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CONSUMER RECYCLING PROGRAMS:
THE MARKETING AND LOGISTICS IMPLICATIONS

presented by

Thomas Joseph Goldsby

has been accepted towards fulfillment
of the requirements for

Ph.D. degree in Marketing and Logistics

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**CONSUMER RECYCLING PROGRAMS:
THE MARKETING AND LOGISTICS IMPLICATIONS**

By

Thomas Joseph Goldsby

A DISSERTATION

**Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of**

DOCTOR OF PHILOSOPHY

Department of Marketing and Supply Chain Management

1998

ABSTRACT

CONSUMER RECYCLING PROGRAMS: THE MARKETING AND LOGISTICS IMPLICATIONS

By

Thomas Joseph Goldsby

This research sets forth an investigation of consumer recycling behavior. In particular, the investigation seeks to identify the marketing and logistics tools available to the public policy-maker or business strategist that effectively encourage higher levels of consumer recycling activity. The Model of Managerially-Influenced Recycling Behavior is offered to better explain and predict recycling behavior.

The hypothesized model is tested across a variety of materials and settings. Beverage containers and newspapers serve as the materials of interest. The geographic settings include bottle bill deposit settings and city settings. Data are collected primarily by surveying the parents of college students at three Midwestern universities. The remaining data are collected through random mailings to each of the three bottle bill settings of interest. In total, 570 responses are available for analysis.

Following preliminary data analysis, structural equation modeling (SEM) is used to assess construct validity and test the model's ten hypotheses. Results demonstrate that the model soundly explains and predicts recycling intentions across newspapers and beverage containers. Among the marketing and logistics tools found to be instrumental in influencing newspaper recycling intentions are: appeal promotions, low participation costs and convenience. With exception to the cost of participation, the same factors are

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influential with beverage container recycling as well. Unfortunately, findings regarding economic incentives are inconclusive given their operationalization.

The model is subsequently tested across the various settings of interest through multiple-group SEM analysis. The model finds considerable application in the bottle bill and city settings. Though few in number, the analysis identifies key differences in modeled effects across settings. The document then discusses managerial and theoretical implications derived from the research findings. Finally, directions for future research are explored.

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ACKNOWLEDGEMENTS

I have come across as many analogies describing doctoral dissertations as I have doctoral students who have embarked upon the process. The dissertation has been compared to everything from learning to fly (without wings) to a blindfolded walk about a forest – anything but an amusement. My analogy of the experience likens it to marathon race. In my own marathon running experience (only one to date), I recall the many waves of emotion and physical pain that occupy the mind and body over the course of a grueling distance. Emotions of doubt are overcome by strength with each turn of the course. But to the finisher, nothing compares to the exhilaration of successfully meeting a grand challenge. Those who have been close to my dissertation, and doctoral study experience in general, know of the instances of strain endured and satisfaction enjoyed throughout the process before finally reaching the finish line.

I am pleased to have an opportunity to thank those people who have been instrumental in helping me to successfully reach this long-awaited finish line. First and foremost, I would like to thank my family and particularly my wife Kathie who is not only a wonderful life partner but my primary motivator and professional asset. Kathie has been the constant voice of love, strength and encouragement throughout this process. I would like to thank my parents, Joe and Sujane Goldsby, who made sure that both my brother (also a newly minted Ph.D.) and I performed respectably in the classroom and in life. They have been supportive of Mike and me throughout our many years of schooling despite wondering when we would finally be satisfied that enough was enough. Our parents have worked extremely hard over the years to provide us with opportunities that

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were unavailable to them. Being able to exchange stories and ideas with my brother Mike throughout our parallel doctoral studies has been a unique and valuable experience.

I must also thank my grandparents, particularly Ivis and Mary McNeely, who have been instrumental in shaping the person that I still hope to become. My grandparents are the epitome of “good people” – always willing to give far more than receive. My father- and mother-in-law have been tremendous supporters and advisors to Kathie and me since our beginning as well. In addition, I would be remiss without thanking our four-legged companion, Chewbacca (Chewy), for the invigorating late-night walks we have enjoyed over the past three years.

At Michigan State, I would like to thank my fine colleagues that made the whole experience not only a learning one but an enjoyable one. I would primarily like to thank my classmates, Jim Eckert and Jeff Thieme. I also thank my program “elders” and guidance counselors, namely Professors Steve Clinton, Matthew Myers and Jeff Schmidt. In addition to these colleagues, I would like to thank the “roundball crew” for offering regular stress relief and many hours of enjoyment on the hardwood. I am sure they benefited from playing with a hick from near French Lick.

I would also like to thank my dissertation committee members: Dr. David J. Closs, Dr. M. Bixby Cooper, Dr. Thomas J. Page, Jr., and Dr. Theodore P. Stank. I must particularly thank Dr. Closs who also served as my primary advisor throughout the duration of the program. Dr. Closs has provided me with considerable preparation for the career that I am about to set forth. I especially appreciate the emphasis he placed on structured communication that will serve me well in future writings and presentations. A special thanks also to Ted Stank who has been a valuable mentor and friend. Ted is a

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tremendous addition to the Michigan State Supply Chain faculty, one who will provide great value to the MSU College of Business and its students for many years to come. I am also thankful for the influence of Professor Donald J. Bowersox who has been a central figure in the formalization and advancement of the logistics discipline. A final thanks goes to the wonderful support staff in the Marketing and Supply Chain department who have facilitated the work that had to be done but also have made time spent in the office a pleasure.

Clearly, a number of individuals have been influential over the course of the process. While space prevents me from thanking everyone who contributed to the experience and my future endeavors, suffice it to say that the program has been a challenge – a venture worthy of the great effort. The experience has been valuable, in part, because of the colleagues and friendships I have formed and the many tokens of support received along the way. Their efforts and well wishes will not be forgotten.

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CHAPTER 1: INTRODUCTION

INTRODUCTION

This research investigates the factors that influence the consumer's decision to participate in recycling programs. Based on the results of the investigation, this research will provide managerial and public policy recommendations that improve the design and operation of private and public recycling programs. This introductory chapter discusses the research problem and its various dimensions. Attention is first directed toward the public call for action to amend environmental problems in general. This chapter then addresses the specific role of recycling in alleviating these problems. The next section provides a brief examination of the activities and functions performed in the distribution channels of recycling. In addition, this chapter defines the research objectives and research questions of the study. Finally, the scope of the research, its anticipated contributions, and organization are described.

THE CALL FOR ENVIRONMENTAL ACTION

The deterioration of the natural environment and the difficulty that developed nations face in sustaining high quality-of-life standards have become issues of justifiable societal and economic concern. Environmentalists claim that for decades, industry and consumers have recklessly contributed to the demise of our natural ecology. They claim the results of this lack of environmental concern are literally all around us; in our land, air, water, and even in the atmosphere. While the degree of environmental damage caused by human activity remains an issue of widespread debate, one thing is certain: public demand compels responsive action on the part of governments and businesses throughout the world.

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Consumers express their concern vocally, and even more powerfully through their voting and buying powers. After all, three out of four U.S. residents consider themselves to be “environmentalists” to some degree (Goldman 1991). Even more compelling is a statistic stating that 80 percent of Americans report changes in their daily behavior as a result of increasing environmental awareness (Cambridge Reports 1992). Another strong indication of consumer concern is the report that consumers are willing to pay five to ten percent more for products they feel are legitimately safer for the environment (Ottman 1992). With these enhanced attitudes toward the environment, people also expect greater sensitivity and involvement on the part of government and business.

Governmental reactions to public concern are readily apparent. In addition to passing laws that limit further environmental deterioration, the federal executive and legislative branches actively seek international trade partners that share a common view toward environmental consciousness. State governments are also taking firm stances on the conservation of natural resources as well as drafting legislation that stringently controls negligent business activity.

While many businesses merely react to legislative mandates, many others are openly embracing the opportunities brought forth by the “green” movement. In fact, many executives believe that the 1990s represents the “decade of the environment” (Kirkpatrick 1990). In response to this declaration, manufacturers are developing environmentally friendly products in record numbers. It is even thought that environmentally friendly producers of goods and services achieve competitive advantage as a result (Ottman 1992). The new set of product expectations is perhaps most apparent in the emergence of the government-sanctioned International Standards Organization’s

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(ISO) 14000 standards for environmental management. In the future, environmentally sound products and processes are likely to become the order qualifier that high quality has become in many industries today.

THE ROLE OF RECYCLING

Many authors claim that a central cause of our deteriorating environment is the production and consumption culture of the modern world (Hawken 1993; Makower 1993; Saunders 1993). As Makower (1993) suggests, it is impossible to create a good or service without inevitably creating waste as well. When it appears unlikely that people will alter their consumption habits, it becomes particularly important to carefully manage the “residues” of production and consumption. Recycling offers consumers and industrial entities a considerable opportunity to participate in environmental protection efforts by more carefully managing these residues.

Recycling is “the process by which materials otherwise destined for disposal are collected, processed, and remanufactured into new products” (Kopicki et al. 1993, p. 3). Recycling actually represents only one practice of the broader waste reduction effort. According to Kopicki et al. (1993), waste reduction encompasses recycling, reuse, and source reduction. “Reuse” refers to the utilization of a product or component part in its same form for future use without reconditioning or remanufacturing. Examples of reuse include the usage of plastic, refillable milk and detergent containers for consumer goods, and the usage of durable pallets and shipping containers in industrial distribution. Meanwhile, “source reduction” is a proactive effort to reduce the volume and toxicity of materials prior to their production (Kopicki et. al 1993). Though each endeavor fulfills a

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central role in ameliorating environmental damage, consumers and industry have primarily become active in recycling and reuse efforts.

Demographic research has shown that diverting recyclable material from the nation's landfills has become a manageable task for many Americans. In its annual "State of Garbage in America" report, *BioCycle* magazine claims that the nationwide recycling rate was a rather impressive 28 percent in 1996 (Goldstein 1997). Table 1.1 reports nationwide figures for the amount of municipal solid waste generated as well as the associated recycling rates, incineration rates and landfill rates dating back to 1989. The figures contained in the table clearly demonstrate that many Americans are making a concerted effort to prevent further environmental decay by participating in community recycling programs.

Table 1.1 Nationwide Figures for Municipal Solid Waste (MSW) Disposal

Year	Tons of MSW Generated (000s)	Recycled^a (%)	Incinerated (%)	Landfilled (%)
1989	269,000	8	8	84
1990	293,613	11.5	11.5	77
1991	280,675	14	10	76
1992	291,742	17	11	72
1993	306,866	19	10	71
1994	322,879	23	10	67
1995	326,709	27	10	63
1996	327,460	28	10	62

^a refers to materials diverted from landfills (includes recycling and composting)

Source: Goldstein (1997)

The increase in participation can be credited, in large part, to a growth in the number of municipally-operated recycling programs. According to Goldstein (1997),

there were 8,817 curbside collection programs in operation in the U.S. in 1996, serving approximately 135 million people or 51 percent of the total U.S. population. In comparison, there were 1,042 such programs in 1988 (Glenn and Riggle 1989). The number of curbside programs saw significant growth in the early 1990s but has leveled off significantly over the past few years (Steuteville 1996).

