

Increasing Recycling Participation at Parque de Diversiones



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December 11, 2008



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December 11, 2008

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Dear Ms. Navarro:

Enclosed is our report entitled Increasing Recycling Participation at Parque de Diversiones. Preliminary work was completed in Worcester, Massachusetts prior to our arrival in Costa Rica. Interviews were conducted, data was collected, and recommendations were written at Parque de Diversiones during the period of October 20 through December 11, 2008. Copies of this report are simultaneously being submitted to Professor Susan Vernon-Gerstenfeld and Professor Isa Bar-On for evaluation. Upon faculty review, the original copy of this report will be catalogued in the Gordon Library at Worcester Polytechnic Institute. We greatly appreciate the time and dedication that you have devoted to us.

Sincerely,

Brenna Colleary

Shawn Wilhelm

TITLE PAGE

Report Submitted to:

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Costa Rica, Project Center

By

(signatures)

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Parque de Diversiones

INCREASING RECYCLING PARTICIPATION AT PARQUE DE DIVERSIONES

December 11, 2008

This project report is submitted in partial fulfillment of the degree requirements of Worcester Polytechnic Institute. The views and opinions expressed herein are those of the authors and do not necessarily reflect the positions or opinions of (Agency Name) or Worcester Polytechnic Institute.

This report is the product of an education program, and is intended to serve as partial documentation for the evaluation of academic achievement. The report should not be construed as a working document by the reader.

EXECUTIVE SUMMARY

Costa Rica is a country of natural beauty and wonder with tropical beaches, active volcanoes, and exuberant national rainforests. These sites have attracted a \$1.9 billion tourism market, which contributes more to the gross national product than all agriculture. Desire to protect this environment is demonstrated by recent initiatives, such as Oscar Arias' pledge to make the country carbon neutral by 2021, and the General Law on Waste. This transfers the responsibility for waste management from the state to the generator, producer, and consumer. In light of these initiatives, Parque de Diversiones is working to become more environmentally conscious. It has attempted to create a recycling program in the past, but it has had insignificant participation. Our goal, therefore, was to increase participation in the recycling program at Parque de Diversiones. To accomplish this goal, we completed the following objectives:

- To develop methods to increase participation
- To determine if these method actually would create an increase in participation.

Recycling is a relatively new issue in Costa Rica and has created problems due to a lack of general knowledge on the subject. In order to develop methods to increase participation, we focused on five main issues recycling programs have:

1. Support from management to enforce initiatives and provide monetary assistance.
2. Education of the patrons and employees to provoke the understanding of the procedures and the importance of recycling.
3. Encouragement for participants and employees to recycle through prompts and reminders.
4. Ease and accessibility to provide effortless opportunities to recycle.
5. Progress of performance to supply the patrons and employees with goals and enticement to continue recycling.

Focusing on these issues, we analyzed different areas of the Parque and its current recycling program to determine areas of improvement. The first step we took was observing the patrons during lunch hours on how they dispose of their waste and the Parque's current program. To complete this task, we interviewed the heads of the waste management, purchasing, psychology, design, and the restaurant departments. These interviews informed us of the processes used, capabilities of the Parque, problems incurred, and the cultural issues related to recycling. We also received suggestions from these individuals.

We found that, while the management was interested in recycling initiatives, there was a lack of monetary support to run a well designed project. Workers and patrons were unaware of how to properly recycle. The Parque's system was too basic to be effective. In the park itself, the program was almost inaccessible with simple stickers on bins in only one area, thus providing only a small opportunity for participation by patrons. In the offices and some restaurants, there was a recycling program to collect cardboard, paper, bottles, cans, and glass, but the system was unorganized making recycling difficult. We also did not find any form of progress presentation in any areas of the Parque.

Before we made recommendations, we tested a small scale recycling program to address encouragement, education, and ease and accessibility. To do this, we used signage explaining how and why to recycle. These signs were informative, encouraging, and were placed next to bins labeled for recyclables and non-recyclables. We compared the amount of materials that were placed in the proper bin when signs were present to when they were not present. In this experiment, when signs were used, people recycled 35 percent more and properly disposed of their waste 30 percent more. During observations, we witnessed patrons viewing signs, reading the labels of the bins, and then placing their waste in the proper receptacle.

Although we were unable to test all of the recycling issues, we have found information regarding each issue from interviews and literature that will allow us to address it accordingly. Based on our research and results, we make the following recommendations for Parque de Diverciones to increase participation.

- There should be support from the management for monetary assistance and an enforcement of the recycling initiatives.
- Employees and patrons should be educated about how, why, and what to recycle. This can be done through an education program and signage.
- For the visitors of the Parque, signs and announcements should be made to encourage them to recycle.
- There should be many opportunities to recycle, with abundant bins available in the Parque. They should have similar themes, so that they can easily be associated with their purpose.
- Patrons and employees should be informed of the progress the Parque has made. This can be done with inter-office competitions. The Parque can also set a goal and use a progress bar to present the Parque's performance.
- Further Research should be done for organic waste management since organic waste comprises the majority of the Parque's recyclable waste. Specifically, research should be conducted for a biodigester and worm farms.

These recommendations will encourage the Parque to have a recycling program with increased participation. This will allow them to comply with the legislative initiatives and help the environment by reducing their waste, while generating additional income to be donated to the National Children's Hospital.

ABSTRACT

New recycling initiatives in Costa Rica are demanding Parque de Diversiones to increase participation in its recycling program. This involves properly disposing of cans, bottles, and glass throughout the Parque, as well as paper and cardboard in the offices. In order to achieve this goal, effective methods of increasing participation must be determined to overcome the obstacles of education and implementation. Information to achieve these goals was obtained through interviews of Parque employees and research of aspiring recycling programs. Recommendations to organize recycling practices are made to establish a program that prolongs increased participation.

AUTHORSHIP PAGE

The research and writing of our report was equally completed by Brenna Colleary and Shawn Wilhelm. Together, we composed, edited, and finalized the introduction, background, methodology, data and analysis, and conclusions and recommendations.

ACKNOWLEDGEMENTS

We would like to thank the individuals that made this project successful. Professor Susan Vernon-Gernstenfeld and Professor Isa Bar-On were excellent advisors, providing prompt feedback. To our liaison, Cinthia Navarro, we are grateful for the opportunity to work with the Parque. Arnold Murillo, Ismael Ramos, and Emilia Murillo were extremely helpful providing the necessary information to conduct our experiments. We would also like to thank our interviewees: Ileana Avendaño, Jesus Prado, Luis Solano, and Don Rodolfo Lee.

TABLE OF CONTENTS

EXECUTIVE SUMMARY.....	iii
ABSTRACT.....	vi
AUTHORSHIP PAGE.....	vii
ACKNOWLEDGEMENTS.....	viii
TABLES.....	xii
FIGURES.....	xiii
CHAPTER ONE: INTRODUCTION.....	1
CHAPTER TWO: BACKGROUND.....	3
RECYCLING FOR A SUSTAINABLE WORLD	3
RECYCLING IN COSTA RICA	4
RECYCLING IN PARQUE DE DIVERSIONES.....	4
Support from Management.....	6
Education of Patrons and Employees.....	7
Encouragement of Recycling.....	8
Ease and Accessibility of Recycling.....	9
Progress of Performance.....	10
CHAPTER THREE: METHODOLOGY.....	11
DEFINING THE NEEDS OF PARQUE DE DIVERSIONES.....	11

DEVELOPING THE METHODS TO INCREASE PARTICIPATION.....	11
DETERMINING METHODS OF INCREASE PARTICIPATION.....	12
CHAPTER FOUR: DATA AND ANALYSIS.....	16
EXPERIMENTAL FINDINGS.....	16
FURTHER FINDINGS AND DISCUSSION.....	19
Support from Management.....	19
Employees.....	20
Bins.....	21
Removal.....	22
Organic Waste.....	24
Education of Patrons and Employees.....	27
Encouragement of Recycling.....	28
Progress of Performance.....	29
CHAPTER FIVE: CONCLUSIONS AND RECOMMENDATIONS.....	31
FUNDING.....	31
Bins.....	31
Restaurants.....	32
REMOVAL.....	35
EDUCATION OF PATRONS AND EMPLOYEES.....	35

ENCOURAGEMENT OF RECYCLING.....	35
PROGRESS OF PERFORMANCE.....	39
FURTHER RESEARCH.....	39
REFERENCES.....	40
APPENDIX A.....	43
APPENDIX B.....	45
APPENDIX C.....	48
APPENDIX D.....	57
APPENDIX E.....	59
APPENDIX F.....	60
APPENDIX G.....	64
APPENDIX H.....	66
APPENDIX I.....	68

TABLES

Table 1: Estimated Amounts of Recyclable Garbage Generated by Clients, 2007.....5

Table 2: Recycled Real Amounts Over 5 Months in 2007.....5

Table 3: Control Results Table.....16

Table 4: Experimental Results Table.....17

Table 5: Waste Generation from 2004-2007.....21

Table 6: Companies Who Collect Glass, Aluminum Cans, and Plastic Bottles.....23

Table 7: Value of Recyclables.....24

Table 8: Summary of Costs for Recycling Program.....27

Table 9: Summary of Recycling Benefits.....27

Table 10: Cost of Banners.....29

Table 11: Amount of Trash Collected Within the Parque in Kilograms 2005-2007.....46

Table 12: Approximated Amount of Recyclable Garbage Generated by Clients 2007.....46

Table 13: Approximated Amount of Recyclable Garbage Generated by Employees 2007.....47

Table 14: Recycled Real Amounts 5 Months.....47

Table 15: Approximated Amount of Solid Biodegradable Garbage.....47

Table 16: Control Results.....57

Table 17: Experiment Results.....58

FIGURES

Figure 1: Banners for Experiment.....	13
Figure 2: Experiment Flow Chart.....	15
Figure 3: Properly Recycling Graph.....	18
Figure 4: Proper Waste Disposal Graph.....	18
Figure 5: Garbage Overflow.....	22
Figure 6: Percent Composition of Waste Generated.....	25
Figure 7: Garbage Bin.....	28
Figure 8: Recycling Bin.....	28
Figure 9: Indicator of Recycling Program.....	30
Figure 10: Size Accommodating Recycling Bins.....	32
Figure 11: Possible Location of Restaurant Recycling Bins.....	33
Figure 12: Signs for the Restaurant.....	34
Figure 13: Bin with Reciclin.....	36
Figure 14: Picnic Table Reminder.....	36
Figure 15: Memo for the Offices.....	37
Figure 16: Poster for Recycling Paper in the Offices.....	38
Figure 17: Progress Meter.....	39
Figure 18: Management Flow Chart.....	44
Figure 19: Simple Poster.....	60
Figure 20: Simple Reminder	61
Figure 21: Intricate Poster	62
Figure 22: Intricate Reminder	63

Figure 23: Picnic Table Reminder for Specific Items.....64

Figure 24: Detailed Picnic Table Reminder.....64

Figure 25: Simple Picnic Table Reminder.....65

Figure 26: Banners of Education and Encouragement.....65

Figure 27: Office Memo.....66

Figure 28: Office Poster.....67

Figure 29: Organic Waste for Employee Soda.....68

Figure 30: Trash Sign for Employee Soda.....69

Figure 31: Restaurant Signs.....70

CHAPTER ONE: INTRODUCTION

In this world of growing populations, modifications in cultural patterns, and concerns for natural resources, waste management has taken on new importance and applications within society. This involves the need to develop an understanding of social, economic, and environmental issues. Recycling incorporates this need by minimizing waste and generating a concern for the environment (Waste Management, 2008). The environment is the world's greatest resource, and developed and developing organizations throughout the world must take actions to preserve it.

Costa Rica is one of the most environmentally aware countries in Latin America (Dutschke, 2000). This is demonstrated by the intentions and legislation of the President Oscar Arias, who has pledged to make the country carbon neutral by 2021. There are also organizations, such as the Ministry of Energy and Environment and the National System of Conservation Areas, that are developing legislation that shifts the responsibility of waste management from the state to the generator, producer, and consumer (MINAE, 2006). These actions demonstrate the importance and mandate the responsibility of environmental awareness and concern for commercial and public entities.

In order to respond to the goals of President Arias, organizations throughout Costa Rica are developing and implementing recycling programs. For example, el Cuerpo de Bomberos and ICE are organizations that are designing recycling programs (William Hidalgo, personal communication, November 12, 2008). These programs, as well as Parque de Diversiones, will face several issues though, according to Eirik O'Neill, President of Corporate Recycling Services. These issues include support, education, encouragement, ease and accessibility, and

progress (Personal communication, September 29, 2008). American corporations and more developed Costa Rican organizations exemplify how these challenges can be addressed.

