. This waste is largely avoidable, as much of it can still be used. If the promotion of student waste sorting is to be successful, it is important to understand the motivations and barriers to students not sorting their waste. This paper examines this by constructing a Nash equilibrium model of the MSU student-school game and by conducting semi-structured interviews with students. It is found that there are several very focused reasons for students' motivations and barriers for not sorting garbage. Although college students have begun their higher education, the scope of their education is frequently limited, and many of them still lack common-sense knowledge about garbage sorting. College students often prefer to spend their time on social, athletic, and academic activities, which gives most students an excuse for being pressed for time and believing they do not have the time to do the tedious task of sorting garbage. At the same time, many students believe that everything they do will have a substantial gain for them; socializing will increase their popularity, and studying is the obvious direct gain of knowledge, compared to which sorting garbage does not seem to be so outstanding. On the other hand, there are problems with the school's management. Many students report that the school lacks garbage cans to sort garbage. These hindrances often limit the motivation of college students to sort their garbage.

***Keywords***: college recycle, recycle behavior, game theory, resource recovery, recycle barriers

## 1. Introduction

Waste sorting is considered an effective means of reducing environmental pollution and promoting recycling [1] [2]. This process requires public participation, and for school students, learning how to efficiently separate garbage is an urgent need for society today. University is arguably the last stop for students entering society, and the knowledge they learn at university is often put to greater use in their subsequent social lives. Then the garbage sorting that students can be exposed to in college will also be brought into their graduation life after graduation. In reality, there is no detailed investigation on how far the university students have been able to sort the garbage and what obstacles exist for

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them to do so. Choosing MSU as the site for this study because MSU is now one of the largest schools in the country and has one of the largest student populations[3], so it can play a representative role in separating trash on campus. The topic of on-campus waste separation does not seem to be receiving much attention from the general public, with most people focusing more on the separation of social waste. But they seem to ignore the fact that there are about 5,300 colleges and universities across the United States, with about 20 million students living and studying on campus, which is a huge area of land with a sizable population. All the information about waste sorting in this area is only counted by the specific departments of a few comprehensive universities, and these data only let the society and the government know that the universities are doing a lot about waste sorting. But no one is looking behind these numbers to see what the hidden problems are and whether there are uncontrollable changes in these numbers in the future. This study is an attempt to find out how the people behind the numbers, the students, create the data, and to understand what the data can mean in the present and how it will change in the future. This will lead to an understanding of college students' motivations and barriers to waste sorting. The current study was conducted through semi-structured interviews with 10 MSU students, asking them about their perceptions of separating garbage on campus, which would encourage them to provide more useful information for the qualitative study [4], such as their perceptions of whether MSU achieves complete garbage separation. The article also used game theory to construct an equilibrium model of interests to derive a Nash equilibrium that theoretically indicates the possible behavior of MSU students in waste sorting. The interviews and the model can be used as a basis to provide MSU with more suggestions for optimizing waste separation management measures, as well as to identify existing management loopholes and real-world problems. At the same time, MSU as one of the largest campuses in the nation can serve as a representative case of universities across the nation, and it is worthwhile to use MSU as an example to learn from the same problems that may exist on campus and among students.

## 2. Interview

Understanding the intentions and behaviors of individuals is crucial for effective implementation of waste separation. Some researchers conducted their research primarily through questionnaires [5]. However, this model limits the thinking of information collectors, who can only respond within the framework of interviews. Therefore, in order to collect information with personal subjective awareness and objective third-party insights, 10 students were selected to be interviewed based on the community that was open at MSU during the summer, which consisted of framed questions and open-ended Q&A. In response to a question asking if they sorted their trash in their campus life, a surprising number of all said they were doing so on an irregular basis. To ensure the authenticity of the answers, a small proof was made and the interviewees were asked to elaborate on the usual items that are sorted, and the answers were surprisingly consistent. They all said that they were interested in separating cans and plastic bottles from other garbage. When asked how they dispose of waste paper, pens with exhausted ink, and courier boxes, all of them said they would put them directly into garbage bags and dispose of them together with other household garbage. At the same time, they all said that 80% of the students around them would do the same as they did. It seems that they do separate garbage, but they don't seem to do it completely. During the conversation, we learned that they know that waste paper is recyclable garbage, but two of them think that it is more convenient to put other garbage out together, and the other two think that there are no other garbage collection points around the dormitory except for plastic bottles and cans. They didn't care about garbage other than empty bottles. The fact is that MSU's common trash cans have a clear classification of bottles and cans, paper waste, food waste, landfills, and chemical waste that are hazardous to health, but someone consistently answered that they do not see three or more labeled trash cans placed together everywhere on campus. This would be one of the reasons why they could not separate their garbage.