Many other communities utilize a dropoff system of collection. Under these systems, self-serve multi-compartmented storage facilities are often made available in central locations for the collection of materials. Dropoff programs are typically provided when curbside services are either in development, suspended, or proven to be uneconomical due to low volumes or low population density (Steuteville 1996b). Like curbside programs, dropoff systems have experienced tremendous growth since the late 1980s. While the number of dropoff programs has only been tabulated in recent years, it is thought that the rate of growth for dropoff systems has remained steady. For instance, there were 10,436 dropoff sites in the U.S. in 1996 compared to only 8,773 the previous year (Goldstein 1997). Figure 1.1 summarizes the growth patterns for both curbside and dropoff programs nationwide.

In addition to nationwide counts for curbside and dropoff programs, Figure 1.1 reports the number of landfills nationwide. Clearly an inverse relationship exists between the emergence of recycling programs and the number of landfills. The reasons for this dynamic are thought to be interdependent. Stringent federal regulations, namely Subtitle D of the Resource Conservation and Recovery Act (RCRA) of 1993, have forced the closure of several landfill sites throughout the nation. Greater emphasis is placed on recycling as a result of these landfill closures. Conversely, the growing awareness and

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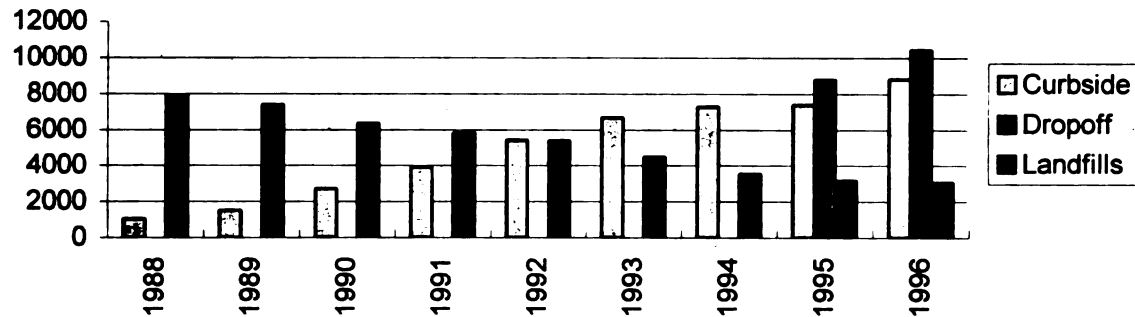


Figure 1.1 Curbside Programs, Dropoff Programs and Landfills Nationwide

While the decline in the number of landfills has forced the issue of recycling somewhat, the growth of municipal recycling programs can also be attributed to the emergence of state-mandated recycling goals. Table 1.2 (in the appendix to this chapter) provides an overview of recycling/reduction goals as well as up-to-date contributions toward these goals for all 50 states and the District of Columbia. While these mandates put pressure on localities to initiate programs, they also provide significant funding to help facilitate the development and daily operation of curbside and dropoff programs.

Many states also solicit the active involvement of the commercial sector in facilitating material collection. Private garbage and refuse collectors operate curbside and dropoff systems in many cities. These collectors typically charge a fee to the city for their services but also benefit from the sale of the recyclable materials. Firms that operate outside the scope of garbage and refuse collection are often called to duty by state

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mandates, however. This is the case for beverage distributors and retailers in many “bottle bill” states. To date, eleven states have initiated bottle bills; nine of which require distributors to collect mandated beverage containers from retailers who are responsible for collecting these containers from consumers.

While many firms are forced to comply with state regulations requiring their participation in mandated collection programs, several other firms are becoming actively involved in recycling programs under their own free will. In fact, a survey of logistics managers reveals that recycling is not only the most popular method of addressing environmental issues by businesses but also the most effective (Murphy et al. 1994). The emergence of “buy-back” and “take-back” programs have provided consumers with ample opportunities to participate in recycling, but firms also benefit from the acquisition of materials for reconditioning and subsequent resale. While the automotive aftermarket industry has been active in trade-in programs for many years, buy-back and take-back programs are being implemented in a number of different product areas. Hewlett-Packard, for instance, is commonly cited for their efforts to collect used print toner cartridges for remanufacturing purposes.

A BRIEF INTRODUCTION TO REVERSE CHANNELS AND LOGISTICS

Whether materials for recycling are collected by public or private entities, it is interesting to examine the cyclical flow of materials in the forward and reverse channels. Materials gain value as they move through each stage of the forward channel until they are ultimately depleted by consumers. However, many materials have the opportunity to gain value again as they are collected and processed in the reverse channel before reentering the typical, forward channel. Essentially, the consumer serves as the supplier

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of “raw materials” in this reverse channel of distribution. As Zikmund and Stanton (1971) noted, consumers possess a commodity that is of value to another party, and they should therefore seek the best means of delivering the goods to the market. However, as the authors pointed out several years ago, the material is often viewed as having little value and not worthy of considerable thought or action by most consumers. Consumers tend to view the personal costs associated with recycling as exceeding the personal benefits. Given the effort that would be required to store and, perhaps, transport the material to a collection site, most recyclable materials and reusable goods are simply thrown away.

However, even when materials fail to be collected for recycling, they should not be forgotten. That is, it is important to remember that materials do not evaporate once they enter the waste stream. Rather, materials exist in a life cycle from the time of initial extraction until ultimate disposal. The goal of recycling is to keep materials and goods in a use/restore/reuse pattern within the life cycle for as long as possible. When materials remain in this cyclical pattern, we prevent further contribution to our landfill problem and alleviate the strain on our natural resources.

Figure 1.2 illustrates the cyclical nature of consumer good material flows. In this rather generic representation of consumer goods flows, raw materials are initially gathered and receive added value to become finished goods at the point of production. Successive time and place utilities are enhanced through wholesale and retail distribution, allowing the consumer to ultimately procure the finished good. Assuming the existence

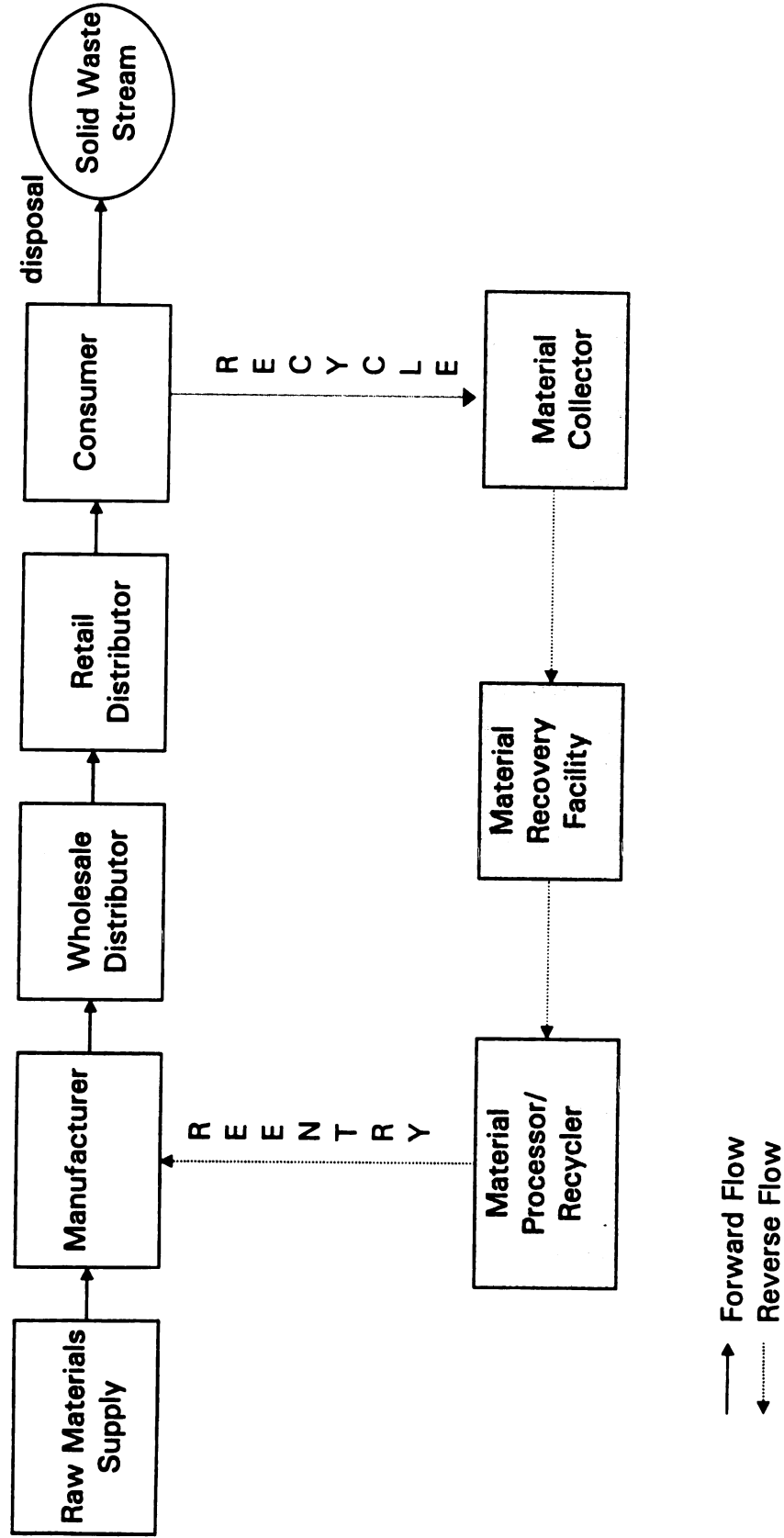


Figure 1.2 The Forward and Reverse Channels of Distribution

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of a reverse channel system, consumer participation, and a degree of redeeming value, recyclable materials will be collected by way of curbside, dropoff or retail collection. These materials are then centrally collected and stored at a material recovery facility (MRF). Upon collection at the MRF, materials are typically transferred to one or more intermediaries to undergo processing that “rejuvenates” the materials to make them valuable again. These secondary raw materials may then serve as a production input on a comparable basis to virgin materials.

Materials and finished goods will continue to flow through this cycle of forward and reverse processes until one of three possible events occurs. Materials are either: 1) suspended from further processing as a result of dismal market conditions, 2) conscientiously disposed of as a result of contamination or damage, or 3) precariously disposed of at any point in the cycle. The first condition is one that has historically plagued the recyclables market as a result of fluctuations in the demand for recycled goods, an issue to be discussed further in Chapter Two. Meanwhile, paper, plastics and glass are often exposed to the second fate as a result of carelessness in the sorting and handling processes. Materials become contaminated when multiple color stocks are intermixed with one another. The third condition, precarious disposal, refers to the discarding of recyclable materials that could justifiably be contributed to a recycling program for reconditioning and further use as a secondary raw material. Minimizing precarious disposal by consumers is a manageable problem that serves as the subject of this study. Identifying the means by which public policy makers and private enterprise can achieve consumer participation in recycling programs represents a significant contribution to the literature, and certainly to practice.

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In particular, this study searches for the most effective and efficient method to motivate consumer participation in the reverse channel of recycling. The solution to this problem becomes even more significant when one considers that the rate of recycling participation is leveling off while the demand and number of uses for recyclable materials continue to grow. A better understanding of the consumer's motivation and willingness to participate in recycling programs would lend considerable insight toward the development of systems that ensure sufficient supplies of secondary raw materials -- materials that might otherwise be diverted to the waste stream.

RESEARCH OBJECTIVES

This research will identify and test the factors that shape consumer attitudes toward recycling participation. These findings will aid in the design and development of effective, efficient recycling programs. Implications for managers and public policy makers are also discussed. The three specific objectives of this research are:

- A) To develop a model that identifies the factors shaping consumer participation in recycling programs and determine the relative influence of each factor in the model;
- B) To assess the model's application across a range of materials and settings; and
- C) To use the model to develop managerial and public policy guidelines that outline the opportunities available to private entities as well as the obligations of government involvement.