Parque de Diversiones is a non-profit organization in Costa Rica whose proceeds benefit the only children's hospital in Central America. The Parque intends to improve its recycling program. In order to do so, and comply with the new Costa Rican initiatives, the Parque will encounter the previously mentioned issues in implementing a recycling program. Our goal, therefore, is to increase participation in the recycling program at the Parque by overcoming these obstacles. In order to increase participation, the Parque must apply the appropriate methods to promote the benefits and procedures of recycling.

According to a previous report written at the University of Costa Rica, as will be discussed in the background chapter, there has been a lack of participation by clients in separating cans, bottles, plastics, and glass from organic waste and trash. There was also not substantial participation in the cardboard and paper recycling program within the offices (Zenteno, Mora, 2007). The objectives of this project, therefore, were to develop methods to increase participation, and to determine if methods resulted in an increase in participation. In order to design an appropriate recycling program, interviews were conducted with the Parque employees. Data was collected through experiments of social participation. The interviews and experiments were a necessary part of data collection because they provided the essential information for designing a successful recycling program and making appropriate recommendations.

CHAPTER TWO: BACKGROUND

In order to meet the objectives of our project, it is important to understand the significance of recycling for a sustainable world. These ideas are applicable to Costa Rica and are driven by Oscar Arias' intentions for a more environmentally friendly nation. There are issues that corporations, specifically Parque de Diversiones, will face when implementing a recycling program in order to comply with new initiatives in Costa Rica. These issues are presented with a theoretical base and are supported by corporate examples.

RECYCLING FOR A SUSTAINABLE WORLD

More materials are being demanded, produced, and disposed of than ever before, yielding more waste. To prevent possible negative effects on the environment, the waste must be managed. Waste management involves generation, characterization, minimization, recycling, reuse, storage, collection, transport and transfer of waste, treatment, environmental considerations, finances, marketing, policies and legislation, education, training, planning, and implementation (International Journal of Integrated Waste Management, 2008). Many of the products we purchase are developed from processes that cause deforestation. This results in destruction of habitats and adds to global warming. Recycling can limit the effects of pollution by decreasing the amount of chemicals and green house gases emitted from landfills (Recycling Guide, 2008). In just the United States, almost 55 percent of waste goes to landfills (Environmental Indicators, 2007). Execution of sustainable waste management practices requires a comprehension of the important legal, social, environmental, and economic issues involved (International Journal of Integrated Waste Management, 2008).

RECYCLING IN COSTA RICA

The environment has become more important to Costa Ricans in recent years requiring new types of environmental care. The leadership of President Oscar Arias and his dedication to this cause resulted in the pledge to make the country carbon neutral by 2021. Such an action implies emitting no excess carbon dioxide into the air (Powell, 2008). Costa Rica's political interest in environmental issues is evident in the presence and recent legislation of environmental organizations, such as MINAE, the Ministry of Energy and Environment, and SINAC, the National System of Conservation Areas. In 2005, the "General Law on Waste", written by MINAE, was passed with encouragement from Oscar Arias. It shifted the responsibility for the management of waste from the state towards the generator, producer, and consumer (MINAE, 2006). These organizations are currently working to create further legislation to protect the environment.

According to J. Alfaro (2008), recycling programs are relatively new and are not well developed. Corporations are taking efforts to become more environmentally friendly and develop recycling programs in compliance with recent initiatives in Costa Rica, especially the carbon neutrality demanded by President Arias. These corporations include el Cuerpo de Bomberos and ICE, who are working to develop recycling programs (William Hidalgo, personal communication, November 12, 2008). Similarly, Parque de Diversiones intends to modernize its recycling program.

RECYCLING IN PARQUE DE DIVERSIONES

Parque de Diversiones is responding to the goals of Oscar Arias and the recent recycling legislation. A previous report done by Zenteno and Mora (2007) at the University of Costa Rica concluded that there is a lack of information regarding recycling for the patrons and employees;

there is a lack of personnel available to collect, sort, and remove waste; and there is insufficient organization and support from the management to carry out the program. This report also concluded that 25 percent of glass was recycled and 0 percent of plastic bottles or cans were recycled (Zenteno and Mora, 2007). These smaller percentages encouraged us to concentrate on increasing participation in the glass and plastic bottle recycling aspects of the program. This data is represented in Tables 1 and 2 below.

Table 1: Estimated Amounts of Recyclable Garbage Generated by Clients, 2007

	LOW SEASON	HIGH SEASON
	KILOGRAMS/MONTH	KILOGRAMS/MONTH
Bags/plastic	425	1,061
Bottles	940	2,351
Glass	126	314
Aluminum Cans	252	631
Glass	170	425
Cooking Oil	100	250
Cardboard	150	375
Paper	100	250
TOTAL =	2,420	5,049

Table 2: Recycled Real Amounts Over 5 Months in 2007

RECYCLED REAL AMOUNTS. OVER 5 MONTHS IN 2007			
	Cardboard (kg)	Glass (kg)	Paper(kg)
TOTAL =	2,300	700	510

The report by Zenteno and Mora (2007) outlined the gaps in the current recycling program that exists at the Parque and recommended solutions to overcome the issues that must be addressed to increase participation. These issues can be summarized as support from management, education of patrons and employees, encouragement of recycling, ease and

accessibility of recycling, and progress of performance (Zenteno and Mora, 2007). Eirik O'Neill, President of Corporate Recycling Services, a consulting company dedicated to minimizing waste by the educating the clients of recycling, uses a theoretical construct for these issues (Corporate Recycling Services, 2008). The University of Surrey also comments on these issues in a *Summary Report of the Surrey Scholar Research Project* to Guildford Borough Council, which tested methods to increase recycling through community action. The report concluded that providing educational information of the recycling benefits, procedures to the participants, and encouragement to recycling, as well as increasing opportunities to recycle, and monitoring and informing the clients of their progress resulted in increased rates of participation in the recycling program (Nigbur, Lyons, Uzzell and Muckle, 2005).

Support from Management

Support from the management requires monetary assistance for the resources necessary for the program, such as time, space, and man power. According to O'Neill, it is of "upmost" importance (personal communication, September 29, 2008). Commitment to the goal of properly recycling waste increases participation (Nigbur et al., 2005). The program has to be supported from the top to eliminate resistance to make the changes necessary for program implementation. Indicators of support are seen through effective budgets, regular meetings, progress updates, and enforcement of goals. If the management does not fully support recycling, then it will not be willing to pay for the costs, or encourage participation among the employees, which will allow for the program to fail in the future (O'Neill, 2008).

Johnson and Johnson, the family soap company, has a recycling program. They use only recycled paper or paper from sustainable tree farms to produce boxes for the packaging of the Band-Aid brand band aids. This dedication to the environment goes back to Robert Wood

Johnson, former Chairmen and member of the Johnson family, who noted in the company's credo that "we must maintain in good order... the environment and [our] natural resources" (Johnson, 1943). William Weldon, the current Chairman, Board of Directors, and Chief Executive Officer, has said that they understand, as a company, that it is their responsibility to protect the environment. This support from the heads of the company has allowed Johnson and Johnson to continue and expand their efforts to protect the environment worldwide.

This idea of support is stressed by the city of San Jose Environmental Services' *Guide to Starting a Recycling Program at Work*. This guide iterated that the first task is to obtain support from the management, explaining that without managerial support, the program cannot exist because there is no financial support or enforcement of initiatives (Recycleworks, 2008). This level of commitment through financial support and endorsement should be maintained by Parque to be more environmentally aware.

Education of Patrons and Employees

An educational program involves creating an understanding of the benefits of recycling and the details of the procedures specific to that company. Individuals must gain an understanding of what to recycle, why to recycle, and how to recycle through a program that incorporates the different learning styles among individuals, as noted by O'Neill (2008). The seven types of learning styles are visual, aural, verbal, physical, logical, social, and solitary. These involve images, words, body, logic, other people, and individualism (Overview of Learning Styles, 2007). Of the seven, there are three main learning styles. These are visual, based on images; auditory, based on spoken word; and kinesthetic that involves touch (Learning Styles, 2004). Yellowstone National Park uses the visual learning style to educate its patrons. The park provides patrons with informative brochures that outline how to recycle. This includes

information on using the bins throughout the park and the advantages of recycling waste to the environment and society. Yellowstone National Park does not have information regarding percent increases in recycling due to these brochures at this time, but these brochures are intended to aid in attaining the goal of recycling 90 percent solid waste generated (Yellow Stone National Park Recycling Program, 2008).

The State of Recycling in Philadelphia: Analysis and Recommendations for Philadelphia's Floundering Recycling Program was a study that investigated implementing an educational system for the recycling program intended to clean up the city. The researchers used the auditory learning style in providing information to the citizens of the city through speakers and presentations to provoke an understanding of what is recycled and why, and to promote the practices needed for a successful program. As with Yellowstone National Park, there is no specific data, but this method was used to educate the large population in order to achieve a cleaner city (Wellington, 2006). The Parque can apply methods of educational visualization and presentations as a way to inform the patrons of the benefits and procedures of recycling to increase participation.

Encouragement of Recycling

Encouragement involves prompting and reminding the individuals to properly dispose of waste through announcements and signage. O'Neill informed us that encouragement is a separate challenge, as it differs from the educational issue in that it is a reminder to recycle and exhibits an appreciation for the efforts of the clients (2008). In 2003, the Guildford Borough Council utilized the Environmental Psychology Research Group at the University of Surrey to investigate the aspects of society that influence recycling. This research identified that recycling behavior is influenced by factors that have a psychological impact, including prompting and reminding

individuals to recycle. With encouragement, participation rose from 50 percent to 90 percent in one experiment, while continuing to remain around 80 percent after feedback was discontinued (Nigbur et al., 2005).

Similarly, at the Arizona State University, a professor of psychology, Dr. Robert Cialdini (May 2000), tested the importance of encouragement in recycling. Public announcements were presented in Tucson, Flagstaff, Yuma, and Prescott, which encouraged the participants to recycle through verbal prompting and reminding of the proper disposal of waste. The data from these communities was compared to a control setting in Phoenix and Snowflake, where no advertisements were presented. The results showed a 24 percent increase in recycling in the four communities with the announcements (Psychological Power of Positive Recycling, 2000). These results are important in demonstrating the effective strategies needed for recycling and applying environmentally conscious policies.

Ease and Accessibility of Recycling

In order to increase participation, there must be opportunities to properly dispose of waste that do not require excess effort. O'Neill agrees and adds that the program must be simple in order to encourage participation (2008). Yellowstone National Park addressed increased ease and accessibility for recycling by placing over fifty bins throughout the park (Yellow Stone National Park Recycling Program, 2008). Ten parks within the state of California have implemented comparable recycling programs where the bins for recyclables are along side the garbage receptacles and are of similar size. The circle on top of the bins only fits bottle and similar shaped objects, prohibiting larger trash from being thrown in with recycling (Ms. Laurane, personal communication, September 22, 2008). There was also a report conducted by the University of Pennsylvania which concluded that there need to be plentiful opportunities to

recycle with multiple bins throughout the streets. By conducting interviews and performing case studies of three other locations with once stagnant recycling programs, it was determined that recycling must be simple and accessible with a single collection system of recyclable items. There is no data to account for increases in recycling from Yellowstone, the California parks, or the University of Pennsylvania, but the size, location, and accessibility of recycling bins were perceived to be important to promote simple and user-friendly practices of recycling.

Progress of Performance

The clients should be informed of how well they are performing in the recycling program, as people want to feel they are making a difference. According to O'Neill, if there is no sense of accomplishment, the plan will eventually fail. He goes on to say that goals and forms of competition are useful measures of progress (2008). In a research experiment by the University of Surrey (2005), the idea of progress was addressed by leaving status updates at the homes the day of recycling pick up to tell the participants how they and their neighbors were doing. The researchers used multiple methods and found that when one street was told that they were doing worse than another street, they performed better in the short run. When they were told they performed better than others, they performed better in the long run. This method alone increased recycling program participation from 50 percent to 90 percent. A follow up survey found that, of the participants who responded, 88 percent remembered and regularly read the performance updates noting that it had "a significant effect" on their willingness to recycle (Nigbur, 2005). This issue needs to be addressed in order for Parque to maximize their recycling program in the future and make the greatest difference to the environment and in the lives of the patrons.

CHAPTER THREE: METHODOLOGY

Previously in the Parque, there were attempts to collect cans, plastic bottles, and glass separately from non-recyclables, but there was a lack of participation by the clients. There was also a small cardboard and paper recycling program within the offices. The goal of this project, therefore, was to increase participation in the recycling program within Parque de Diversiones and its offices. The objectives were to develop methods to increase participation and to determine if these methods resulted in an increase in participation.

In order to meet these objectives, we conducted interviews with experts within the Parque. These interviews provided information necessary to create the potentially feasible methods of increasing participation. We conducted pilot programs, with the aid of the plant manager and design artist, to test some of these proposed measures.