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On the flip side, all respondents felt that sorting trash was a time-consuming and labor-intensive activity, so they were too lazy to do it at all. A 2014 study by the University of Iowa determined that 51% of students in their data set recycled "as much as possible" while only 9% said they did not recycle at all [6]. This is also consistent with the data obtained from the interviews, which showed that most college students are indeed doing limited recycling on campus but are not able to complete it 100% of the time and make it a habit of their lives.

## 3. Modeling

The next step can be simulated by assuming a scenario, which can be called the "garbage sorting dilemma". A simple Nash equilibrium model. This can help us to get the relative Pareto optimal choice, and in theory, we can infer the trend of students in sorting garbage. In this model, both MSU and the students have two choices: to sort their trash or not to sort their trash. The model scenario is that when MSU starts to implement a sorting policy, then its regulatory measures will also kick in (fines/rewards). If MSU does not implement a garbage sorting policy, then the decision to sort garbage is made by the students themselves and there are no regulatory measures.

Table 1: The first recycling policy game between students and schools.

| Student / MSU | Classified | Non-classified |
|---|---|---|
| Classified | 0 , -C | -A+B , -B |
| Non-classified | 0, -C | 0 , 0 |

A: Cost of MSU for waste sorting
B: MSU adopts regulatory policy penalty amount
C: The cost of waste sorting for students
[A>B>C]

Now, with the added factor that the government or a third-party company will pick up MSU's sorted trash for a price, MSU has found that selling recyclable trash can be very profitable. Because MSU has the revenue, it wants to give a portion of the proceeds to those students who sort their trash as an incentive. Based on Table 1, it can be concluded that the Nash equilibrium is that neither the school nor the students sort their garbage. This could be the status quo, where schools are not willing to pay financial and human resources to implement waste separation policies and students are not willing to put effort into waste separation. Based on Table 2, it can be concluded that the Nash equilibrium is that both schools and students sort their garbage. This needs to be achieved when sufficient benefits exist for waste sorting. Realistically, MSU has not adopted appropriate incentives for recycling, and students are motivated to recycle cans and plastic bottles only from supermarket recycling machines. When it comes to, what MSU has done to facilitate waste separation and suggestions for improvement. The exchange suggested that if MSU added incentives for waste sorting, such as setting up cash rewards for indicators or redeeming some gifts for separating waste, all 10 students interviewed expressed great interest in this suggestion, and at the same time they said that if these initiatives existed, then it would definitely increase their motivation to sort their waste.

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Table 2: First recycling policy game between students and schools with third-party recycling companies.

| Student / MSU | Classified | Non-classified |
|---|---|---|
| Classified | D , B-C | -A+B+D , -B |
| Non-classified | D , -C | 0 , 0 |

A: Cost of MSU for waste sorting
B: MSU adopts regulatory policy penalties and award amounts
C: The cost of waste sorting for students
D: Profits generated by the sale of recyclable waste after school waste separation
[D>A>B>C]

## 4. Obstacles and Methods

On the other hand, it is interesting to note that according to the interviews 100% of the students believe that they do not have enough time to sort their garbage. Because the answer to an additional question was generated by 10 interviewees, they draw at least 2 hours a day on extracurricular activities, another explanation is that 2 hours of rest and fun with nothing to do. Most of their activities were swiping social apps and videos, but the response was still that they felt they were so pressed for time that they did not have time to do the tedious task of sorting trash every day. The experience of applying and interviewing for several internships is standard for many MSU students who attend job fairs or other job opportunities on campus. The anxiety and self-comparison that accompanies this experience is also a common trend. This is not an issue isolated to students in a particular field of study. According to MSU's Career Services Network, 75 percent of undergraduate students will complete an internship before graduation[7]. It can be seen that the interview mentioned that there is less time to sort the garbage due to the stressful study time and thus the garbage sorting is not very efficient. This is a one-sided expression, and perhaps they do not realize that their pressure may not only come from the pressure of schoolwork, but also from the pressure of employment after graduation, and the pressure of competition among classmates. The convergence of these pressures can cause internal anxiety about time constraints, but in reality, MSU students are still within acceptable limits in terms of academic stress. Some people find it helpful to schedule 30 minutes each day just to worry. If worrisome thoughts creep in at any other time, put them aside by telling yourself you have a scheduled time to worry. Your goal is to worry only during your scheduled 30 minutes each day[8]. As students' time-planning skills are important, likewise, effective time-planning ensures that students are efficient in sorting their trash. MSU does have open time planning lecture classes, but this mostly combines life and coursework. From the problems identified, it is clear that MSU students do not place the same level of importance on trash sorting as they do on studying and recreation. This requires the university to take the necessary steps to raise the importance of waste separation, such as organizing waste separation at specific times, or promoting and advocating that students spend half an hour a day separating waste.