Note that this research will offer empirical evidence to meet only the first two objectives.

The final objective will be addressed qualitatively. The third objective will be met using

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Figure 1.3

knowledge developed from the model tests of the first two objectives as well as insights gathered from the literature and practical experience.

RESEARCH QUESTIONS

Given the objectives outlined above, a series of research questions addresses the three objectives in the order outlined in Figure 1.3. The specific research questions are grouped according to the three stated objectives and listed below.

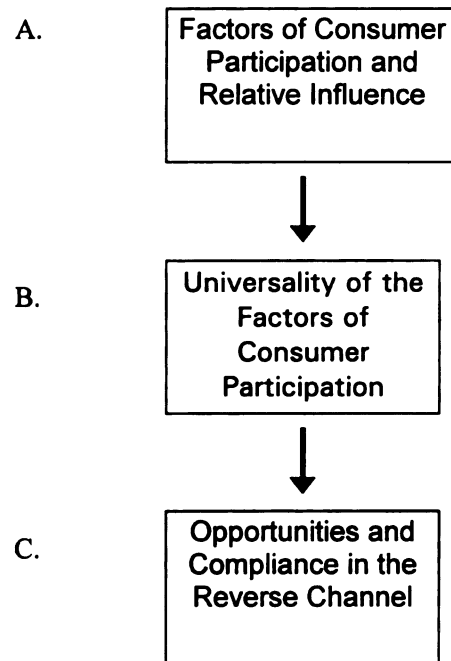


Figure 1.3 Research Question Framework

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The first set of research questions examine the factors of consumer participation and the relative influence of these factors. The treatment of these research questions will test the Model of Managerially-Influenced Recycling Behavior developed in Chapter Two.

A. Factors of Consumer Participation and Relative Influence

1. What factors shape the consumer's willingness to recycle?

The second set of research questions builds upon the findings of the question A.1. These questions examine the application of the model of consumer recycling behavior across two different varieties of recyclable material as well as a variety of legislative and city settings.

B. Universality of the Factors of Consumer Participation

1. Does the model of consumer recycling behavior identified in the first objective apply uniformly across different varieties of recyclable material?
2. Does the model of consumer recycling behavior identified in the first objective apply uniformly across legislative and city settings?

The third set of questions examines the roles of reverse channel participants given findings from the first two objectives. Research questions in this area are based upon the ability and willingness of consumers and channel intermediaries to participate in the reverse channel. When participants appear to be either unable or unwilling to participate, the role of government intervention is investigated.

C. Opportunities and Compliance in the Reverse Channel

1. How should consumers be motivated, educated and assisted to achieve higher levels of recycling participation?
- 2a. Which channel participants are in the best position to provide the mix of marketing and logistics offerings that consumers desire?
- 2b. Given an identification of the ideal reverse channel configuration in question C.2a, how closely should the reverse channel reflect the forward channel?
3. What level of responsibility is the consumer willing to assume?
4. Is government involvement necessary to implement the desired recycling program?

SCOPE OF RESEARCH

This research surveys consumers' attitudes, perceptions and intentions directed toward recycling participation. Consumers represent a critical point in both the forward and reverse channels. While they often serve as the end user in the typical channel setting, it is important to note that they can serve as a supplier in the reverse channel as well. In addition, material derived from consumers (post-consumer content) is considered a premium material input in consumer goods. Manufacturers that make the effort to collect and reuse post-consumer content are often perceived as more environmentally responsible.

The research will survey the attitudes and intentions individuals have toward specific materials. The specific materials examined in the study are newspapers and beverage containers. Newspaper is a commonly purchased recyclable material that has

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relatively low value per unit when compared to other recyclables. In fact, the low value of newsprint often prohibits effort to collect the material in the first place. The infrastructure for newspaper collection varies across different municipalities when it *is* deemed worthy of collection. Many locations collect newsprint at the curbside, others at dropoff facilities, and still others by temporary fund-raising drives. The market value of recyclable newspapers has only recently stabilized though the value is still relatively low as supply manages to exceed demand on a regular basis. In fact, newspapers are sometimes collected for recycling only to be discarded into the solid waste stream when markets are oversupplied with the material. Given that newspapers have relatively low redeeming value and, therefore, few incentives attached to encourage their collection, newspaper recycling will represent “generic” recycling behavior in this study.

Beverage containers, on the other hand, maintain significantly higher recyclable market value. Aluminum cans in particular have historically maintained high recycling value. Plastics and glass demand far lower prices than aluminum though new uses for these materials emerge virtually every day. For instance, one U.S. firm collects used beverage containers and processes them into mesh such that when several layers of the mesh are attached together they make a durable, comfortable, quick-dry blanket. These blankets are becoming widely adopted by emergency workers who comfort victims at the scenes of accidents and natural disasters. Glass is commonly used today as a component in a road paving composite called “glasphalt.” As a result of these new uses for recyclable plastics and glass, the value of these materials as secondary inputs rises as well.

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The infrastructure for the collection of beverage containers is typically more developed and formalized than that of newsprint. This enhanced development is a result of the higher market value of beverage container materials. As noted above, many states have instituted bottle bill legislation that require retailers and beverage distributors to actively collect containers from consumers for recycling. In other states, beverage containers may be collected at the curbside, at dropoff facilities, or even by industrial recyclers themselves. Therefore, the contrasting market values, differences in consumer activity, and the presence of distinct infrastructures combine to give rise to the selection of newspapers and beverage containers as the materials of interest in the study.

The research will examine the attitudes, perceptions, and intentions of consumers across states with differentiated approaches to bottle bill legislation: Michigan with its ten-cent redemption value on several beverage containers, Iowa with its five-cent redemption value, and Kansas which has no bottle bill legislation. The surveys will be distributed to the parents of students who attend a chosen university in one of the three states. While the chosen institutions have very high in-state student enrollments, it is anticipated that a fraction of the surveys will be collected from states outside the three originally intended. The sample will thereby be segmented according to the bottle bill legislation present in each location. Michigan respondents represent the ten-cent redemption condition, Iowa and six other states represent the nickel return while Kansas and the remaining 41 other states represent the states with no bottle deposit. California and Florida will be lumped with this group despite their penny return.

In addition, it is anticipated that surveys will be distributed to rural, suburban and metropolitan areas alike. Surveying both rural and metropolitan areas is desirable since it

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Chapter Five

allows us to examine whether any attitudinal or behavioral differences can be attributed to city settings. The survey design approach utilizes the approach suggested by Creswell (1994). Further discussion of the sample and survey method may be found in Chapter Three.

CONTRIBUTIONS: MARKETING THEORY AND MANAGEMENT PRACTICE

The research offers a number of contributions of theoretical and managerial importance. With regard to theory, the research directly examines the influence of managerially-relevant variables on consumer attitudes, perceptions and intentions. Therefore, the research offers the contribution of enhanced relevance to an already rich attitude-behavior literature stream. However, the focus on the consumer is decisively unique to the reverse channels and logistics literature that has largely ignored the behavioral dimension of the consumer. This is particularly important when one considers the pivotal role fulfilled by the consumer in the forward/reverse channel interface.

The findings of the study hold significant implications for public and private recycling managers as well as policy makers. By developing a better understanding of the factors that influence and motivate consumer recycling, the study will yield a series of recommendations helpful in the design and operation of recycling programs. These guidelines will prove beneficial to a host of interested parties, including the municipal recycling manager who must contribute to state recycling goals, the waste management company that is diversifying into recyclables collection, and the forward channel participant that can achieve a competitive advantage by taking part in recycling activities. Chapter Five will present the strategic and operational guidelines yielded from the study.

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These guidelines will give ample consideration to the location and scope of programs. One major limitation of the study, however, is the lack of explicit economic measurement of costs and revenues associated with a specific program design. Essentially, the research can help program managers to design an effective, efficient method of collection, yet it is the responsibility of a manager to rationalize the appropriate level of service to offer under a given economic structure of investments and returns.

RESEARCH ORGANIZATION

The remainder of this research is organized into Chapters Two through Five. Chapter Two examines the relevant literature streams within the broad areas of marketing management of recycling programs and consumer research of recycling behavior. Chapter Three presents an overview of the research methodology, reviewing research objectives, presenting operational definitions, outlining data collection methods, and delineating analytical methods applied in the study. Chapter Four presents the research results. It presents each research question individually and discusses the statistical analyses or logic utilized, and interprets the findings. Chapter Five presents the research conclusions and implications, elaborating on contributions, managerial and public policy implications, and directions for future research.

Table

Alaska
Alabama
California
Colorado
Connecticut
Delaware
Dist. of Columbia
Florida
Georgia
Hawaii
Idaho
Illinois
Indiana
Iowa
Kentucky
Louisiana
Maine
Maryland
Massachusetts
Michigan
Minnesota
Mississippi
Missouri
Montana
Nebraska
Nevada
New Hampshire
New Jersey
New Mexico
New York
North Carolina
North Dakota

APPENDIX TO CHAPTER 1

Table 1.2 Statewide Solid Waste Recycling/Reduction Goals

State	1996 Recycling Rate	Goal (%)	Deadline	Type of Goal		
				Recycling/ Diversion ^a	Waste Reduction ^b	Both
Alabama	20	25	-			x
Arkansas	36	40	2000	x		
California	26	50	2000		x	
Colorado	17	50	2000	x		
Connecticut	23	40	2000			x
Delaware	21	25	2000	x		
Dist. of Columbia	8	45	1994	x		
Florida	40	30	1995	x		
Georgia	33	25	1996		x	
Hawaii	23	50	2000			x
Idaho	-	25	1995	x		
Illinois	23	25	2001	x		
Indiana	23	50	2000		x	
Iowa	30	50	2000		x	
Kentucky	18	25	1997		x	
Louisiana	15	25	1992	x		
Maine	33	50	1998	x		
Maryland	27	20	1994	x		
Massachusetts	33	46	2000	x		
Michigan	25	50	2005	x		
Minnesota	46	50	1996	x		
Mississippi	12	25	1996			x
Missouri	26	40	1998		x	
Montana	5	25	1996		x	
Nebraska	26	50	2002		x	
Nevada	12	25	1995	x		
New Hampshire	20	40	2000		x	
New Jersey	43	60	1995	x		
New Mexico	12	50	2000	x		
New York	32	50	2000			x
North Carolina	22	40	2001		x	
North Dakota	27	40	2000		x	

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Table 1.2 (cont'd)

State	1996 Recycling Rate	Goal (%)	Deadline	Type of Goal		
				Recycling/ Diversion	Waste Reduction	Both
Ohio	15	25	2000			x
Oregon	29	50	2000	x		
Pennsylvania	20	25	1997	x		
Rhode Island	23	70	-	x		
South Carolina	27	30	1997			x
South Dakota	38	50	2001		x	
Tennessee	40	25	1995		x	
Texas	-	40	1994			x
Vermont	30	40	2000			x
Virginia	35	25	1995	x		
Washington	39	50	1995	x		
West Virginia	13	30	2000		x	
Wyoming	4	35	2005	x		

^a includes recycling, composting and source reduction

^b refers to a reduction in volume from disposal facilities from a baseline year.