DEFINING THE NEEDS OF PARQUE DE DIVERSIONES

Based on conversations with our liaison, Cinthia Navarro (2008), and observations at the Parque, we determined that the most important aspect of the project was to encourage the proper disposal of recyclable materials. She noted that there was a recycling program currently at the Parque, but the clients were not taking the extra step to deposit their waste in the proper receptacle. Our priority was to determine if the methods developed from interviews and research would increase participation in this recycling program.

DEVELOPING THE METHODS TO INCREASE PARTICIPATION

In order to develop increased participation in the recycling program at the Parque, we researched the psychology of motivation, and its use in methods of recycling programs. We also had interviews with a Costa Rican psychologist and a design artist to learn about the aspects of local culture pertaining to motivation and recycling in general. We used information presented in

the background regarding the issues of recycling programs and how other organizations addressed these issues to develop methods that could increase participation. In order to make the methods more compatible with Costa Rica, we consulted the parks psychologist and graphic designer to gain their perspectives. These methods included:

- Educational programs intended to inform patrons of the proper actions required for recycling and its benefits.
- Active participation in which someone stands by bins showing people how to recycle properly.
- Signage in the form of posters, banners, and pamphlets used to encourage recycling and inform the patrons of the progress of the Parque.
- Redesigned receptacles with shaped openings limiting the types of waste that can be deposited in them.
- Increasing the number of receptacles used to collect recyclables as to make recycling more easily accessible.

DETERMINING METHODS OF INCREASED PARTICIPATION

Signage was decided as the best method to test because it offered the most usable data, fit in our timeline for planning, and execution was relatively inexpensive. We would be able to test education and encouragement, as well as ease and accessibility by using bins already located in the Parque. Although it is not ideal to test three issues simultaneously, there were only two weeks available to conduct experiments. One week was used to gain baseline data of the level of participation with multiple bins present. We placed two bins already available in the Parque in this picnic area, one designated for recyclables and the other for non-recyclables. The second week was used to determine how encouragement and education, addressed with signage, would

affect the level of participation. The results and observations from this test informed us of how these issues work together.

We used bright colors and active graphics that would receive the most attention. We designed two signs for encouragement and one for education, as seen below. The wording was chosen because it was simple, direct, and informative.



Figure 1: Banners for Experiment

We conducted an experiment to determine if there was an increase in participation due to these signs. The location of the test was determined to be a picnic area of moderate usage with only two entrances and exits allowing for monitoring. We chose this because it would have enough traffic to see normal participation, but not so much as to create overflow problems. This information was gathered by observing different picnic areas during our time in the park. We ran experiments over two weekends because the Parque was only open Friday through Sunday. The

first week would be used to be a control for the test and the following week would be for the experiment. See Figure 2 for a diagram of the experiment.

The experiments took place from 12:00 pm to 2:00 pm. These hours were chosen because they included the Parque's main lunch hours, implying more people would be disposing of their waste after eating. On each of these days, we observed the actions of the patrons to record their recycling behavior. This allowed for both qualitative and quantitative data to be collected. At the end of the designated period, the standard garbage bins and the recyclable bins were collected and separated. The contents were examined to see how much recyclable and non-recyclable material was in either bin. The materials were weighed, counted, and analyzed after sorting. This data was then recorded into a table.

We conducted a control experiment the first weekend. The experimental setup took place the following week. For this setup, we placed the educational poster next to the same receptacles used the previous week. The posters for encouragement were placed near the entrance and exits of a picnic area. The encouragement posters were designed to present the idea of recycling to the patrons. Then, when the patrons would throw away their trash, they would again be reminded with a sign that explained to them how to recycle.

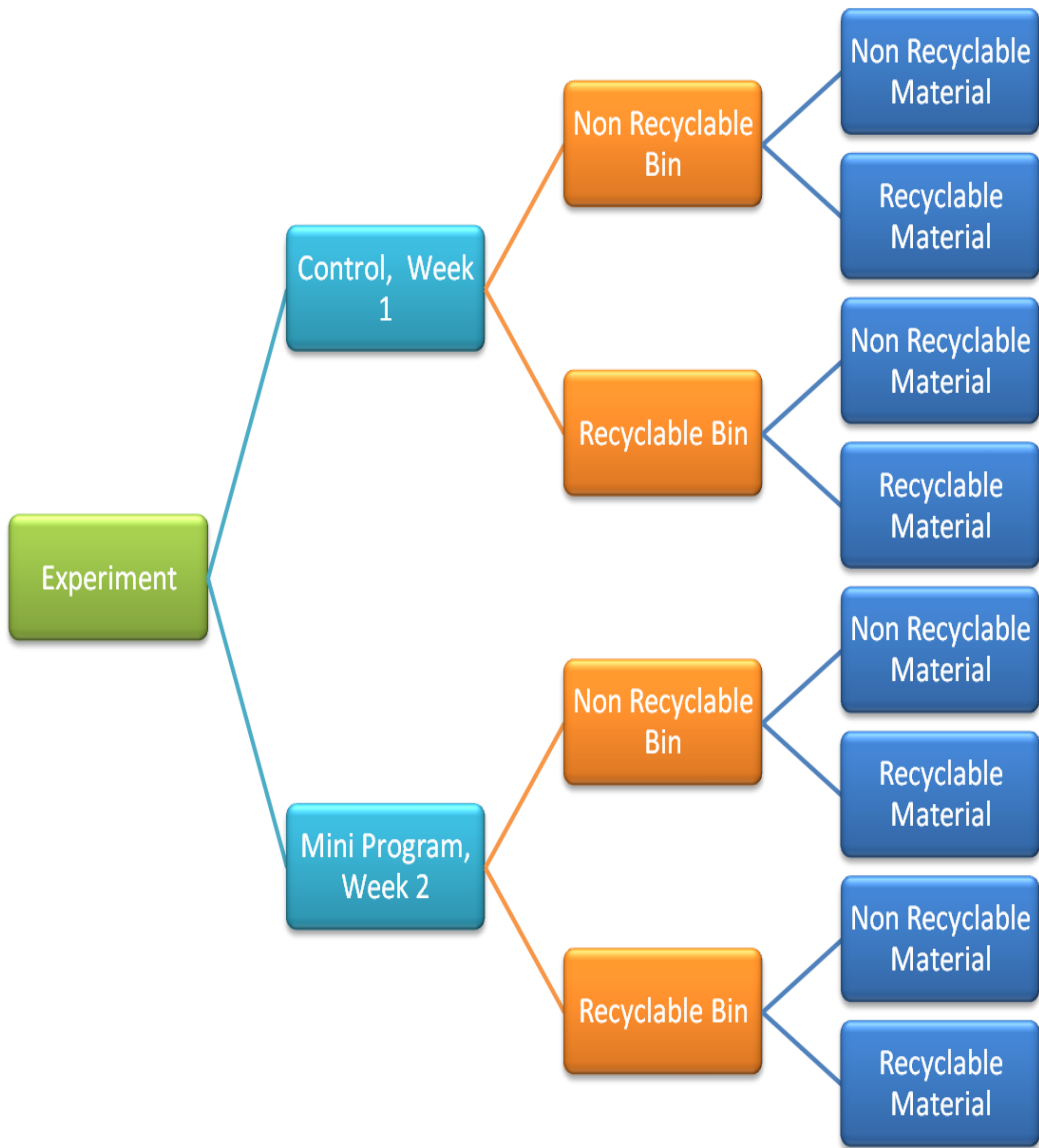


Figure 2: Experiment Flow Chart

CHAPTER FOUR: FINDINGS AND DISCUSSION

This chapter provides the results from the experiments we performed. It also analyzes these results with regard to the issues that Parque de Diversiones faces in increasing participation among patrons and employees.

EXPERIMENTAL FINDINGS

We determined which types of experiments would provide the most information from testing, given our time and financial restrictions. An educational program, for example, would require extensive planning, many months to witness the effects, and supplementary funding. Active participation and the redesigning of receptacles could not be tested because we did not have sufficient time to train an employee or redesign and construct a new receptacle.

Our experiments testing education, encouragement, and ease and accessibility yielded the following results. Table 3 is the control results table and Table 4 is the experimental results, which tested if providing education, encouragement, and increasing ease and accessibility would increase participation.

Table 3: Control Results Table

<i>CONTROL</i>	RECYCLABLES	NON-RECYCLABLES
Day	% properly recycled	% properly disposed
Friday 14 Nov	52.2%	40.0%
Saturday 15 Nov	40.5%	40.0%
Sunday 16 Nov	43.1%	45.4%

Table 4: Experimental Results Table

<i>EXPERIMENTAL</i>	RECYCLABLES	NON-RECYCLABLES
Day	% properly recycled	% properly disposed
Friday 21 Nov	70.6%	77.2%
Saturday 22 Nov	83.3%	71.8%
Sunday 23 Nov	78.2%	77.7%

Based on our experiment and results, there was an increase in participation from the control weekend to the experimental weekend, as presented in the graphs below. With the presence of the educational and encouraging banners and the easily accessible bins, there was a 30 percent increase in properly disposing of waste and a 35 percent increase in properly disposal of recyclable materials. This data was recorded as increases in properly disposing of waste and properly recycling materials because it is equally important to properly dispose of waste as it is to recycle. Due to limited time and resources, we tested these issues in one experiment, similar to the study done by the University of Surrey. Therefore, we were unable to distinguish which aspect of education, encouragement, and ease and accessibility that affected the results most substantially.

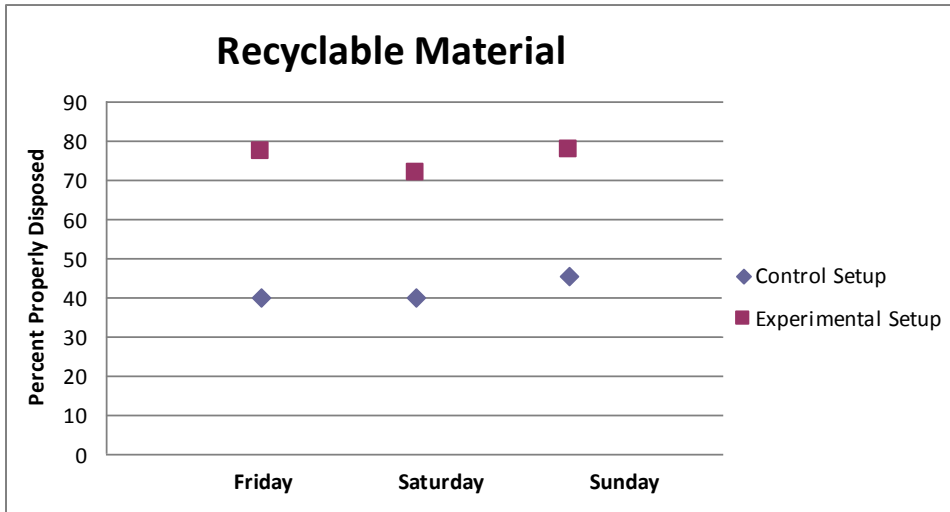


Figure 3: Properly Recycling Graph

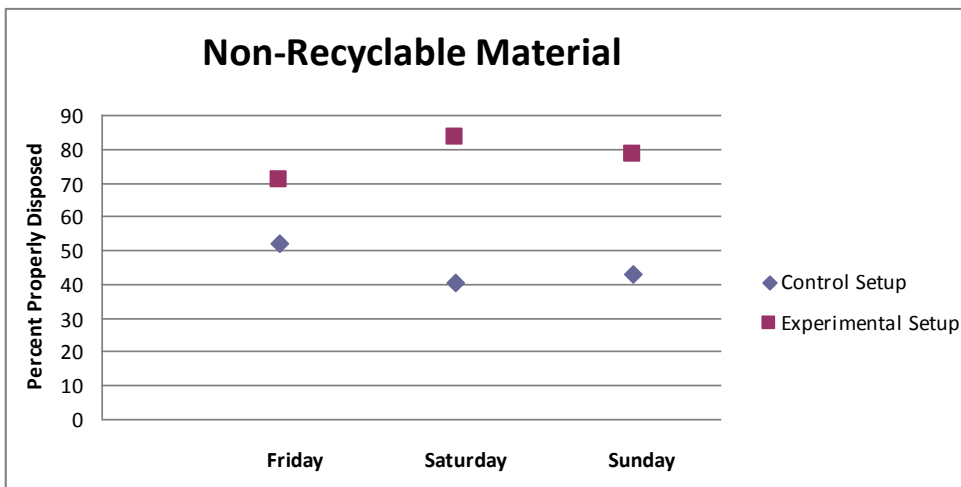


Figure 4: Proper Waste Disposal Graph

For the weekend of the control experiment, there were fewer visitors to the Parque due to inclement weather. These visitors brought their own lunches, which included food, plastic bags, bottles, and plastic silverware. When disposing of the waste, as presented in the results, not much care was given to recycling. Some children and adults noticed the stickers on the bins, whereas most teenagers ignored them.