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## 5. Achievements

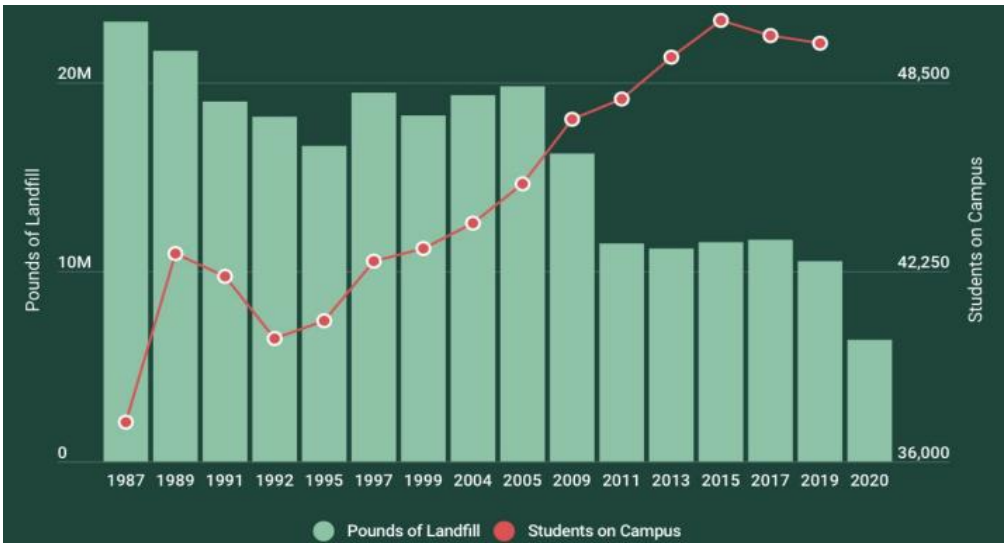



Figure 1: MSU started to focus on waste sorting results in 1997.

MSU still has shortcomings, but the GO Green slogan is still achieving considerable results. With the emphasis on recycling of waste resources starting around 1992, considerable results have been achieved by now [9]. The yearly increase in the number of students has not increased the amount of trash retained. However, this is largely due to the work of the MSU Recycling Center, where MSU collects all the garbage on campus, takes it to the conveyor belt at the recycling center, and the students working there sort the garbage manually. According to Miss. Goss of the Recycling Center, about 100 people per work period are processed by each person to help them sort their trash. But she would prefer that the sorting be done on an individual basis, and Miss Goss thinks it would be a great help if all the garbage that comes in is sorted. But it's good to know that MSU has reduced its garbage production by about 50 percent in recent years.

## 6. Conclusion

Set up more recycling points; create incentives for students to recycle, such as offering material and moral rewards; and advocate a reasonable schedule for recycling. These measures can optimize the efficiency of MSU's garbage collection and reduce the barriers to students' garbage collection on top of the existing ones. So that the problems of no garbage collection point at school or a garbage collection point that is too far away, a lack of general knowledge of garbage sorting, and a lack of time for garbage sorting due to the limitation of study time are adequately solved.

Due to the restrictions of summer vacation MSU did not open all dormitories and the main students interviewed for this thesis were from the East Side and could not represent the whole school, thus not ensuring the comprehensiveness of the data. For the sake of data objectivity, it is important to interview students from all communities on campus after the school year begins and to increase the number of interviewees. Later in the study, the focus should be on educating students about personal waste recycling and encouraging waste separation habits. Also, re-scientific planning of school waste separation locations, and waste separation bins comprehensiveness. Ensure that barriers to student waste sorting are removed.

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