^c six states that do not appear in the table have no formal recycling goals as of May 1997

^d no new goals have been established for those states with past deadlines

Table adapted from Goldstein and Glenn (1997), p. 71

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CHAPTER 2: LITERATURE REVIEW

INTRODUCTION

Chapter Two presents and synthesizes the research streams related to the proposed study. This chapter segments the literature into two broad areas: 1) marketing management of recycling programs, and 2) consumer research of recycling behavior. This review of the literature identifies the contributions of influential pieces of research in these two distinct areas, identifies a variety of relevant streams, synthesizes previous contributions, then identifies the issues resolved through the current research. Finally, the chapter discusses anticipated contributions of the research to theory and practice.

MARKETING MANAGEMENT OF RECYCLING PROGRAMS

This research suggests that recycling program participation is a marketing transaction. As noted in the introduction to the study, the consumer of products in the typical, forward channel of distribution possesses the material residues of purchases that may be of value to industrial channel entities. Industrial entities therefore must make an effort to re-acquire these materials for recycling and reuse in the manufacture of new products. While the motivations for participation and the economies of distribution often contrast in the forward and reverse channel flows, it is apparent that basic marketing concepts find application in the reverse setting too.

This section of the review examines literature that directly addresses the managerial aspects of recycling programs. Examining the means by which private and public entities manage the transaction receives particular emphasis. It is first suggested that recycling programs represent a marketable product by way of the customer service delivered to consumers. The second area addresses the various efforts that program

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managers and policy makers utilize to garner participation in recycling programs. The third area closely examines the reverse channels and logistics literature. Finally, a summary provides concluding thoughts for this section of the review.

THE RECYCLING PROGRAM AS A MARKETABLE SERVICE

The societal benefits of recycling and the disappointingly low levels of participation associated with many programs are topics addressed in the introduction to this study. Helping consumers realize the consequences of inaction and efforts to change behavior are primarily addressed from a psychological perspective. The next major section of this review examines this perspective and its robust literary contributions. Shrum et al. (1994) suggest, however, that the psychological perspective is unnecessarily restrictive. Rather, these authors propose that recycling programs themselves represent products, or rather services. Selling the recycling concept to consumers, therefore, presents a marketing problem. The proposed research positions the amenities of convenience as the primary service rendered by private and public recycling entities.

Given that recycling programs can be viewed as services, one might ponder whether the evaluation criteria of recycling programs are similar to those of “typical” products. Jahre (1995) lends insight to this dilemma by suggesting that recycling programs have two major performance measurements. The most obvious measure is the cost associated with program operations. The second measure is customer service. While a fixture in the assessment of product delivery in the forward channel, customer service is often overlooked in the collection of recyclables. However, if municipalities and industry are serious about collecting recyclable materials for reuse, they must concern themselves not only with the first measure but also the second. That is, concerned

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channel entities must make an effort to identify and meet the demands of consumers who supply secondary raw materials in order to garner their participation.

Customer service is the output or result of logistics activities (Ballou 1992). This certainly holds true in the reverse channel of recycling as well, where logistics activities represent a large bulk of the total cost of recycling (Kopicki et al. 1993). As noted above, customer service in the recycling setting is exemplified primarily by the convenience that recycling entities offer the consumer. For instance, customer service for a recycler is demonstratively low when he must transport materials long distances to a recycling collection point. Customer service may also be considered poor when the collection point is rarely open for business. Likewise, customer service may be poor for the consumer that must extensively sort materials or facilitate the storage and movement of materials without the assistance of plastic storage bins. These dimensions of convenience represent customer service offerings that are critical in the consumer's decision to recycle. Convenience, therefore, represents a fundamental element of the marketable service and is a focal construct of this research.

Similar to the forward channel, identifying the proper balance between cost and service is of great importance in the reverse channel of recycling. Just as Bowersox pointed out in 1969 with regard to physical distribution in the typical, forward channel, firms have traditionally viewed logistics as a necessary cost of doing business -- a cost to be minimized. While many firms in the forward channel have repositioned logistics as an important means of differentiating themselves from competition by offering superior customer service, most firms involved in the collection of recyclables primarily view their logistics activities as costs to be minimized. This holds true for both private and public

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entities. Reverse channel participants that operate in this manner are primarily assuming a reactive posture toward compliance with legislative forces (Kopicki et al. 1993). These entities see little value in delivering value-added service to consumers, and seek instead to minimize their investment.

Another segment of firms, however, is embracing the opportunities offered by the green consumer movement. These proactive firms may be seeking to preempt the onslaught of further environmental legislation or perhaps to favorably influence future legislation in a way that provides competitive advantage (Kopicki et al. 1993). Still others assume a proactive stance to build an environmentally responsible image (Eisenhart 1990; Guintini and Andel 1995). An individual representing a Fortune 20 company cites the multifaceted benefits of assuming a proactive stance on the environment in the following dialogue:

“Environmental protection and competitiveness are not mutually exclusive. When environmental regulations apply to everyone, the company that meets them most effectively has a cost advantage over those that do not. Environmental performance is a new business variable that will be with us from now on. Companies that drag their heels and view it as a burden will chase numbers from year to year and just get by. Companies that see environmental performance as an opportunity to innovate and leap ahead of the competition will gain.”

- Dr. Kaahr, Vice President of Environmental Policy, DuPont
(in Kopicki et al. 1993, p. 61)

Regardless of motivation, proactive firms are characterized by their voluntary extension of services beyond those mandated by law.

Yet another segment of firms represents what Kopicki et al. (1993) refer to as “value-seeking” firms, representing those that are even more progressive in their

environmental beliefs than the proactive segment. These firms position environmental activities at the core of their business strategy and make efforts to minimize environmental impacts throughout their operations. Value-seeking firms concern themselves with designing products for disassembly, recycling and reuse as well as creating competitive advantage by instituting responsive reverse distribution programs (Kopicki et al. 1993; Wu and Dunn 1995).

Unfortunately, research to support the claims posited by progressive environmental firms is far short of achieving generalizability. Rather, findings are anecdotal in nature or based on limited case studies (Goldsby and Goldsby 1997). Therefore, it is clear that customer service is a central consideration in the development of effective recycling programs, but determining the appropriate level of service given the subsequent costs is a dilemma that remains elusive to most firms in the reverse channel.

EFFORTS TO ACHIEVE PROGRAM PARTICIPATION

As the previous section alluded, achieving consumer participation in a recycling program is comparable to achieving sales in a forward channel situation. Private and public entities often find that they must market programs just as manufacturers and merchandisers market their products and services. Where participants in the forward channel have the marketing mix variables at their disposal to help generate sales, public and private entities often have a number of controllable variables at their disposal to garner participation as well. This section illustrates the various influences and components of customer service and other marketing variables available to recycling programs. Everett (1996-97) presents a typology of program incentives and strategies that encourage program participation. He categorizes these efforts into four broad areas:

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1) market incentives, 2) coercive incentives, 3) program promotion, and 4) convenience strategies. Each of these areas receives a brief treatment below.

Market incentives represent any form of economic return offered for participation in a given recycling program. These returns may include the direct payment for recyclable materials, deposits paid for returnable containers, or unit pricing schemes for diverting materials from the waste stream (Everett 1996-97). Until recently, the market value for most reusable materials was so low that it prohibited direct payment schemes, with steel and aluminum representing the two materials that have maintained consistent market value over time. One must keep in mind that the value of recyclable materials has a number of determinants, including: 1) the demand for recyclable materials that, in turn, is derived from demand for products made of recycled content, and 2) the supply of the material. Fortunately, the number of uses and demand for products consisting of recycled content have exploded in recent years (Nulty 1990; Ottman 1992). However, acquiring consistent, high-quality supplies has been difficult for many manufacturers (Chandrashekar and Dougless 1996).

In order to better develop the market for recyclable materials and to achieve market stability and efficiency in the process, the Chicago Board of Trade (CBOT) opened a recyclables exchange to help link buyers to suppliers. This much needed market mechanism offers the promise of a continuous supply of various high-quality recyclable materials to meet the needs of manufacturers (Chandrashekar and Dougless 1996). With the advent of these developments and continued popularity of products made of recycled content, there is the potential for direct payments in the future. Until direct consumer payments become prevalent, however, municipalities will continue to benefit by

generating revenues on the front end through the acquisition of collection fees as well as on the back end through the sale of materials.

Bottle bills, on the other hand, have created an artificial market for returnable beverage containers. This artificial market establishes specific monetary rates for the return of legislatively-mandated product containers. These schemes rely on the upfront payment of a deposit amount by consumers with redemption of the deposit typically occurring at a retail location. Since Oregon passed the first statewide bottle bill in 1972, nine other states have followed (see Table 2.1 below). There has been much discussion in recent years of a nationwide bottle bill, though lobbying efforts have been successful in limiting support for these legislative acts (Alter 1993; McDonald and Prince 1991; Shireman 1992). Firms forced to comply with bottle bill legislation naturally tend to view the associated costs of compliance as an unnecessary cost of conducting business. Unfortunately, as beverage distributors have realized, efforts to gain efficiencies in the forward channel are rarely complemented by efficiencies in the reverse flow of materials (Lesser and Madhavan 1987).

Rather substantial literature addressing the effectiveness of bottle bills emerged soon after the implementation of the first legislative actions. Independent evaluations of these bills' successes have reported mixed findings. Five years after the enactment of Michigan's bottle bill, Porter (1983) found that the legislation had resulted in an 85 percent reduction in beverage litter and a deposit redemption rate of more than 90 percent. These benefits cost \$11.08 per person annually. A more recent study conducted by Closs, Cooper and Goldsby (1997) found that the costs absorbed by Michigan distributors and retailers in compliance with the state's bottle bill totaled \$168 million

each year. This figure

\$76.50 per household

Table 2

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each year. This figure amounts to approximately 4.43 cents per container, or roughly \$76.50 per household annually when consumers absorb these costs.

Table 2.1 Survey of State Bottle Bill Laws

Bottle Bill State	Redemption Value per Container (\$)	Date of Implementation
Oregon	.05	October 1972
Vermont	.05	September 1973
Maine	.05	January 1978
Michigan	.10	December 1978
Iowa	.05	July 1979
Connecticut	.05	January 1980
Delaware	.05	July 1982
Massachusetts	.05	January 1983
New York	.05	September 1983
California	.01	September 1987
Florida	.01	October 1993

Sources: Levitt and Leventhal (1986); Martin (1994); Moore and Scott (1983); Naughton et al. (1990)

California has instituted a system very different from that of Michigan and other bottle bill states. In particular, under California's Beverage Container Recycling and Litter Reduction Act (AB2020), the state assumes most of the responsibility for container collection by establishing redemption centers at locations within one-half mile of all supermarkets with annual sales of over \$2 million. Therefore, retailers and distributors are not responsible for collecting, storing and moving containers in California as they are in other bottle bill states (Naughton et al. 1990).

In the most recent bottle bill to become law, Florida applies the legislation not **only** to beverage containers but to a wide range of food containers. Under the Florida **system**, manufacturers and distributors have the unique opportunity to achieve exemption

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status from the law if they can either sustain a 50 percent return rate on their containers or demonstrate that their product containers have a certain amount of recycled content (recycled content percentages vary by material). The Florida Department of Environmental Protection approved over 60 percent of the 173 petitions for exemption by mid-year 1994, demonstrating proactive effort on the part of Florida food and beverage manufacturers (Martin 1994).