For the weekend of the experimental setup, the weather was sunny and warm for the first two days and very rainy the third. The patrons that visited also brought their own lunches. When

observing the patrons actions, we noticed that some saw the signs near the bins and proceeded to read the labels and recycle properly. One visitor was even seen making multiple trips to sort her waste after reading the signs and stickers. Others, though, threw their waste away with no regard for the signs or labels.

FURTHER FINDINGS AND DISCUSSION

The experimental results and information from the interviews can be correlated with issues the Parque must handle. Arnold Murillo, the Plant Manager; Emilia Murillo, the Design Artist; Ileana Avendaño, the Psychologist; Jesus Prado, the Restaurant Manager; and Luis Solano, the Head of Purchasing, as well as specific bodies of literature, provided information for discussion of the issues that the Parque will face.

Support from Management

Support from the management exists in enforcing the goals of recycling. At the Parque, there is support from the management for a future recycling program with a twenty year plan in place, which reorganizes the Parque. Recycling is the first initiative in completing this transformation; therefore, there is great interest in our project. Recycling will exist in each area of the park and the plan entails that there will be an efficient collection and sorting system in place for the increased participation (personal communication, Don Rodolfo Lee, November 21, 2008). This plan exemplifies the support needed for a recycling program with employee and patron participation.

Support from the management also exists in purchase planning. Currently, there is interest in buying more recyclable and environmentally friendly products, such as biodegradable plastics. The Parque has moved to more digital and computerized information storage to save money and reduce paper usage; using a quarter of the receipt paper they had previously (personal

communication, Luis Solano, November 14, 2008). This information expresses the company's desire to recycle and be more environmentally conscience at the present time. As discussed in the background, the management must support current actions and future endeavors to increase participation, which is exemplified at the Parque.

Employees

A recycling program requires sufficient funding and man power. The plant services department, which coordinates the recycling at the Parque, has a tight budget of \$200 per month allocated for all cleaning supplies including soap, garbage bags, and gloves. The remainder of the budget pays salaries. They also have a small work force consisting of two collectors and four to eleven cleaners depending on the season. The crew is capable of collecting the sorted waste, but they do not have enough employees or the facilities to properly sort and store these materials (personal communication, Arnold Murillo, November 5, 2008). In order efficiently collect the recyclables, additional employees are needed.

Each additional employee to sort the waste would cost approximately \$2653 per year. This is based on an eight hour work day; working four days a week during low season and seven days a week during high season at 800 cólonos per hour. If the employee were to work seven days a week for the entire year, it would cost the Parque approximately \$3900 not including benefits (personal communication, Cinthia Navarro, November 13, 2008). During the low season, the Parque is only open three days a week, therefore, sorting would be required during those three days and an additional day to handle the waste produced during the rest of the week. During the high season, the park is open seven days a week, thus, an employee would be necessary during the full week.

Bins

According to Zenteno and Mora (2007), there has been an average 24 percent increase in the waste collected in the Parque each year over the past three years, as presented in Table 5 (Zenteno and Mora, 2007). In order to accommodate these increases, the Parque needs to purchase an average of 30 percent more bins. Currently, there are 127 bins throughout the property. Next year, with 165 bins, the Parque would avoid overflow and could manage the waste. It has also been determined that approximately 30 percent of the waste from the Parque is plastic bottles, cans, and glass. Therefore, 30 percent of the bins should be allocated for recycling. For next year, this would mean that fifty bins would be for recycling, while the remainder for garbage. However, this ratio is not ideal. Eventually, there should be an equal ratio of recycling bins to garbage bins. This will aid in ease and accessibility by providing many opportunities to properly dispose of waste.

Table 5: Waste Generation from 2004-2007

Year	Waste Generated (kg)	Increase From Previous Year (%)
2004	175250	-
2005	225929	29
2006	271114	20
2007	329916	22

The need for additional bins is also exemplified in the cleanliness of the Parque. There are not enough waste bins to handle the number of people who use them. As seen in Figure 4, these bins become over full. A more organized system for waste management would prevent over flow and create a cleaner park (personal communication, Jesus Prado, November 14, 2008). Each additional bin costs approximately \$54. For the immediate 30 percent increase, it would

cost \$2700. The ultimate goal of an equal ratio of recycling bins to garbage bins would require 65 additional bins, or \$3510. Total cost for these bins would then be \$6210.



Figure 5: Garbage Overflow

Removal

Increased participation involves more than people depositing materials into the proper bins. The program must be complete. In order for the Parque to handle an increase in participation, they will need to consider how to handle these recyclables and who removes them. Without this step, the Parque itself will not be able to participate in its own recycling program. Currently, the Parque stores the recyclables in barrels next to the trash compactor. This system will not be sufficient to store larger quantities of recyclable materials. There are at least seven companies, shown in Table 6, who pick up, and pay for glass, aluminum cans, and plastic bottles. This new information can aid in the collection process by providing other possible solutions.

Table 6: Companies Who Collect Glass, Aluminum Cans, and Plastic Bottles

Business	Recicladora San Antonio	Recicladora San Antonio	Recolectores y Recicladora de Grecia
Contact Person	Jorge Cordero	Berny Cordero	Ademar Navarro
Telephone 1	276-4113	572-0317	444-2885
Telephone 2	x	573-6446	494-2402
Cellular	x	x	879-8181
Fax	x	x	494-3379
E-mail	x	x	x
Hours	L-V: 6 am- 6 pm	L-V: 7 am- 5 pm/ S: 7am-1pm	L-V: 7 am- 5 pm/ S: 7am-1pm
Canton	Desamparados	Cartago	Grecia
Purchase Price per Kilogram	¢40	¢40	¢40
Deliver or Pickup	Pick up fee by distance/amount	Pick up fee by distance/amount	Pick up fee by distance/amount

Business	Centro de Reciclaje Dalman López	Centro de Acopio MABE	Centro de Acopio El Liberiano	Reciclaje Forester
Contact Person	Dalman López	Jose María Méndez	Henry Espinoza	Elizabeth Brenes
Telephone 1	451-4711	824-8105	665-3024	276-8559
Telephone 2	x	360-6355	x	x
Cellular	386-6176	x	x	829-7002
Fax	x	x	830-6244	276-8559
E-mail	x	x	x	recicladora-forester@hotmail.com
Hours	L-V: 7 am- 5 pm	L-V 7am- 5pm	L-D 6 am- 6 pm	L-S 7am-12 y 1-5pm
Canton	Naranjo	San Carlos	Liberia	Curridabat
Purchase Price per Kilogram	¢55	¢60	¢80	¢70
Deliver or Pickup	Pick up fee by distance/amount	Pick up fee by distance/amount	Pick up fee by distance/amount	Pick up fee by distance/amount

To determine the amount of money the Parque could make from selling recyclables collected, we had to analyze the different types of waste they produced. We obtained this information by using the percent composition data created by the University of Costa Rica study. We then used these values, combined with the total amount of waste generated in 2007, to determine the quantity of the individual recyclables were available. We found prices other companies would pay to recollect these materials. This information is presented in Table 7.

Table 7: Value of Recyclables

Material	Percent Composition	Amount (kg)	Price per kg (Cólones)	Profit (US Dollars)	
Plastic Bottles	19.40%	64000	70		\$752
Cans	5.10%	16800	20		\$8,145
Glass	6.28%	20700	650		\$19,854
Total	30.78%	101500		100%	\$28,751
				70%	\$20,125
				40%	\$11,500

Furthermore, the Parque can benefit by not paying to have these materials removed with the garbage waste. Every 10,000 kilograms of waste costs the park \$54 for removal, which is \$548 per year if 100 percent of this material is recycled. If 70 percent of the recyclables are properly handled, as was achieved in our experiment, \$411 would be saved. With 40 percent participation, which is the minimum that was recorded in our control experiment, \$220 would be saved. This totals a possible \$29300 in savings by recycling these materials.

Organic Waste

To handle their solid waste, the Parque must also consider a solid biodegradable waste management system. The park has seven restaurants and several hot dog stands. They also have an animal farm, which produces animal waste. They have grass and garden clipping from the grounds keeping. With the exception of the animal waste, all of these materials are thrown into the compacter and eventually sent to the landfills.

Approximately 9.5 percent, or 14615 kilograms, of biodegradable waste comes from restaurants (Zenteno, Mora 2007). With additional training, the cleaners could sort this waste at the source. Most food is brought in from outside park, and this becomes problem for collecting that other 91.5 percent of biodegradable waste. This would require additional workers to do this sorting. The food waste could be used to create fertilizer with composting, or even a biodigester.

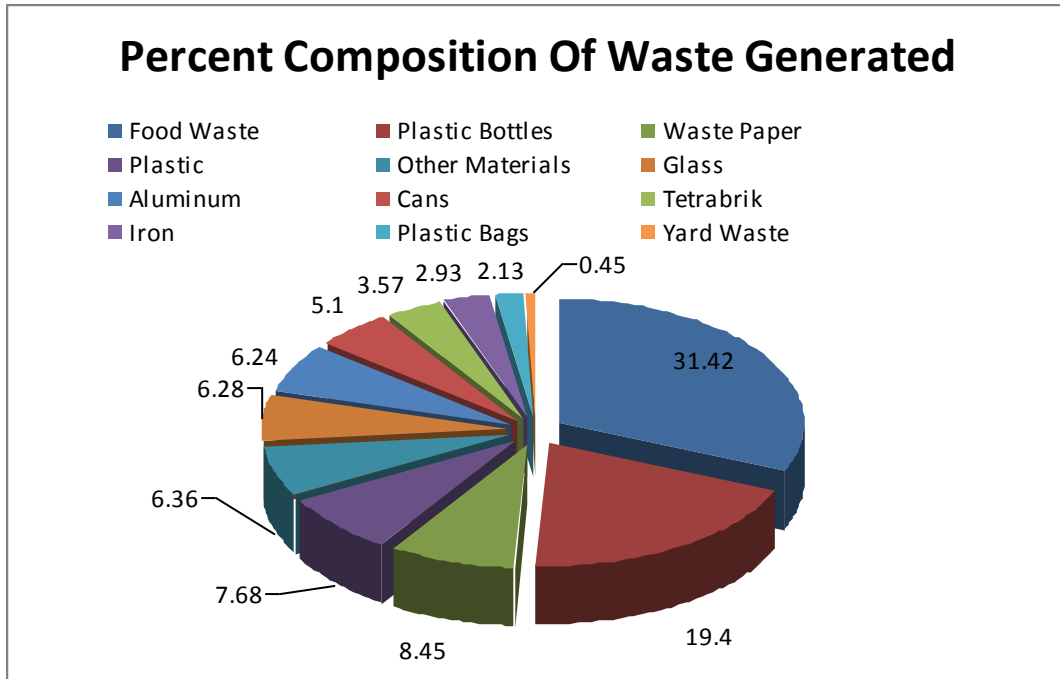


Figure 6: Percent Composition of Waste Generated

From the data presented in the study done by the University of Costa Rica, as shown in Figure 6, we determined that 46.42 percent of waste generated by the Parque can be used for a biodigester. This includes food wastes, oil, napkins, animal manure, and lawn clippings which, in 2007, accounted for 153147 kilograms, or \$827 in savings. Based on current information, a polyethylene anaerobic digester is known to be the simplest and most effective for small scale facilities (LeGare, Sierad, Waugh, 2005). In Costa Rica, a biodigester appropriate for the park costs around \$310, which is less than one half of the possible savings (Rural Costa Rica, 2007).

The principal advantages of such a machine are nutrient recycling, waste treatment, and odor control (Energy Efficiency and Renewable Energy, 2008). The specific process of digestion requires bacteria without the presence of oxygen, decomposing organic material, converting the matter into organic acids, and transferring the acids into biogas. This biogas is typically methane, which can be used for other purposes. When it is burned, a cubic foot of biogas can result in about 2.52 kcal of heat energy (Energy Efficiency and Renewable Energy, 2008). The products of a biodigester can also be sold as fertilizer.

Another option is composting with worms, which produces soil conditioner and fertilizer. This process involves collecting organic food waste, burying it in layers with the soil, and adding worms to eat the waste. The suggested worms are *Eisenia foetida* and *Lumbricus rubellus*, which are found in manure compost. Only the Parque's food waste, 31.42 percent of the generated waste, is usable for the worm farm. This amounts to 103659 kilograms, or \$560 per year in savings (Zenteno, Mora 2007). The worms cost about \$75 per kilogram, and it is necessary to purchase two kilograms of worms for every kilogram of waste. This can become expensive, but the Parque could maintain a worm composting attraction for some of their waste and a biodigester could be used to handle the rest of the waste. A possible plan is to use the worms to handle twenty five kilograms of waste initially, requiring fifty kilograms of worms costing \$3750. Then, as the worms reproduce, they can handle increased amounts of waste. The rest of the solid biodegradable waste can be handled with a biodigester.