The differences do not rest with collection methods, however. The redemption value for containers in California and Florida is a mere penny per container. This is in stark contrast to the dime offered (and charged) to Michigan consumers and the nickel in all other bottle bill states. In addition to facilitating container collection, however, California has also actively assured the subsequent recycling of collected containers through the subsidization of processors and recyclers when necessary. In comparison to the Michigan statistics delineated above, California has achieved a 29 percent reduction in litter with a return rate of approximately 57 percent. These successes have occurred at an average cost of \$6.16 per household (in 1988 dollars) (Naughton et al. 1990). As the Michigan and California cases demonstrate, state legislation has generally been effective in reducing container litter, and total solid waste to a degree, but at a significant cost to all parties involved.

Unit pricing schemes, meanwhile, encourage the minimization of waste by charging consumers and businesses for garbage collection services based upon either the weight or volume of the waste collected. Materials set out for recycling or composting, however, are typically free from these charges (Riggle 1989). Thogersen (1994) tested the effect of differentiated garbage fees, and economic incentives in general, and found

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that these incentives often cause program participants to reframe the situation so that they focus on the potential monetary gains rather than the moral obligation to participate. This reframing can often result in behavior that is undesirable. For instance, Thogersen (1994) presents the example of beverage container “scavengers” in New York City that empty trash bins into the street in search of the valuable commodities.

Coercive incentives represent efforts to insist on desired behavior under the force of law. The use of warnings, fines or the refusal of collection service when recyclables are intermingled with garbage represent efforts to ensure compliance (Everett 1996-97). Approximately half of all U.S. curbside collection programs required mandatory participation in 1989 (Glenn 1989). Most programs developed since then, however, assume a posture of voluntary participation (Glenn 1990). Participation rates are much higher under the mandatory schemes, though Everett (1996-97) suggests that increased participation levels should not be credited to the punishments associated with non-compliance, since the laws are rarely enforced, but rather to the increased publicity and greater government commitment found in mandatory initiatives.

Program promotion strategies serve a two-fold purpose. On one hand, they make potential participants aware of the personal and societal benefits of recycling. Everett (1996-97) describes the array of promotion techniques meant to encourage behavior as ranging from personal, direct appeals to mass media efforts in newspaper, radio and television. Everett and Pierce (1991) report that personal communications, followed by informative fliers, tend to be the best approach to evoke participation. On the other hand, promotion strategies may also be directed toward instructing participants of the proper methods involved with action -- describing where, when and how to participate.

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Convenience strategies are the embodiment of customer service in the consumer recycling setting. These efforts essentially make it easier for the consumer to participate in the program, lowering his personal cost of action. Managers can enhance convenience by providing any one or combination of the following: 1) closer proximity, 2) higher availability with regard to hours of operation, and 3) minimal complexity in sorting and storage for consumers (Pieters 1991). Everett and Pierce (1991; 1993) utilize a similar characterization of convenience but consider a reliability factor in collection performance as well. With regard to each factor, Everett (1996-97) summarizes the findings of numerous studies to note that the highest level of convenience, and subsequently high rates of participation, result from programs that offer 1) a limited number of material categories, 2) curbside collection, 3) rigid containers for storage and movement, and 4) reliable collection occurring anywhere from once per week to once every four weeks. The operationalization of the convenience construct in the proposed study is discussed in Chapter Three.

Again, making a recycling program more convenient results in higher customer service, effectively altering the product offering itself. Significant discussion has emerged over the past 20 years regarding who should perform the various functions that ultimately deliver a specific level of convenience, or customer service, to the program participant. This stream of investigation addresses the reverse flows in channels and logistics, and represents the most abundant source of managerial insight into recycling.

The section below provides a more detailed discussion of the flow patterns, membership, and specific functions performed in the reverse channel of distribution.

THE REVERSE CHANNELS AND LOGISTICS LITERATURE

The reverse channels of recycling first gained attention with the work of Zikmund and Stanton (1971) more than 25 years ago when they noted that the contributions of consumers to recycling programs represented a unique channel of distribution. Their identification of “backward channels” and reverse distribution as areas in need of further investigation resulted in a worthy, though brief, series of contributions to the literature. However, as popular interest in the ecology waned during the carefree consumption years of the 1980s, so did interest in reverse channels research. The momentum has shifted again in the 1990s in favor of environmental awareness, and now holds promise for sustained interest in the future. In fact, many general business authors and practitioners now view environmental conscientiousness as a fundamental requirement of business conduct in the modern age (LaLonde 1995; Porter 1991). Recycling and the development of reverse channels of distribution are being viewed as primary means of integrating economic and ecological needs (Fuller 1994; Fuller et al. 1996). Therefore, reverse channels and logistics are yet again receiving substantial research attention.

Proof of this renewed interest is the white paper devoted to the topic of reverse logistics sponsored by the Council of Logistics Management and written by James Stock (1992). The book has the primary purposes of defining and describing the basic characteristics of existing operations, and also serves as a ready reference for relevant literature and industry contacts. The description of basic operational characteristics, however, is not a unique contribution to the literature. In fact, descriptive explanations of

reverse channel flows and operations represent the bulk of the literature in this area. The next two sections overview this stream of investigation and conclude this part of the literature review by identifying managerial areas in need of further investigation.

Characteristics of the Reverse Channel of Recycling

The terms “reverse channels,” “reverse distribution” and “reverse logistics” are often used interchangeably in the literature. Discussions of “channels” and “distribution” typically make particular reference to the *entities* involved, while “logistics” addresses the *operations* of interest. An often-cited definition of the “reverse” or “backward” channel is “[the series of entities] which returns the reusable packaging and other waste products from the consumer to the producer” (Zikmund and Stanton 1971, p. 35). According to Stock (1992), “reverse logistics” assumes a broader perspective, referring to the role of logistics in recycling, waste disposal and management of hazardous materials. An even broader view of reverse logistics considers the activities involved in the collection and movement of defective and returned goods (Bowersox and Cooper 1992; Bowersox and Closs 1996).

While it is clear from the above definitions that the nature of the products handled in the reverse channel is different from those of the forward channel, it is worthwhile to identify other differences that exist between the two flow patterns. One way to identify these differences is to utilize Alderson’s (1954) typology of channel activities, the four sorting processes. These four processes are: sorting out, accumulation, allocation and assortment. A brief description of these activities in both the forward and reverse channels helps to distinguish differences between the two flows.

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The first sorting process in the channel, *sorting out*, refers to the segmentation of small heterogeneous stocks into small homogenous groups (Alderson 1954). Manufacturers in the forward channel sort out, or standardize, when they separate defective goods from non-defectives. Likewise, household recyclers sort out materials when determining what to contribute to the waste stream (throw away) and what to maintain for recycling. Further sorting out may occur when recyclers separate various recyclable materials from one another using segmented storage bins for collection purposes.

The second sorting process, *accumulation*, entails the gathering of similar stocks into larger homogeneous bundles, typically for gaining efficiencies in processing or transportation (Alderson 1954). Accumulation serves the purpose of bringing products closer to the end user market, but in a far more efficient manner than direct distribution. Manufacturers in the forward channel often perform this activity themselves by utilizing their own network of distribution centers. In other cases, they may utilize brokers or turn ownership over to wholesalers. In reverse channels, however, channel intermediaries (middlemen) typically assume significant involvement in this stage. For instance, material recovery facilities (MRFs) owned by private or municipal parties accumulate similar, small bundles of materials from thousands of household “suppliers” in curbside, dropoff, and retail collection methods. The economies of scale and scope available by middlemen in the reverse channel make their involvement imperative in this early stage of the reverse channel (Barnes 1982).

The next step in the channel’s sorting process, referred to either as *allocation* or *breaking bulk*, involves gathering a variety of large homogenous supplies to create large

heterogeneous groups. In the forward channel, breaking bulk is typically the responsibility of wholesale intermediaries who gather the product assortments offered by multiple manufacturers for successive distribution to retailers. The material recovery facility (MRF) performs this process as well in the reverse channel, gathering a variety of large homogeneous supplies of paper, plastic, aluminum and other recyclable materials.

The final step, *assortment*, is the effort to match the heterogeneous demands of buyers with an assortment of heterogeneous supplies. Retailers typically personify the assorting function in the forward channel by holding small stocks of numerous, perhaps several thousand, different products and stockkeeping units (SKUs) for consumer acquisition. Intermediate processors (recyclers) perform a similar task in serving the needs of manufacturers in the reverse channel. Plastic recyclers, for instance, meet this obligation by providing a variety of resins and qualities to match the needs of their industrial customers. A number of manufacturers perform this function themselves. Figure 2.1 summarizes these processes in the forward and reverse channels.

A number of worthwhile conclusions emerge from this examination of processes in the forward and reverse channel. It is apparent that forward and reverse channels both utilize the full scope of sorting activities, though the responsibilities assigned to channel members differ across the two settings. In particular, it is clearly important that channel intermediaries (material recovery facilities) be readily available to consumers in the reverse channel in order to ensure an efficient flow of materials in the early stages of the channel.

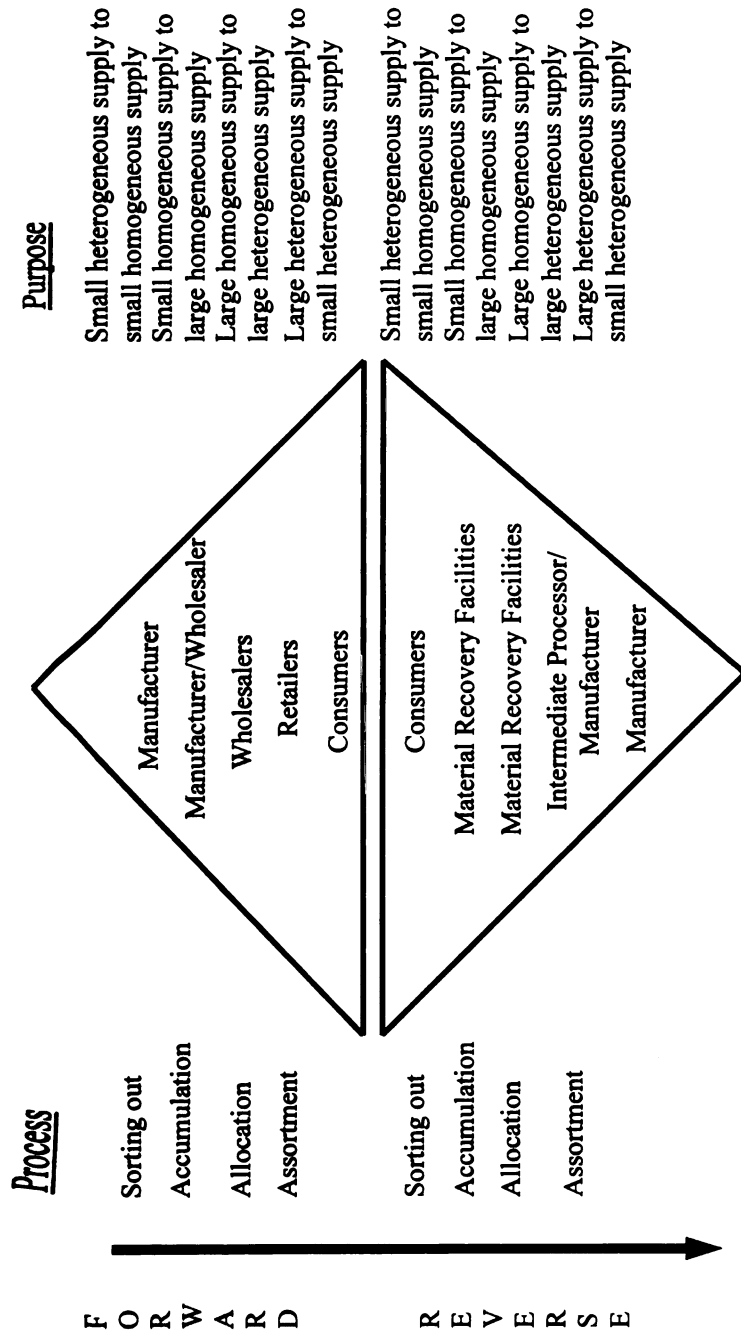


Figure 2.1 The Sorting Process in Forward and Reverse Channels

As Ginter and Starling (1978) point out, the obvious difference between the two settings is the fact that there are many, perhaps millions of small suppliers (forward consumers) of materials for each “manufacturer” (process intermediary) in the reverse channel. This creates significant opportunity for intermediaries who serve the purpose of “amassing large quantities of recyclable and reusable materials, [which is] a prerequisite to efficient and profitable recycling” (Ginter and Starling 1978, p. 76). Barnes (1982) concurs by saying that intermediaries are a must for the backward flow of materials to occur “with any degree of efficiency” (p. 33). It is also clear that significant cost savings can be generated if the consumer assumes greater responsibility in the sorting out activity, and doing so properly to reduce material contamination (Jahre 1995).