Below is the summary of the costs and benefits of our proposed program. For the first year, the program would cost approximately \$14538, as presented in Table 8. The program will pay for itself if the park can properly sort and sell approximately 50 percent of their recyclable materials. In our test, there were upwards of 77 percent being attained. After the first year, the

annual costs will be approximately \$4378. This program would then produce more profits for the Parque to donate to the Children’s hospital. If the program maintains only 40 percent material properly handled, it will still produce \$7670 in profit every year. This is presented in Table 9 and calculated from the costs and benefits of the additional employees, additional bins, removal, and organic waste. Also, the intangibles values must be accounted for. Less waste will be sent to the landfills, which will help the environment; the Parque can gain an image of environmental friendliness; and more money could be donated to the National Children’s Hospital.

Table 8: Summary of Costs for Recycling program

Costs	Each	Quantity	Total	Annual/Capital Cost
Bins	\$54.00	115	\$6,210.00	Capital
Biodigester	\$310.00	1	\$310.00	Capital
Worms	\$75.00/kg	50 kg	\$3,750.00	Capital
Signs	\$15.00	115	\$1,725.00	Annual
Employees	\$2,653.00	1	\$2,653.00	Annual
Total			\$14,653.00	

Table 9: Summary of Recycling Benefits

Benefits	Yearly Value
Sale of Recyclables	\$28,751.00
Landfill Cost Savings	\$1,368.00
Total	\$30,119.00
	100%
	70%
	\$21,083.30
	40%
	\$12,047.60

Education of Patrons and Employees

Educating the clients and employees of the benefits of recycling and the procedures required will provide them with the knowledge necessary to properly dispose of waste, as discussed in the background chapter. Currently, there is a low level of comprehension among the clients. Figure 5 demonstrates how recyclables are mixed in with the garbage in a trash bin. Similarly, Figure 6 presents how garbage is also mixed in with the recyclables with disregard for the sticker advocating recyclables only. This is due to the newness of recycling initiatives.

Costa Ricans want to help the environment, but they do not know how to (personal communication, Ileana Avendaño, October 31, 2008). The ideas of recycling practices have not become engraved in their culture yet.



Figure 7: Garbage Bin



Figure 8: Recycling Bin

There is also a deficit in education among the employees. This is evident in the observation of paint cans in the recycled cardboard storage bin (personal communication, Arnold Murillo, November 5, 2008). This exemplifies how an educational program for both the clients and the employees that incorporates the procedures and benefits of recycling would help to encourage proper disposal of waste.

Encouragement of Recycling

After the patrons and employees are educated, it is crucial to encourage them to recycle. As presented in the background chapter, this can be done through reminders and displays that exhibit an appreciation for efforts made to recycle. Currently at the Parque, the only forms of reminders to recycle are small stickers on recycling bins in one section. This is not sufficient to encourage recycling in that area or the entire park.

To encourage the patrons and employees to recycle, the use of colors must be considered. Specifically, yellow is an activator, while blue is a comforting color (Precision InterMedia, 2008). These two colors are seen on signs throughout the Parque to advertise the attractions and could be used similarly to encourage recycling. Encouragement should also be cordial, as the intention is not to beg individuals to recycle, but encourage them to properly dispose of their waste (personal communication, Emilia Murillo, October 30, 2008).

The typical size for posters is 120 by 160 centimeter posters and each costs \$15. These must be varied and circulated evenly throughout the Parque at each recycling bin. For the initial setup of 50 bins, this would cost \$750. This then can be augmented over the years, as with the bins, to 115 banners or posters or 65 additional ones, which would cost \$975. This would be a total of \$1725 necessary to fully encourage participation, presented in Table 10.

Table 10: Cost of Banners

Number of Banners	Cost
1	\$15
50	\$750
115	\$975
TOTAL	\$1725

Progress of Performance

After the employees and customers have been educated, encouraged, and then had many opportunities to recycle, they need to be informed of their progress. Currently, there is no information available to patrons or employees to express the progress the Parque has made. There is no indication of a recycling program in the Parque besides the stickers placed on bins in Plaza Tio Conejo, pictured in Figure 9 below.



Figure 9: Indicator of Recycling program

There are possibilities, such as signs or announcements, which express the progress the Parque has made though. For employees, it can something such as a memo or email update. The idea of a competition could be used help to create a desire for the employees to read these updates and further participate (personal communication, Ileana Avendaño, October 31, 2008).

For the clients, a possibility is comparing the progress to another park in the United States or elsewhere that is similar to the Parque. This could create a sense of pride in, not only the Parque, but the country. An additional suggestion is comparing the Parque's progress to itself. If they set a goal of 75 percent recycling, for example, they can present this goal and express their progress. This will give the employees and patrons the ability to see the difference that they are making (personal communication, Ileana Avendaño, October 31, 2008).

All of these alternatives involve setting a goal and showing the progress of the Parque towards that goal. In doing so, the Parque can create a sense of personal responsibility among employees and customers. The Parque must consider how to present this progress to employees and customers.

CHAPTER FIVE: CONCLUSIONS AND RECOMMENDATIONS

Our main conclusions are:

- There was a 30 percent increase in properly disposing of waste and a 35 percent increase in recycling when the patrons were educated and encouraged to recycle.
- There is uneven support from the management throughout the Parque for a successful recycling program.
- There is an insufficient amount of attention given to recycling within the Parque infrastructure.
- A recycling program can produce profits to be donated to the National Children's Hospital.

Therefore we recommend the Parque take specific measures in increasing participation in the recycling program. These recommendations will raise profits for the Children's Hospital, but also create a sense of environmental concern that can not be measured.

FUNDING

We recommend that the Parque support the recycling program through additional funding of recycling procedures. We recommend more employees to handle the increases in recycling participation. There must also be additional recycling bins throughout the Parque to increase ease and accessibility. Funding also incorporates signs and posters to promote proper disposal of waste.

Bins

We recommend an equal ratio of recycling bins to garbage bins. The recycling bins should also have holes that will only accommodate bottles, cans, and glass, as to avoid larger trash being disposed with the recyclables, as was applied at the California Parks. This is

presented below in Figure 10. These ideas would provide more opportunities to properly dispose of waste. This monetary assistance necessary for this recommendation is \$6210.



Figure 10: Size Accommodating Recycling Bins

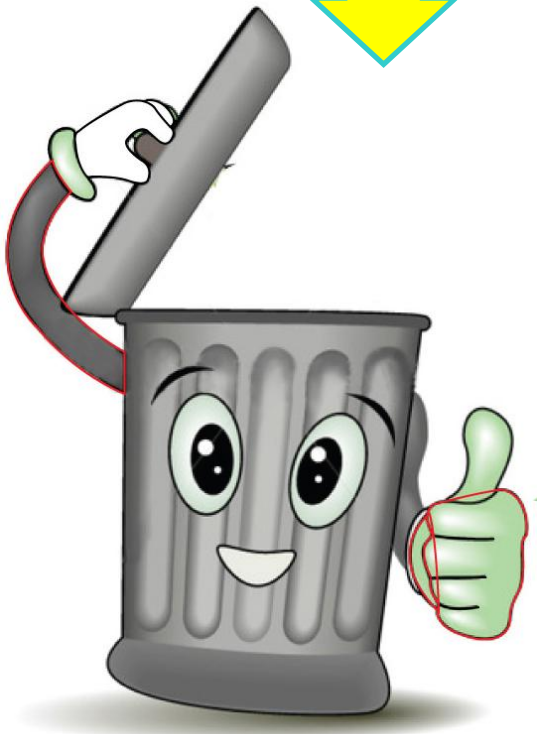
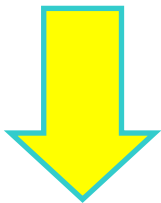
Restaurants

For the restaurants, we recommend recycling containers in the sight of the eating area. This is pictured in Figure 11. The presence of these bins will promote recycling by the patrons, as well as provide more ease and accessibility for the waiters and waitresses to recycle. Knowing that customers are able to see the employees recycling would encourage the employees to properly dispose of the waste. In addition to this organization, we suggest there be more concise and bright poster in the kitchen for the employees to recycle, as seen in Figure 12. This monetary assistance necessary for these recommendations is \$1725 for posters in the upcoming years.



Figure 11: Possible Location of Restaurant Recycling Bins

Vidino



Latas

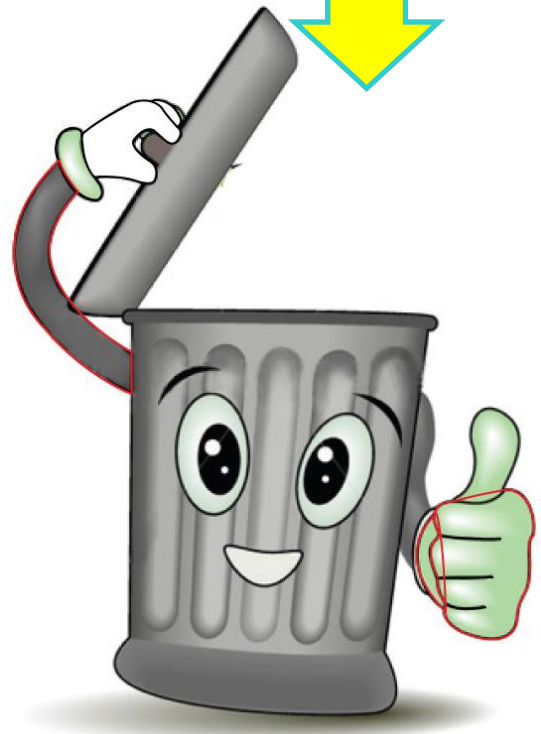
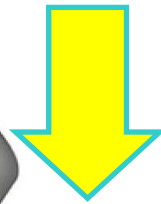


Figure 12: Signs for the Restaurant

REMOVAL

Based on the data supplied in the discussion, we recommend that the Parque use the Reciclaje Forester removal company. They are the closest to the Parque that will pay the most for the recyclables. This also incorporates the ease of the pick up method, such that the company will come to the Parque to remove the recyclables. If the goal of 70 percent recyclables is attained, the Parque can receive upwards of \$20000 each year. In addition, a minimum of \$400 can be saved each year by recycling this waste rather than disposing of it with the garbage.

EDUCATION OF PATRONS AND EMPLOYEES

We recommend an educational program that uses visual signs, messages over loud speakers, and the practice of recycling. To inform the patrons of the procedures of recycling, there should be an educational program in the form of a show. The Parque's characters could be used as icon showing the viewers how to recycle while being entertained. Incorporating the initiatives of recycling, demonstrating what is recyclable, and how to properly recycle would provide the guests with the information required to participate. The Parque already has an Education with Amusement program in the local schools. Recycling could be added to that curriculum to teach students of the benefits and processes necessary.

For the employees, a training presentation on how to properly dispose of waste and the benefits of recycling is necessary. The employees will know how to recycle and that it is important to the company and would be encouraged to participate. The employees in the restaurants could also be trained specifically how to recycle organic waste.

ENCOURAGEMENT OF RECYCLING

To encourage the patrons and employees to recycle, we recommend the Parque use four main ideas. First, posters that advocate recycling should continually change. This will keep the

patrons and employees minds engaged on new ideas of recycling. The recycling bins should remain consistent though. To attract attention, the outside of the bins should have the Reciclin design painted on it. This will serve as a prompt to recycle, as seen on the posters and picnic table reminders. This will cost the Parque approximately \$1725, and these recommendations will ensure that although the ideas of promoting recycling are changing, the procedures involved are the same.



Figure 13: Bin with Reciclin



Figure 14: Picnic Table Reminder

The offices in the Parque must be encouraged to recycle, as well. We recommend this be done with three steps. First, a written a memo, replicated below, should be sent to the office that describes how to recycle and why. Next, a poster should be shown by the recycling bins in each office. An example we have designed is presented below in Figure 16. This exhibits the same ideas as the memo, but addresses the different learning styles. Finally, additional bins should be supplied to the offices for the proper disposal of paper, cardboard, and garbage.

Estimado Empleados,

Para ayudar en los esfuerzos del Parque ser más conciencia del medio ambiente, vamos a implementar un nuevo programa de reciclaje en las oficinas. Habrá tres recipientes para los desechos. El primer guardará productos de papel, el segundo, cartón e el final guardará el resto. Por favor, utilizar estos recipientes efectivamente. Juntos, podemos hacer una diferencia!!