Channel Design and Separation in the Recycling Setting

Several authors have categorized the reverse channels of recycling according to the configuration of channel intermediaries that facilitate the movement of recyclables from consumers to end users (manufacturers). Zikmund and Stanton (1971) were the first to categorize channels in this manner. They identified the fact that consumers may directly contribute materials to manufacturers (without the use of intermediaries) or that they may utilize a network consisting of one or more of the following intermediaries: 1) “atypical” intermediaries such as ecologically concerned civic and community groups), 2) traditional middlemen, or 3) trash-collection specialists.

A number of other descriptive studies have utilized similar categories to demonstrate the variety of reverse channel configurations (see Fuller 1978; Pohlen and Farris 1992; Stock 1992). Fuller, Allen, and Glaser (1996) provide a more up-to-date categorization in their identification of five modern channel networks. These five

networks and an example of each include: 1) corporate-integrated networks (e.g. “buy-back” programs), 2) waste hauler-public recovery networks (e.g. curbside programs), 3) specialized reverse dealer-processor networks (e.g. “mom and pop” collectors to large corporate processors), 4) forward retailer-wholesaler networks (e.g. bottle bill systems), and 5) temporary/facilitator networks (e.g. civic groups and for-hire intermediaries).

Interestingly enough, the channel networks identified by Fuller et al. (1996) reflect only the physical flow of materials in the logistics channel. While the authors acknowledge the critical role that public policy has played in generating both the supply and demand for recyclables, little explicit discussion is directed toward the marketing channel. The marketing channel consists of entities responsible for negotiating, contacting, and administering the transaction (Bowersox and Cooper 1992). Many of these marketing responsibilities have historically rested with policy makers who have initiated legislation to facilitate the exchange. Municipalities often hire third parties to provide curbside or dropoff service and charge consumers for the service through property taxes. In bottle bill states, distributors charge retailers for the service through higher product prices. Retailers then charge consumers (above and beyond the deposit amount) in order to finance the retail collection operations and higher purchase prices they receive from distributors.

By examining the physical and financial flows in these settings, it is suggested that channel separation exists in the municipal curbside and dropoff programs and not in commercial collection programs. In the municipally arranged programs, consumers pay city government that then pays third parties to perform the collection activity. In commercial collection programs such as those mandated by bottle bills, the financial

flows mirror the physical flow of materials. The distinction between marketing and logistics responsibilities has yet to receive considerable treatment in the reverse logistics literature, however.

While it is worthwhile to acknowledge the roles various parties play in the marketing and logistics systems, one should keep in mind that no single channel member is more important in the reverse channel than the forward channel consumer. Unless the consumer acts accordingly by making recyclables available for further utilization, there is no supply for remanufacturing. Sharing in importance, of course, is the ultimate user of recyclable materials. There must be demand for the materials in the first place.

Interestingly, these endpoints represent the entities that have received the least attention in the reverse channel literature. Rather, channels researchers have opted to yield descriptive studies of channel configurations, focusing largely on intermediaries. While these studies serve a definite purpose, it is clear that further investigation of the critical roles of consumers and manufacturers is necessary to better understand the dynamics of reverse channels. Pieters (1991) points out that not only is the consumer's role overlooked in research, but that many managers fail to consider the actions expected of consumers. Appreciating the critical role of consumers, this study proposes methods that generate higher consumer participation in municipal and commercial recycling programs. By achieving greater program participation, ready volumes of supplies are available to manufacturers that use secondary raw materials.

CONCLUSIONS OF THE MARKETING MANAGEMENT LITERATURE

A review of the marketing management literature lends considerable insight when approaching the central research questions of the study. Among these insights, the review

suggests that recycling programs represent marketable products, and as a marketable product, customer service is an important element of the product offering. In addition to the customer service offered to consumers by way of convenience strategies, program managers and policy makers have at their disposal to achieve program participation. These strategies include marketing incentives, coercive incentives and program promotion strategies. Clearly, as in the marketing and logistics of typical finished goods, there is a tenuous balance between meeting the needs of consumers and the costs incurred in fulfilling these demands. Often times, firms and municipalities participate in recycling programs not because of their proactive nature but rather as a mandatory reaction to legislative influence. These organizations typically seek only to minimize their investments in compliance with these mandates. A number of firms and municipalities, however, are realizing the tremendous opportunities vested in the green movement and readily making investments with full expectation of generous returns.

Research examining reverse channels as a whole, has been descriptive and focused on the specialized roles of intermediaries. The roles of consumers in supplying materials, and manufacturers in demanding these materials, have been ignored. Theory that addresses these gaps in the research has promise for yielding considerable contributions to research and practice. As a note of caution, Zikmund and Stanton (1971) point out that the level of generalization that can be achieved in reverse channels is somewhat limited. As in the forward channel, the optimal channel design is likely to be dependent upon the characteristics of the product (namely, product value), the location of markets, the level of control desired, and the balance of power among channel entities. Therefore, findings are likely to be somewhat specific to materials, locations and markets.

The level of generalizability for reverse channels across these dimensions has not been addressed in the literature.

CONSUMER RESEARCH ON RECYCLING BEHAVIOR

For decades, consumer research has examined how and why consumers act as they do in the marketplace. In particular, the principal area of emphasis among marketing researchers has been the consumers' behavior directed toward purchasing products (Pieters 1991). Interest has broadened more recently, however, to deeply consider the consumer's thoughts and actions *after* the product purchase. One such area of interest focuses on the decision that consumers ultimately face upon acquiring and retiring a product or service. The decision is whether to dispose of the product and packaging through conventional waste collection methods or to contribute the product to a recycling program.

As indicated in the Introduction chapter, municipal recycling programs are on the rise throughout the United States. A vast majority of U.S. citizens have the opportunity to recycle everything from newspapers to car batteries by participating in publicly and privately sponsored recycling programs. Disappointingly, participation in recycling programs time and again fails to achieve potential levels. Participation rates vary by location but in one recent study, Everett (1996-97) found that 97 percent of respondents to his survey indicated that they agreed with the statement that "recycling is good," but only 69 percent of those surveyed actually participated in the municipal recycling program. Again, findings such as these are very common.

Despite outreach efforts on behalf of public and private enterprise, recycling has failed to achieve expected levels of participation in the U.S. As demonstrated in the example above, environmental consciousness has grown and people support environmental action, but behavior itself has fallen short of anticipated levels. The resultant environmental attitude-behavior (A-B) inconsistency has served as the impetus for a volume of research directed toward solving the problem.

Consumer research that has sought to explain recycling behavior is segmented according to the proposed antecedents of the behavior. The first group of studies embraces intrinsic motives to the behavior. The second group emphasizes extrinsic motives to recycling behavior. A thorough discussion of these two broad groups appears below.

INTRINSIC MOTIVES OF RECYCLING BEHAVIOR

Intrinsic motives refer to the characteristics inherent within the individual that guide his behavior (Guagano et al. 1995). These motives include the actor's demographics and psychographics. The next two sections of the review discuss relevant findings within these areas.

DEMOGRAPHICS

One variant of recycling research has examined consumer participation according to such predispositional characteristics as age, gender, income, and education. The primary purpose of this research is to identify segments of the population that are likely to react to recycling alternatives in a similar manner (Shrum et al. 1994). It is believed that should clear segments of the population emerge with similar recycling thoughts and

actions, then specific program implementations might better, and more efficiently, meet the recycling needs of those potential participants. Table 2.2 overviews the research using demographic characteristics as independent, predictor variables of recycling behavior.

Table 2.2 Demographic Variables as Predictors of Recycling Behavior

Demographic Variable	Study	Hypothesis	Finding
Age	Vining and Ebreo (1990)	-	+
	Oskamp et al. (1991)	-	0
	Granzin and Olsen (1991)	-	+
Education	Vining and Ebreo (1990)	+	0
	Oskamp et al. (1991)	+	0
	Granzin and Olsen (1991)	+	0
Socioeconomic status/Income	Jacobs et al. (1984)	+	+
	Vining and Ebreo (1990)	+	+
	Oskamp et al. (1991)	+	+
	Granzin and Olsen (1991)	+	0
Marital status	Granzin and Olsen (1991)	Married	0
Gender	Granzin and Olsen (1991)	Females	+
Race	Ellen et al. (1991)	0	Whites
Media attentiveness	Granzin and Olsen (1991)	newspapers	+
	Corral-Verdugo (1996)	newspapers	+
Liberal political orientation	Oskamp et al. (1991)	+	0
	Ellen et al. (1991)	+	-
Presence of children in household	Oskamp et al. (1991)	+	0
	Granzin and Olsen (1991)	+	0
Single-family living	Oskamp et al. (1991)	+	+
	Granzin and Olsen (1991)	+	+
Home ownership	Oskamp et al. (1991)	+	+

(+) = positive effect, (-) = negative effect, (0) = no effect

The research studies described in the table fail to yield a consistent pattern of behavior based solely on the proposed set of demographic variables. If one characterized active recyclers based on these studies, he might conclude that older, white, high-income

females who read newspapers and own single-family homes represent the group. Unfortunately, the literature lacks the depth and replication to make such a conclusion. Rather, results in this area are what Shrum et. al (1994) refer to as “ambiguous, if not contradictory” findings when demographics serve as predictors of various environmental behaviors (p. 396).

One shortcoming associated with this stream of research is that the studies typically examine only a single setting (Pieters 1991; Pelton et al. 1993). That is, few studies have tested the hypothesized relationships across multiple settings simultaneously. Rather, there is the assumption that the chosen setting is representative of a larger geography. When findings vary across different settings there is the uncertainty associated with determining whether the differences result from location effects or the specific operationalization of the study. In other words, when findings conflict, we must wonder whether the subjects differ or whether the studies themselves differ. Applying a uniform study to multiple settings would help to determine the true nature of these differences. It is possible, for instance, that residents of larger cities receive greater exposure to recycling alternatives and, therefore, are more likely to participate in a given recycling program.

PSYCHOGRAPHICS

A far more extensive stream of consumer research examines the psychographic antecedents to recycling behavior. Psychographic analyses focus on the individual's attitudes, beliefs, and values. These traits, too, are inherent to the actor though they change over time or as a result of persuasive arguments (Petty and Cacioppo 1986). This stream of research is more insightful than that consisting solely of demographic predictor

variables. While psychographics may not be as easily identifiable as demographic variables to the casual observer, psychographic information can help to “flesh out the consumer in a way that is impossible with sterile demographics alone” (Shrum et al. 1994, p. 402). Rather, psychographics enable one to deeply understand the targeted consumer and perhaps act in an appropriate manner to conduce desired behavior.