Saludos y Gracias,

La Administración de Parque de Diversiones

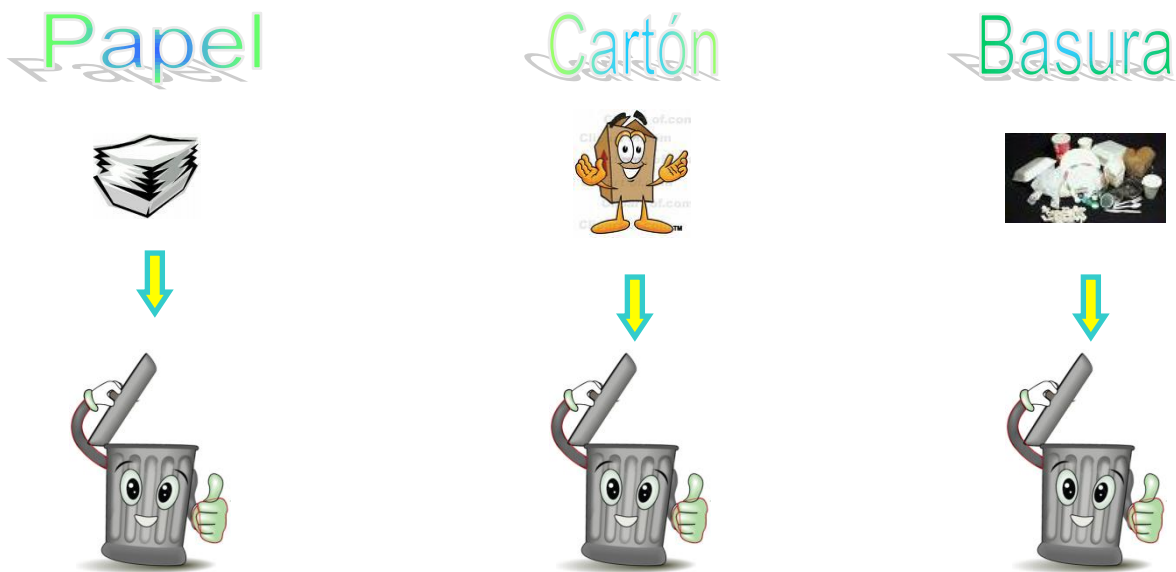


Figure 15: Memo for the Offices



Promoción válida del 7 al 14 de noviembre del 2008
• Teléfonos: 2242-9240 / 2242-9200 Fax: 2290-3033
ventas.corporativas@parquediversiones.com • www.parquediversiones.com

Juntos, todas podemos hacer una diferencia

Por Favor



Juntos, Reciclaremos

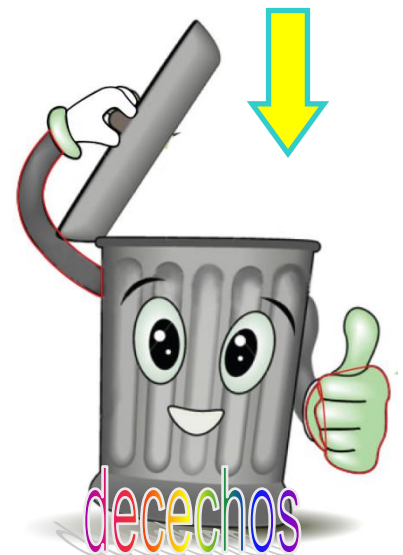
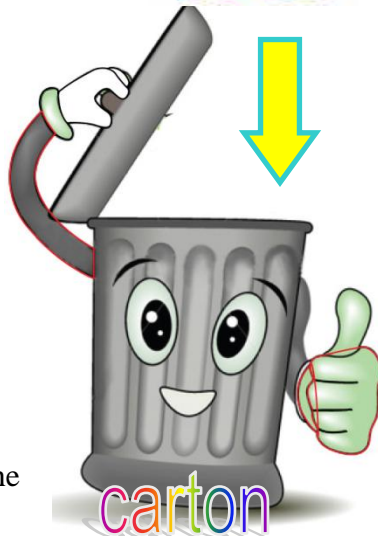
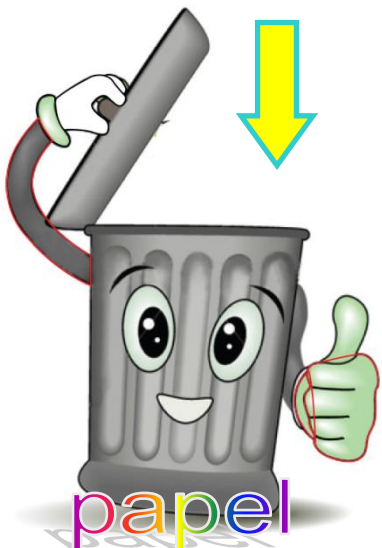


Figure 16: Poster for Recycling Paper in the Offices

PROGRESS OF PERFORMANCE

The issue of progress is an essential aspect for increased participation at Parque de Diverciones. For this, we recommend three phases. The first phase of monitoring progress is to set a goal for the Parque to work towards. This would be announced as recycling a specific percent of the recyclable waste generated. To encourage this, the second phase should be inter-office competitions. The office that recycled the greatest percentage of recyclable waste in a specific time frame should receive an award, such as a lunch or gift. Finally, to encourage and inform the patron and employees of progress, the Parque should announce comparisons with another amusement park or corporation with a similar recycling program. As with the University of Surrey, the competition would encourage participation and ensure its continuation.

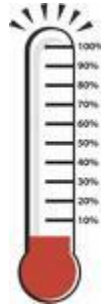


Figure 17: Progress Meter

FURTHER RESEARCH

We recommend further research be conducted to collect and manage organic waste. For Parque de Diverciones' twenty year plan, we recommend that a biodigester be used for a percentage of the food waste, as well as the grass clippings and paper waste. For the remaining food waste and animal waste, we suggest composting with worms. This could provide an attraction near the farm for the children to enjoy. Another project, though, is required for the research and data necessary for this biodegradable waste. This will be an important addition to a program that is already thorough, as it will reduce waste production to such a minimal scale.

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APPENDIX A: Sponsor Description

Our Appendix A is taken largely from “Increasing Ride Efficiency and Evacuation Planning in Parque de Diversiones,” which was completed by Laura Barry, Derek Hall, Elizabeth McLaughlin and Edward Tacvorian under Professors Lorraine Higgins and Tahar El-Korchi in Costa Rica in E-term 2007.

Parque de Diversiones is a non-profit amusement park outside of San José in La Uruca, Costa Rica. Built to raise funds for the Hospital de Niños, its construction was complete December 18, 1981. The idea to create an amusement park to generate profits for the hospital was developed by the Children’s Hospital Costa Rica Foundation, or the CHCRF. Today, the CHCRF is still responsible for maintaining and improving the park, always with the main goal of earning more profits to be donated to the hospital (CHCRF, 2007). Also, profits from Parque de Diversiones pay for all administrative costs of the CHCRF, allowing one-hundred percent of donations to the organization to go directly to the Hospital de Niños (CHCRF, 2007).

The CHCRF has two methods to generate funds for the Hospital de Niños: acquire donations from private organizations and corporations, and raise funds via Parque de Diversiones. However, the park believes that it could increase profits by \$200,000 if they could increase overall ride efficiency. Currently, Parque de Diversiones earns \$250,000 - \$300,000; between twenty-five to thirty-five percent goes to the Hospital de Niños, with the remainder applied to maintenance, improving the park, and paying the 350 employees.

The park expressed a desire to implement a new, fully developed, recycling program, thereby allowing them to generate a profit increase to contribute to the Hospital de Niños. Also, the park wanted to have an education program attached to teach the patrons and employees about proper recycling.

The company structure is typical: there are managers, supervisors, and employees. The managers concerned with this project were Braulio Petta, general manager, Siony Moya, ride manager, and Cinthia Navarro, safety manager. The supervisors report to Sra. Moya, and are in charge of micromanaging employees that work at the rides. The park has a mission statement, which is: “Propocionar alegría y diversión segura a nuestros visitantes y ofrecer servicios de excelencia a nuestros clients, con el propósito de brindar bienestar y formación a la sociedad costarricense y generar excedentes para realizar donacionas al Hospital de Niños.” In English: “To provide joy and safe diversion to our visitors, and to offer excellent services to our clients, in order to promote well-being and strengthen Costa Rican society, and to generate donations for the Hospital de Niños.”

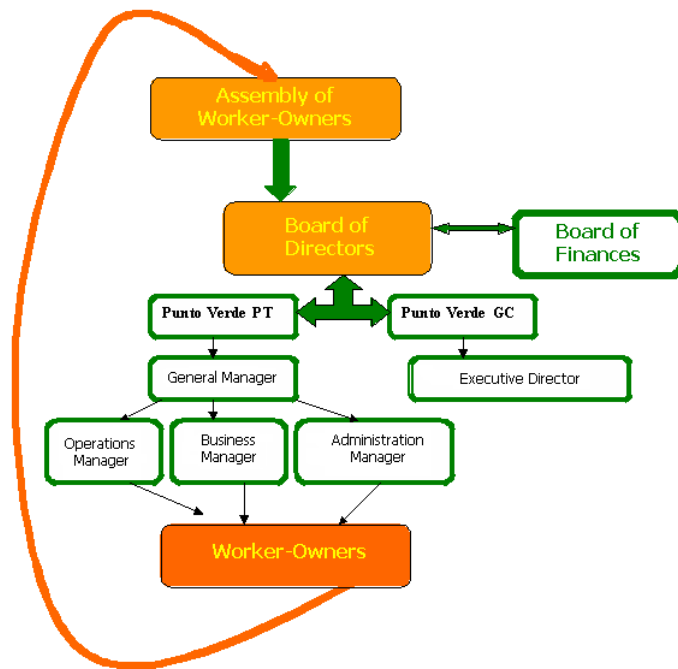


Figure 18: Management Flow Chart

APPENDIX B: PARQUE WASTE FIGURES

C. Navarro (personal communication, September 16, 2008) informed us that Parque De Diversiones has shown a huge increase in waste collection, up 46 percent in just two years. Much of what is collected is recyclable, approximately 13,000 kilograms (kg). While Parque de Diversiones does have a small recycling program, it is inadequate. Navarro (2008) presents the facts that in 2007, the park generated between 2,420 to 6,049 kg of recyclable materials per month, of which, only glass, paper, and cardboard are recycled. Over the course of five months 3,510 kg, approximately 14 percent of waste generated, was recycled. They also generated between 550 and 1,055 kg of biodegradable waste per month. Because the park does not have a biodegradable waste management system, all of this waste is sent to landfills and was not managed in a sustainable way.

Table 11: Amount of Trash Collected Within the Parque in Kg 2005-2007

**AMOUNT OF TRASH COLLECTED WITHIN THE
PARQUE IN KILOGRAMS 2005-2007**

	2005	2007
	Kilograms/Month	Kilograms/Month
JAN	2,259	3,766
FEB	16,570	24,140
MAR	13,560	19,650
APRIL	11,260	15,760
MAY	13,040	17,410
JUN	9,180	24,010
JUL	43,200	60,850
AUG	13,800	19,830
SEP	15,790	18,990
OCT	13,880	27,690
NOV	28,020	26,520
DEC	45,370	71,300

TOTAL = 225,929 329,916

INCREASE = 46.03 %

Table 12: Approximated Amount of Recyclable Garbage Generated by Clients, 2007

**APPROXIMATED AMOUNT OF RECYCLABLE GARBAGE
GENERATED BY CLIENTS. 2007**

	LOW SEASON	HIGH SEASON
	KILOGRAMS/MONTH	KILOGRAMS/MONTH
Bags/plastic	425	1,061
Bottles talks	940	2,351
Tetra pak	157	392
Glass	126	314
Tins	252	631

TOTAL = 1,900 4,749

Table 13: Approximated Amount of Recyclable Garbage Generated by Employees 2007

**APPROXIMATED AMOUNT OF RECYCLABLE GARBAGE
GENERATED BY EMPLOYEES 2007**

	LOW SEASON	HIGH SEASON
	KILOGRAMS/MONTH	KILOGRAMS/MONTH
Glass	170	425
Cooking Oil	100	250
Cardboard	150	375
Paper	100	250

TOTAL = 520 1,300

Table 14: Recycled Real Amounts 5 Months

**RECYCLED REAL AMOUNTS.
5 MONTHS**

	Cardboard (kg)	Glass (kg)	Paper(kg)
nov-07	0	700	0
dec-07	1,000	0	10
jan-08	300	0	200
feb-08	700	0	200
feb-08	300	0	100

TOTAL = 2,300 700 510

Table 15: Approximated Amount of Solid Biodegradable Garbage

**APPROXIMATED AMOUNT OF SOLID
BIODEGRADABLE GARBAGE**

ORIGIN GARBAGE	LOW SEASON. KILOGRAMS/MONTH	HIGH SEASON. KILOGRAMS/MONTH
Plant of Production	400	840
Rest. Ventolero	100	110
Soda water	50	105

TOTAL = 550 1,055

APPENDIX C: WRITTEN SUMMARIES OF INTERVIEWS

Interview with Ms. Laurane 9/29

Director at California Parks

Can you tell me about your recycling program?

It is very labor intensive and has high up front costs. We are a non-profitable organization, and we collect the deposits from the cans and bottles recycled.

How are the recyclables collected?

We have bins that are the same size as garbage, that are placed next to garbage. There is a circle on top to only fit bottle and similar shaped objects into the recycling bin.

How is it removed from the property?

We have external employees, either non-profit individuals or people from the county staff, collect the bins and turn the bottles and cans in for deposits.

This was a very short, informal interview. I got transferred to her through the California Park Service. She was very excited to hear about the project, but not very forthcoming with information to help us.

Interview with Eirik O'Neill 9/29

President Corporate Recycling

Can you give us a general description of your company?

We are an educational implementation company. We consult organizations for reaching their recycling resources.

How do you create a recycling agenda for the organizations?

We match the recycler to the business. We describe how landfills work, in that waste does not break down, where it does in compost. We then do waste audits, through dumper diving and analyzing their waste. Based on cost benefits and solid business sense, we find the opportunities for the company. We then educate the workers on the program, which is a very critical aspect of the process.

What kind of problems have you encountered implementing these programs?

You must have the commitment from the top, as in the General Managers. Complete support is necessary. The next step is then "implementing change." It begins at the ground level. You must minimize the amount of work, making it as easy as possible. The containers should be placed by the garbage. There is no cookie cutter method, but making it easy and getting support is the best way to go.

Are there ever increased costs with recycling?

Typically not. You can decrease solid waste cost and increase savings.

How do you encourage recycling?

We do a lot of signage for advertise the recycling. We use posters, bulletin boards, especially to measure the progress. There is also the market segment. A "green business" creates a sustainable imagine that gives an edge on other competitors. PR is used to spread the word of sustainability, especially with strong commitment.

Interview with Emillia Murillo 10/30

Theme Director

How do you make your designs?

First, the boss presents the information that must be included and the purpose of the design. Then I design it depending on what it is for. Cost is a big issue.

How do you make these designs a reality?

We can print some things in the building, but they take time and the equipment is a little outdated. We have an outside agency that does the more complicated printing. For the garbage cans, a big sticker is printed and then wrapped around the cans. Also we take pictures of where the designs will go, and then we use photo shop to create an image of what it would look like, in order to present it to the bosses for approval.

What type of things do you make and how much do they cost?

Banners are \$12 per square meter and take three days to print and around fifteen days to design. Brochures take a while.

What designs have you found to be most effective?

Specific colors used for specific ideas, like for the idea of clean we use light blue and green; for food, we use orange, brown, green, and a little yellow; recycling uses green and blue. The designs should be friendly, bright with lots of colors, attention grabbing, and cordial, but not begging.

Will you be able to help us with our designs?

I would be more than happy to.

Interview with Ileana Avendaño 10/31

Psychologist

What type of Psychologist are you? And what kinds of problems do you handle?

I am a clinical psychologist. I only handle conflict between personnel and bosses, co-workers, etc. I do not handle any external problems, only internally within the company.

We have been investigating the psychology of people and their motivations for recycling, but we need some information specific to Costa Rica. Do you have any insights you could give us about employees and patrons?

It's a cultural issue. People do not recycle, they say they will or that they would do it, but then they do not. It is hard for people here to understand and learn what is recyclable and how to recycle it. Kids learn about it in school and then come home asking their parents how they can recycle and the parents simply do not know. Also it is on a very individual base, people feel differently about it, because it is so new.

Why is there a resistance to recycle in general?

If there was a good program, people would recycle. It is a lack of convenience. People need a way to recycle, but they do not have a conscience for it.

What do you think the motivators of recycling are?

People want to recycle to have a good environment. They need to see the problem, with a power point or something similar. They need to feel like they are making a difference. They need to know the problem and know that they can help.

Is there an importance in the colors for advertisements?

Yes, it is very important. For example, yellow is an activator, red is used in restaurants, while blue is comforting. There are important associations. Different colors are associated with different things and how you combine them is important too.

Do you have any ideas de what could motivate the people to recycle?

A competition between areas could be a good idea, like marketing versus design, and things similar. There could be an award, such as a lunch or a plaque or something similar. This would get the idea of recycling in the employees heads and teach them how to properly recycle too. It is important to show them what is happening, so they have a sense of accomplishment.

What importance does the age of the people have?

It is extremely important. Children are easier to motivate to do things. Teenagers need to feel like the problem is important to them. They also need to know that the rest of the world is doing it and they have to see the problem and how recycling can help them.

Interview with Arnold Murillo 11/5

Plant Manager

How do you recollect your waste?

My coworker and I drive around the Parque in our truck with an attached trailer. We go from station to station picking up garbage. This is done every day the Parque is open for business.

The AS restaurant is not very clean, as they put garbage outside, behind the restaurant.

The Pueblo Antigo restaurant is very clean. They have a dumpster and separate their recyclables. I pick up the recyclables and bring them to the storage and separation area near the compactor.

There is a lot of opportunity for organic waste, because the style of restaurant allows for easy separation with most of their waste, which is rice that is scraped off plates and could easily be separated and store.

Pizza Hut is another clean location, but because cleanup is done by patrons, separation at the source would be difficult.

How many bins do you have around the Parque and how often do you collect them?

There are 120 in the Parque and 17 more in Pueblo Antinguo. They are collected four times a day.

Would you be able to collect recyclables if there were bins designated for that purpose?

Yes, that would be possible. The problem comes from separating the recyclables later.

The rest of the interview was tour where Arnold explained processes

Cardboard is collected and sold but not compacted. It goes in its own container but people sometimes don't know it's only for cardboard and it sometimes gets contaminated.

Food oil's are recycled as well. It is put in garbage pales outside of restaurants and then later collected and put in containers for collection.

Interview with Jesus Prado 11/14

Manager of the Ventalero and Manatín Restaurants

In this interview the manager gave us a tour through the restaurants and explained there process of recycling and problems that have been faced.

Jesus tells us that in the Ventalero, they try and recycle, but it is difficult for a few reasons. First, the program lacks organization. It consists of putting cans, glass bottles, and other wastes in different bags and crates with no explicit designations. These bags are also in an inconvenient location for the employees, because it is in the hallway that allows travel through the kitchen. This creates mixing of different recyclables and non-recyclables. When these bags get full they are placed outside the restaurant and await collection by plant services, which can take anywhere from an hour to a day.

This creates a few more problems. The collection area is viewable from the restaurant and, when the area is full of trash, is unattractive. Pests get into the trash and tear bags open causing garbage to be strewn across the property. These materials also can produce a strong odor. As a restaurant, the Ventalero does not want to appear dirty.

Jesus offered a few solutions to this problem. He noted that he would like to have an organized system that can be seen by the customers. This creates an environment that it is attractive and clean. The idea, he notes, is that he wants the customers to see the efforts they are making toward recycling. In his opinion, this will make the restaurant appear cleaner and more environmentally friendly.

At the other restaurant, The Manatín, he brought up a few more points. At the entrance, there are two garbage receptacles for customers to dispose of their food. He told us that this is very unattractive and the garbage tends to overflow. He says that there are not enough garbage bins for the amount of customers at the Parque.

Interview with Luis Solano 11/14

Purchasing Manager

In this interview, we spoke about the different products that the Parque purchases and what they are doing to improve their environmental image

According to Luis, the company is looking into buying more environmentally friendly products, such as biodegradable plastics. They purchase a lot of aluminum cans, and plastic bottles. He told us he would send us exact numbers in later correspondence.

He then took us on a tour of their warehouses, where their supplies are stored. He explained their efforts to reduce paper usage by using more digital documentation. Currently, they go through about sixty reams of paper per month. We saw the plates and cups they use for events, a lot of which are Styrofoam, while the party cups are biodegradable. The majority of their products are recyclable and there are huge opportunities, but the program required to handle all of this is out of the scope of our project.

Interview with Don Rodolfo Lee 11/21

Human Resource Manager

This was an interview meeting with Mr. Lee, Cinthia, Arnold Murillo and ourselves.

In this interview, Mr. Lee informed us that the Parque is undergoing a twenty year transformation plan. The current plan for recycling stopped this year due to the addition of this twenty year plan. The goal is to reorganize the Parque's attractions by age. The first initiative in this is to ensure proper recycling. This involves having a large enough area to collect and sort the increased amounts of recyclables and waste. Within one year, they intend to have recycling and the service areas moved to the new location.

We also discussed the specifics of our project. Cinthia said that 40 percent of the patrons bring in their own meals. This includes cans, bottles, glass, food, etc. An education plan is very important, therefore, to ensure that the waste is properly disposed of. The educational aspect should trigger the children, in particular. This may involve using the schools to encourage recycling procedures.

APPENDIX D: EXPERIMENT RESULTS

Table 16: Control Results

Control

Friday	Bin		
		Non-Recyclables(Kg)	Recyclables (#)
	Non-recycling	2.4	3
	Recycling	2.2	2

Saturday	Bin		
		Non-Recyclables(Kg)	Recyclables (#)
	Non-recycling	1.5	3
	Recycling	2.2	2

Sunday	Bin		
		Non-Recyclables(Kg)	Recyclables (#)
	Non-recycling	2.2	6
	Recycling	2.9	5

	Waste (kg)	Recyclables (#)
Properly Handled	6.1	9
Total Material	13.4	21
%	45.5	42.9

Table 17: Experimental Results

Experimental

Friday

Bin

	Non-Recyclables(Kg)	Recyclables (#)
Non-recycling	3.4	5
Recycling	1	12

Saturday

Bin

	Non-Recyclables(Kg)	Recyclables (#)
Non-recycling	2.8	3
Recycling	1.1	15

Sunday

Bin

	Non-Recyclables(Kg)	Recyclables (#)
Non-recycling	3.1	4
Recycling	1	14

	Waste (kg)	Recyclables (#)
Properly Handled	9.3	41
Total Material	12.4	53
%	75.0	77.4

APPENDIX E: ENVIRONMENTAL PROTECTION AGENCY COMPOSTING GUIDELINES

What to Compost - The IN List

- Animal manure
- Cardboard rolls
- Clean paper
- Coffee grounds and filters
- Cotton rags
- Dryer and vacuum cleaner lint
- Eggshells
- Fireplace ashes
- Fruits and vegetables
- Grass clippings
- Hair and fur
- Hay and straw
- Houseplants
- Leaves
- Nut shells
- Sawdust
- Shredded newspaper
- Tea bags
- Wood chips
- Wool rags
- Yard trimmings

What Not to Compost - The OUT List

- Black walnut tree leaves or twigs
 - Releases substances that might be harmful to plants
- Coal or charcoal ash
 - Might contain substances harmful to plants
- Dairy products (e.g., butter, egg yolks, milk, sour cream, yogurt)
 - Create odor problems and attract pests such as rodents and flies
- Diseased or insect-ridden plants
 - Diseases or insects might survive and be transferred back to other plants
- Fats, grease, lard, or oils
 - Create odor problems and attract pests such as rodents and flies
- Meat or fish bones and scraps
 - Create odor problems and attract pests such as rodents and flies
- Pet wastes (e.g., dog or cat feces, soiled cat litter)
 - Might contain parasites, bacteria, germs, pathogens, and viruses harmful to humans
- Yard trimmings treated with chemical pesticides
 - Might kill beneficial composting organisms

APPENDIX F: OUR DESIGNED POSTERS AND REMINDERS



Figure 19: Simple Poster



Figure 20: Simple Reminder

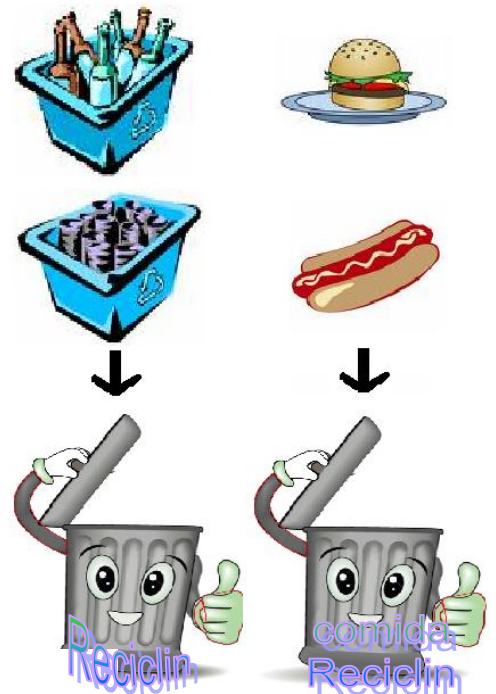
Juntos, todas podemos hacer una diferencia

él nos quiere que pongamos...

las botellas, los vidrios, y los latas

desecho orgánico en una basuera

Tio Conejo tiene un nuevo amigo que se llama Recyclin.



Juntos, reciclaremos.