The relationship between attitude and behavior is perhaps the most studied relationship in all of social psychology (Shrum et al. 1994). This certainly holds true in recycling behavior research. Table 2.3 presents a chronological survey of the psychographic literature devoted to recycling behavior literature. Much of the research focuses on attitudinal influences on recycling. While it is clear that researchers uniformly hypothesize that a favorable attitude toward the environment and/or recycling should lead to consistent recycling behavior, the sum of research investigations has yet to yield congruous support for the relationship (Shrum et al. 1994). Hines, Hungerford, and Tomera (1987) report an average correlation between broader environmental attitudes and environmental behavior of approximately 0.3.

There are a number of reasons offered for the apparent attitude-behavior inconsistency. One common problem alluded to in recent meta-analyses is the lack of correspondence between the nature and measurement of the attitude and behavior constructs (Shrum et al. 1994). As many authors on the subject have indicated, there may be little direct relationship between a person's general level of concern and his willingness to act in a specific manner (Ajzen and Fishbein 1974, 1977; Bagozzi and Burnkrant 1979). That is, one must carefully measure specific attitudes to match specific actions. Hence, as Shrum et al. (1994) point out, general pro-environmental attitudes may

Table 2.3 Chronology of Psychographic Predictors of Recycling Behavior

Study	Independent Variables	Mediators/ (Moderators)	Dependent Variable (measurement method)
DeYoung (1986)	Satisfactions from: Frugality (+)+ Self-sufficiency (+)0 Participation (+)+ Luxuries (-)0		Recycling behavior (self-reported)
Oskamp et al. (1991)	Proecological attitudes (+)0 Environmental consciousness (+)0 Intrinsic motives (+)+ Efficacy (+)0 Attitude toward recycling effectiveness (+)0 Liberal political orientation (+)0 Pro-governmental involvement (+)0 Knowledge about conservation (+)+ Other environmental behaviors (+)0 Past recycling for cash (+)0 Recycling by peers (+)+		Recycling behavior (self-reported)
Ellen, Wiener and Cobb- Walgren (1991)	Perceived consumer effectiveness (+)+ Concern for the environment (+)+		Recycling behavior (self-reported)
Bagozzi and Dabholkar (1994)	Attitude toward the act of recycling (+)+ Subjective norms (+)0 Attitude toward the act of recycling (+)+ Subjective norms (+)0 Past behavior (+)++		Behavioral intention to recycle

(+) = positive effect, (-) = negative effect, (0) = no effect; double signs (i.e. ++ and --) imply emphatic effect strength

Table 2.3 (cont'd)

Study	Independent Variables	Mediators/ (Moderators)	Dependent Variable (measurement method)
McCarty and Shrum (1994)	Collectivism(+) Self-gratification (+)- Fun/Enjoyment (+)+ Security (+) Collectivism(+)- Self-gratification (+) Fun/Enjoyment (+) Security (+)	Attitude, societal importance of recycling (+) Attitude, personal inconvenience of recycling (-)	Recycling behavior (self-reported)
Smith, Haugtvedt and Petty (1994)	Attitude toward the act of recycling (+) Affect (+)	(Attitude importance: low importance makes affect dominant) (Attitude accessibility: low accessibility makes affect dominant)	Recycling behavior (self-reported)
Thøgersen (1994)	Effectiveness of garbage fees (0) Equity of garbage fees (+) Mistrust of other participants (-) Perceived personal costs (-) Perceived public benefits (+)		Attitude toward differentiated garbage fees Attitude towards recycling

(+) = positive effect, (-) = negative effect, (0) = no effect; double signs (i.e. ++ and --) imply emphatic effect strength

not serve as particularly sound predictors of recycling behavior. In fact, upon closer inspection of the more than 50 studies that examined environmental attitudes and behaviors, Hines et al. (1987) found that the attitude-behavior correlation was enhanced when the measured attitude was directed toward a specific action.

A second primary reason offered for the low attitude-behavior correlation often found in recycling research is the measurement error often found in the dependent variable. Either out of necessity or convenience, the measure of recycling behavior is often provided by the research subject himself via a self-report method (Shrum et al. 1994). While the anonymity of respondents is often considered in survey research, it is not uncommon for social desirability biases to manifest in responses (Miller 1983).

Table 2.3 demonstrates that when actual behavior is measured by an independent agent (and not the subject himself), there tends to be higher correspondence between recycling attitudes and behaviors. Hines et al. (1987) derive a similar conclusion in their meta-analysis. They found that the method of measurement tended to temper the proposed relationship when self-reports were utilized in place of actual behavior. As Table 2.3 indicates, however, self-reports and survey instruments still serve as the most prominent means of gathering research data in the field. The added cost and privacy invasion inherent with auditing behavior serve as primary deterrents to measuring actual behavior.

Therefore, while the findings derived from intrinsic motives research on recycling behavior are far from conclusive, they serve as a considerable source of knowledge generated thus far on the topic. The chronology of research presented in Table 2.3 indicates that researchers appear to be converging on a set of recycler characteristics.

However, as Shrum et al. (1994) point out, the psychological perspective is too narrow for comprehensive solutions to the complete problem. While identifying the characteristics common to recyclers is a significant component, identifying practicable implementations that lead to the desired behavior represents the complement to these characteristics in generating broad consumer participation.

EXTRINSIC MOTIVES OF RECYCLING BEHAVIOR

As noted, a complementary stream of research to the intrinsic motives of recycling behavior examines the effects of events and factors that either precede or follow participation in a recycling program (Reams et al. 1996). These investigations into the extrinsic motives of recycling behavior seek to demonstrate that incentives and disincentives can enhance the participation rates of recycling initiatives. This stream suggests that managerial and public policy initiatives serve as the stimuli that directly influence behavior. Examinations that focus exclusively on the direct effects of extrinsic motives on recycling behavior are relatively few, however.

Two studies characterizing this stream of research are Luyben and Bailey (1979) and Luyben and Cummings (1981-82). The first study hypothesized, and supported, recycling behavior as dependent upon: 1) the proximity of collection alternatives, and 2) the promise of prizes. This study has one significant departure from those discussed thus far in that *group* recycling behavior was measured rather than *individual* behavior. This is acceptable since the study made no express effort to test the intrinsic motives of the individual. The second study found that the combination of informative fliers (prompts), lotteries and contest prizes resulted in increased recycling in a dormitory setting. While

the study did examine individual behavior and actually audited the behavior of subjects, the authors failed to quantify the individual effects of the various influences.

Therefore, while the literature examining the direct effects of extrinsic motives on recycling behavior is scant, the two sample studies demonstrate that external factors apparently help to shape favorable recycling results. This stream of research is to be commended as it explicitly addresses the practicable side of recycling management that is lacking in purely intrinsic studies, though the above studies fail to yield a salient theory. While the results of these studies may be useful in a particular setting, they tend to assume a descriptive posture by merely identifying factors that may or may not ultimately yield desirable behavior.

The critical pieces missing in these initiatives are the definitive hypotheses and testing of *how* the selected factors affected the dependent variable. The identification of potential influences on behavior represents a valuable start, though, it beckons an identification of the critical intervening processes. Linking managerial factors to internal, intervening determinants and ultimate behavior represents a comprehensive theory of recycling behavior. Such a theory should embody both the “mechanics” of the consumer found in intrinsics research and the implementable findings of extrinsic research. Therefore, it seems that an embodiment of the general model suggested in Figure 2.2 would best meet the complementary goals of theory and practice. Extrinsic motives serve as the stimuli that indirectly influence behavior through intrinsic motives.



Figure 2.2 Model for Practicable Theory Development

The following section describes research that has examined the combined effects of extrinsic and intrinsic motives on recycling behavior. While these investigations suggest that both intrinsic and extrinsic factors influence behavior, not all studies below follow the extrinsic-intrinsic pattern of effects illustrated in Figure 2.2. Many authors suggest that the intrinsic and extrinsic factors occur independently of one another.

COMBINED MOTIVES IN RECYCLING BEHAVIOR

The stream of research that promises the most insight into recycling behavior has combined the influences of intrinsic and extrinsic motives, examining the inter-relationships among factors that are internal and external to the actor. Table 2.4 offers a chronological survey of the literature, distinguishing intrinsic and extrinsic motives of behavior from one another, and illustrates hypothesized effects and findings.

With regard to specific relationships among extrinsic variables and recycling behavior, it appears as if *market incentives* have an influence on behavior based on the two studies that examine the relationship. Vining and Ebreo (1990) hypothesized no such relationship in their study but found there to be a definite positive relationship between the availability of monetary incentives and recycling behavior. Likewise, Pelton et al. (1993) find the same to hold true with their operationalization of rewards for participation.

Table 2.4 Chronology of Studies Utilizing both Intrinsic and Extrinsic Motives

Study	Independent Variables	Mediators/ (Moderators)	Dependent Variable (measurement method)
Vining and Ebreo (1990)	<u>Intrinsics:</u> Program knowledge (+)+ Environmental concern (+)+ Social influence (+)0 <u>Extrinsics:</u> Economic motives (0)+ Personal inconvenience (-)- Household inconveniences (-)		Recycling behavior (self-reported)
Hopper and Nielsen (1991)	<u>Intrinsics:</u> Social norms (+)+ <u>Extrinsics:</u> Block leader intervention (+)++ Prompts (fliers)(+)+ Program information (+)+	(Personal norms only affect behavior when these norms are strong)	Recycling behavior (recorded by curbside route drivers)
Granzin and Olsen (1991)	<u>Intrinsics:</u> Concern for the environment (+)0 Perceived benefits (+)+ Perceived costs of participation (-) <u>Extrinsics:</u> Personal information sources (++)++ Impersonal information sources (+)0		Recycling behavior (self-reported)

(+) = positive effects, (-) = negative effects, (0) = no effect; double signs (i.e. ++ and --) imply emphatic effect strength

Table 2.4 (cont'd)

Study	Independent Variables	Mediators/ (Moderators)	Dependent Variable (measurement method)
Goldenhar and Connell (1991-92)	<u>Extrinsics (treatments):</u> Education and feedback posters (+)+ Feedback posters (+)+ Education posters (+)0 Hypothesized direct effects on behavior: Education and feedback posters (+)+ Feedback posters (+)+ Education posters (+)0	<u>Intrinsics:</u> Attitudes (+)0 Beliefs (+)0 Behavioral intentions (+)0 Importance of recycling (+)0 Recycling knowledge(+)0	Recycling behavior (self-reported)
Pelton et al. (1993)	<u>Intrinsics:</u> Referents' attitudes toward recycling (+)+ <u>Extrinsics:</u> Opportunity to participate (+)+ Rewards for participation (+)+ Punishments for non-compliance (+)+		Willingness to recycle
Lord (1994)	<u>Extrinsics:</u> Advocacy message (+)+ Positively-framed messages (++)+ Positively-framed advertised messages (+)+ Positively-framed publicity messages (+)+ Positively-framed personal messages (++)+ Negatively-framed advertised messages (+)+ Negatively-framed publicity messages (+)+ Negatively-framed personal messages (+)0	<u>Intrinsics:</u> Attitude toward message (+)+	Recycling behavior (curbside participation audited)