Figure 21: Intricate Poster



Recuerde

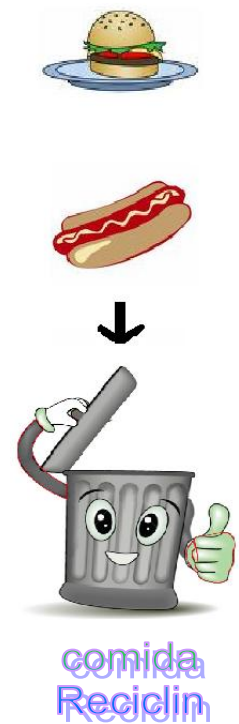
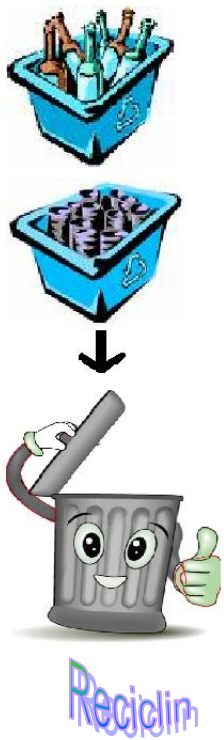


Figure 22: Intricate Reminder

APPENDIX G: ACTUAL POSTERS AND REMINDERS



Figure 23: Picnic Table Reminder for Specific Items



Figure 24: Detailed Picnic Table Reminder



Figure 25: Simple Picnic Table Reminder



Figure 26: Banners of Education and Encouragement

APPENDIX H: OFFICE ADVERTISEMENTS

Estimado Empleados,

Para ayudar en los esfuerzos del Parque ser más consciencia del medio ambiente, vamos a implementar un nuevo programa de reciclaje en las oficinas. Habrá tres recipientes para los desechos. El primer guardará productos de papel, el segundo, cartón e el final guardará el resto. Por favor, utilizar estos recipientes efectivamente. Juntos, podemos hacer una diferencia!!

Saludos y Gracias,

La Administración de Parque de Diversiones

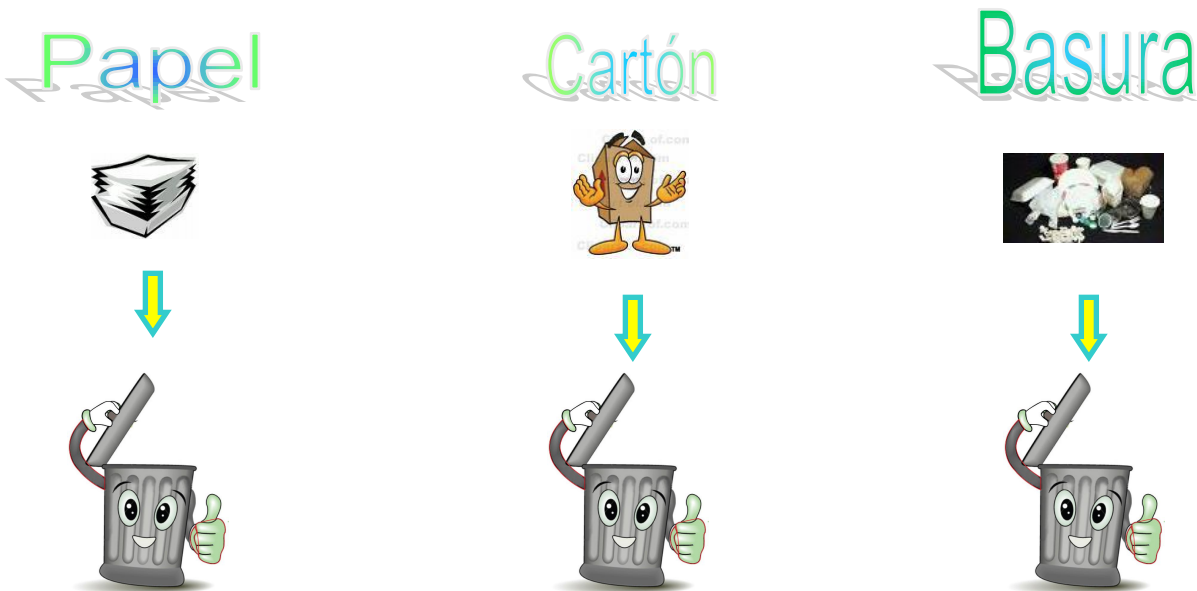


Figure 27: Office Memo



Promoción válida del 7 al 14 de noviembre del 2008
• Teléfonos: 2242-9240 / 2242-9200 Fax: 2290-3033
ventas.corporativas@parquediversiones.com • www.parquediversiones.com

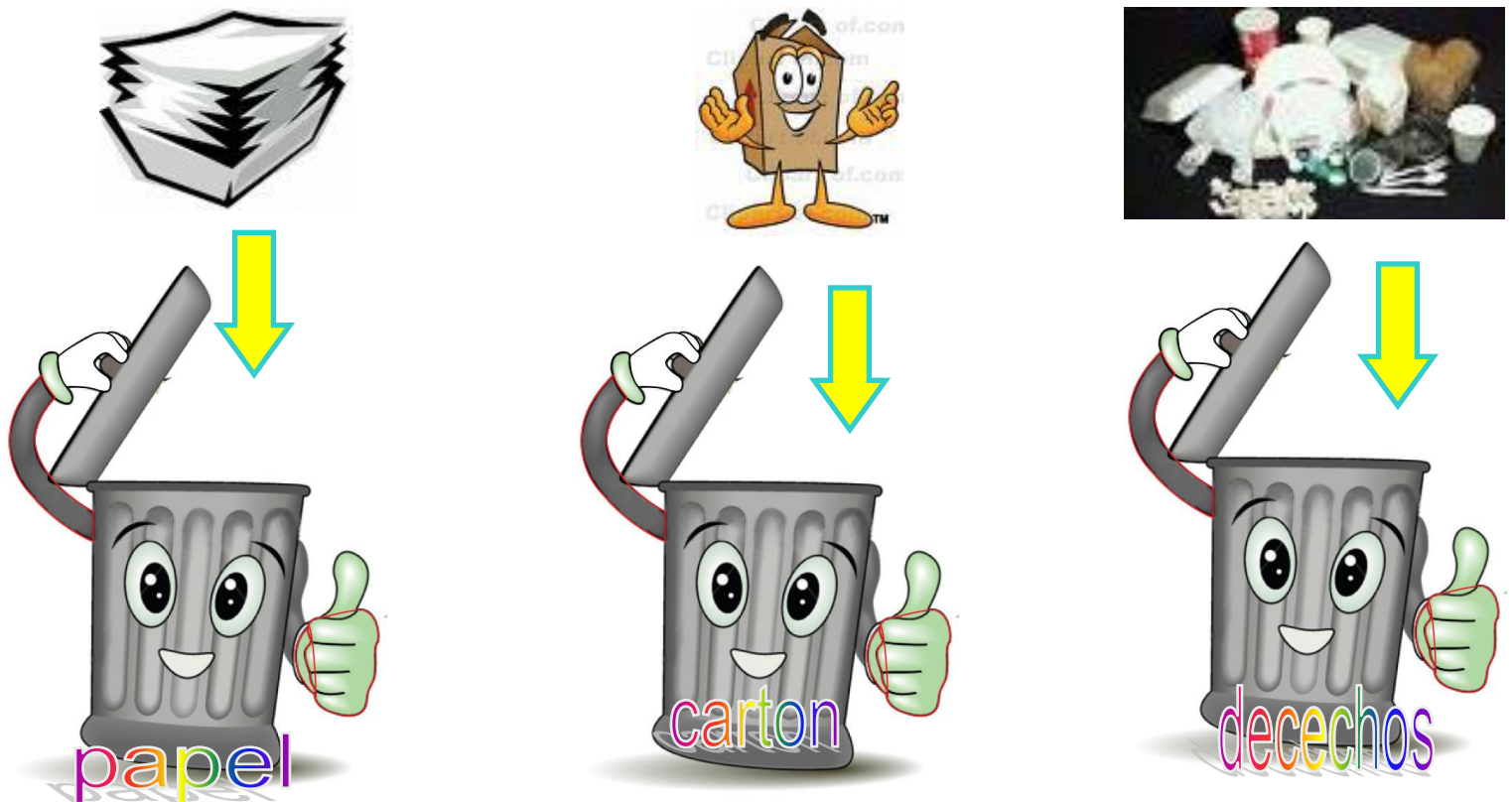
Juntos, todas podemos hacer una diferencia

Por Favor



Juntos, Reciclaremos

Figure 28: Office Poster



APPENDIX I: SIGNS FOR THE PARQUE

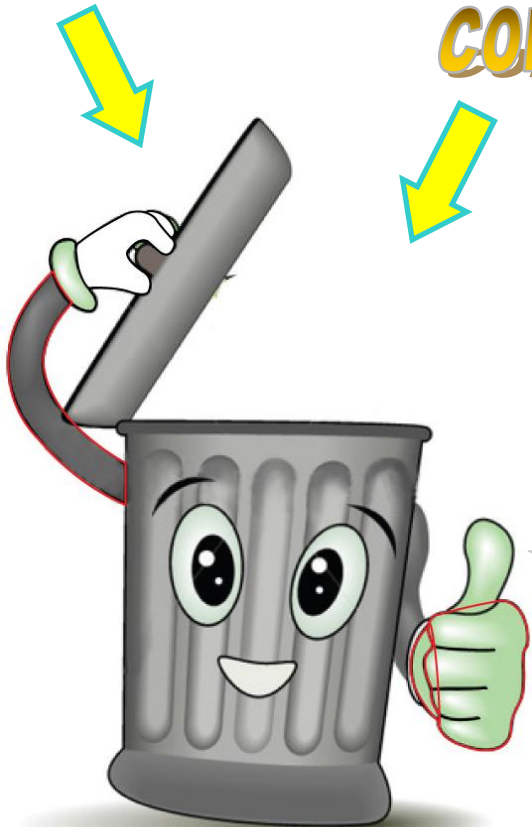
Resechos Organicos



servilletas



comida



Juntos, todas podemos

hacer una diferencia

Figure 29: Organic Waste for Employee Soda

Basura



desechos



vajilla de plata

Juntos, todas podemos

hacer una diferencia

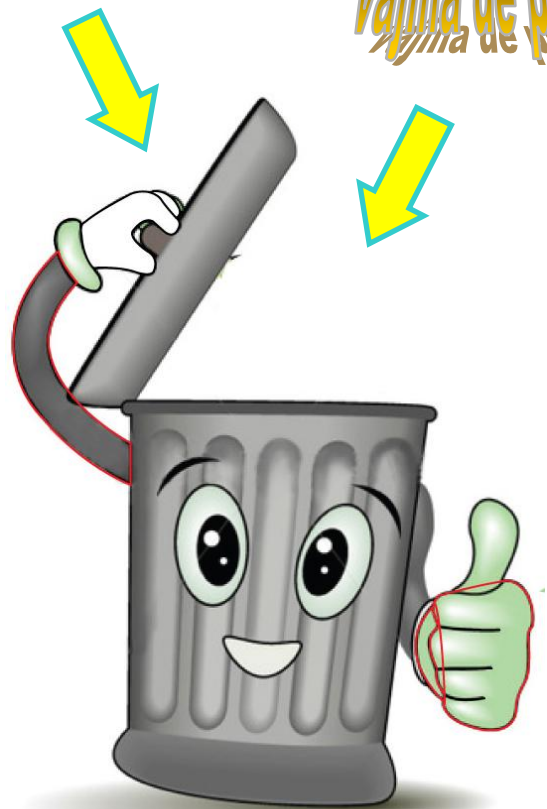
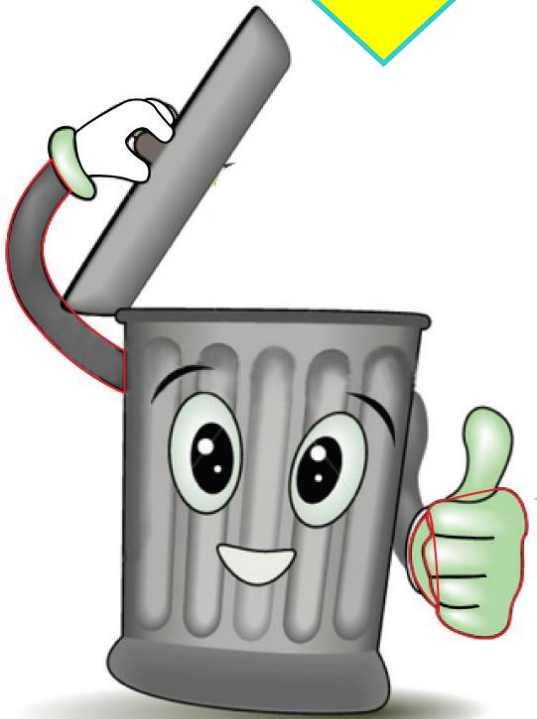
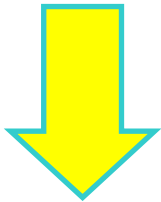


Figure 30: Trash Sign for Employee Soda

Vidino



Latas

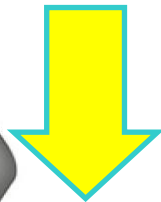


Figure 31: Signs for Restaurant