(+) = positive effects, (-) = negative effects, (0) = no effect; double signs (i.e. ++ and --) imply emphatic effect strength

Table 2.4 (cont'd)

Study	Independent Variables	Mediators/ (Moderators)	Dependent Variable (measurement method)
Taylor and Todd (1995a)	<u>Intrinsics:</u> Relative advantage (+)+ Perceived task complexity (-)- Internal normative beliefs (+)+ External normative beliefs (+)+ Self-efficacy (+)+ Compatibility (+)0 <u>Extrinsics:</u> Resource-facilitating conditions (+)+	<u>Intrinsics:</u> Attitude toward the act of recycling (+)+ Subjective Norms (+)- Perceived behavioral control (+)+	Behavioral intention to recycle
Taylor and Todd (1995b)	<u>Intrinsics:</u> Personal relative advantage (+)0 Societal relative advantage (+)+ Perceived task complexity (-)+ Internal normative beliefs (+)+ External normative beliefs (+)+ Self-efficacy (+)+ <u>Extrinsics:</u> Resource-facilitating conditions (+)-	<u>Intrinsics:</u> Attitude toward the act of recycling (+)++ Subjective norms (+)+ Perceived behavioral control (+)+ (also proposed to have a (+) direct effect on behavior)+	Second-order mediator: Behavioral intention to recycle (+)+ Recycling behavior (self-reported)

(+) = positive effects, (-) = negative effects, (0) = no effect; double signs (i.e. ++ and --) imply emphatic effect strength

Table 2.4 (cont'd)

Study	Independent Variables	Mediators/ (Moderators)	Dependent Variable (measurement method)
Guagnano, Stern and Dietz (1995)	<u>Extrinsics:</u> Presence of curbside facilities (+)+ (also proposed to have + direct effect on behavior)+	<u>Intrinsics:</u> Awareness of consequences (+)+ Awareness of personal costs (+)+	Second-order mediator: Ascription of Recycling responsibility (+)+ Recycling behavior (self-reported)
Boldero (1995)	<u>Intrinsics:</u> Attitude toward recycling newspapers (+)+ Subjective norms (+)0 Perceived behavioral control (+)0 Evaluation of curbside service (+)+ (also proposed (+) direct effect on behavior)+ Past behavior (direct on behavior (+))+	Behavioral intention to recycle newspapers (+)+	Newspaper recycling behavior (audited by student relatives)
Corral-Verdugo (1996)	<u>Extrinsics:</u> Insufficient newspapers (-)- Storage space (direct effect on behavior (+))+	<u>Intrinsics:</u> Conservation motives (+)+	Recycling behavior (audited within subjects' homes)

(+) = positive effects, (-) = negative effects, (0) = no effect; double signs (i.e. ++ and --) imply emphatic effect strength

Few studies have examined the effects of *coercive incentives* on recycling behavior. In one exception, Pelton et al. (1993) found a positive relationship between punishments for non-compliance and the willingness to recycle. While the results of this one study suggest the enforcement of punitive measures under mandatory systems, the lack in replication of results offers no definitive statement on the efficacy of such punishments.

Promotion strategies offer mixed results. Most studies examined the effect of appeal efforts on recycling behavior, leaving the purely informative descriptions of where, when and how to recycle noticeably untested. In one exception, Hopper and Nielsen (1991) found that higher levels of program information led to greater recycling participation. The various appeal efforts demonstrated mixed effects on recycling behavior. Goldenhar and Connell (1991-92) found that environmental education and participant feedback interventions had hypothesized positive effects on intrinsic mediators of behavior, but that these mediators then had no effect on recycling participation. Granzin and Olsen (1991) found that the source of the appeal effort resulted in differential effects on behavior, with a strong positive effect resulting when messages emanate from personal sources. Lord (1994) looked much closer at the effects of various sources and message frames (positive versus negative) and found that only negatively-framed personal messages had no significant effect on recycling behavior.

The mixed findings associated with *convenience strategies* offer an interesting venue for further research. Vining and Ebreo (1990) found a negative, direct influence between two measures of inconvenience and recycling behavior. Pelton et al. (1993), likewise, found a positive effect between their opportunity construct and willingness to

recycle. Boldero (1995) found that insufficient storage space in the household discourages consumers from collecting newspapers and contributing these materials to community recycling programs. The results of Guagnano et al. (1995) and Taylor and Todd (1995a) provide additional insight by suggesting that intrinsic motives mediate the relationships between operationalizations of convenience and recycling behavior.

However, in the second study by Taylor and Todd (1995b) as well as that of Corral-Verdugo (1996), the authors discover a negative relationship between their respective measures of convenience and recycling behavior. Taylor and Todd (1995b) find that resource-facilitating conditions result in lower levels of perceived behavior control, a mediator of the convenience-behavior relationship. Corral-Verdugo (1996) similarly find that the presence of storage facilities in the home has a direct, negative effect on behavior. Taylor and Todd offer little post hoc explanation for the finding though Corral-Verdugo associates his finding with economic status in the Mexican setting. Corral-Verdugo implies that having the space available for storage containers in the household alludes to higher relative wealth. Higher wealth, he proposes, has a negative relationship with recycling participation.

In sum, while the studies listed in Table 2.4 provide considerable insight into the factors that may affect recycling behavior, they fail to yield a comprehensive model of recycling behavior. Rather, the individual studies tend to begin with an array of constructs (both internal and external) believed to have some tenuous effect on behavior. In turn, they tend not to reflect the extrinsic-intrinsic order of effects suggested in Figure 2.2. The section below describes two common theoretical frameworks in social science and serves as a prelude to a hypothesized model of recycling behavior.

THEORETICAL FRAMEWORKS

Tables 2.3 and 2.4 above illustrate that the number and variety of proposed antecedents to recycling behavior are many and diverse. To accommodate the many attitudinal and belief constructs, recycling researchers embrace a multitude of comprehensive theories to support their particular views. A sample of these theories includes means-end chain theory (Bagozzi and Dabholkar 1994), Schwartz's altruism model (Guagano et al. 1995; Hopper and Nielsen 1991; Reams et al. 1996), and group-mediated social control (Everett 1997). Prominent among the theoretical frameworks, however, is reference to the theory of reasoned action, developed by Fishbein and Ajzen (1975). The discussion below further describes the theory of reasoned action and examines a derivation of this basic model.

The Theory of Reasoned Action

Fishbein and Ajzen's (1975) theory of reasoned action (TRA) identifies factors that shape one's behavioral intention toward a specific action, and subsequently predicts that the individual will act in accordance with his intention. The theory's model depicted in Figure 2.3 illustrates how attitude toward a behavior and subjective norms combine to shape behavioral intention. The subsequent behavior should then be consistent with the individual's behavioral intention. In algebraic representation, the relationship takes the form:

$$\text{Behavior} \sim \text{Behavioral Intention} = w_1 A_B + w_2 SN,$$

where A_B represents one's attitude toward a specific behavior, SN is the subjective norm, and w_1 and w_2 are the standardized regression coefficients attached to each component (Fishbein and Ajzen 1975, p. 301).

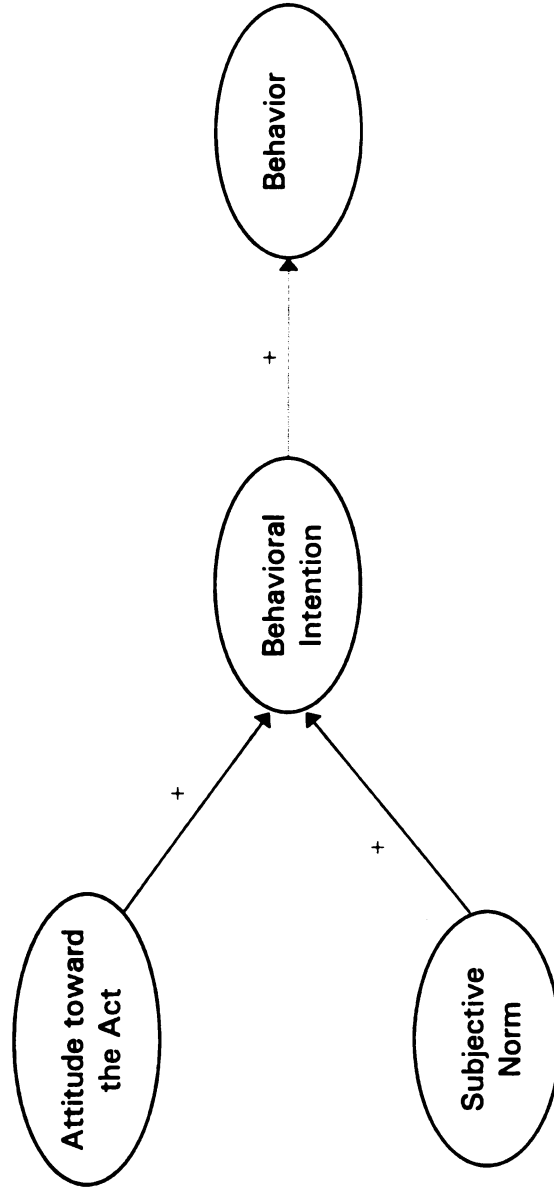


Figure 2.3 The Theory of Reasoned Action

The measurement of A_B consists of the actor's beliefs that the behavior in question leads to particular outcomes and his evaluation of these outcomes. This composition is expressed symbolically as: $A_B = \sum b_i e_i$, where b_i is the cognitive belief that performing the behavior leads to outcome i and e_i is the individual's affective evaluation of outcome i (Fishbein and Ajzen 1975, p. 301).

Meanwhile, the measurement of subjective norm reflects the actor's beliefs regarding referents' opinions of the behavior in question and the actor's motivation to comply with these referents. This composition is expressed symbolically as: $SN = \sum NB_j MC_j$, where NB is the individual's cognitive belief regarding whether referent j thinks he should perform the behavior in question and MC is the individual's affective motivation to comply with referent j (Fishbein and Ajzen 1975, p. 302). Referents are individuals who demonstrate influence on the actor's thoughts and behaviors. These normative influences depend upon the source (Burnkrant and Page 1988). Taylor and Todd (1995b) dichotomize the influences according to whether they originate from familial sources (internal normative beliefs) or friends, neighbors and other peer groups (external normative beliefs). Therefore, in brief, TRA states that people consider the possible outcomes of behavior before acting. They tend to behave in intended ways such that the result is either personally favorable or in compliance with significant others' expectations (Eagly and Chaiken 1993).

With the theory's wide use in the social and behavioral sciences, it perhaps has faced more scrutiny than any other single psychological theory of its time. The model's creators themselves have stepped forward regularly in its defense, explicitly stating the model's assumptions and limitations. First of all, as first posited by Fishbein and Ajzen

in 1975 and again in 1977, every behavior has the elements of action, target, context and time. These elements help to specify a *single* behavior as opposed to general behaviors aggregated over a range of actions, targets, contexts and/or times (Eagly and Chaiken 1993). Behavioral prediction is most accurate when measurements of attitude and behavior demonstrate consistency with regard to the level specificity. In other words, specific attitudes better predict specific behaviors. Fishbein (1988) refers to this rule as the “principle of compatibility” (Fishbein 1988). As noted above, Hines et al. (1987) support this contention in their meta-analysis of environmental attitudes and behaviors.

Therefore, attitudes toward environmental issues in general may not necessarily serve as a strong predictor of glass recycling behavior. In this case, the attitude applies to a broad set of behaviors (litter reduction, wildlife preservation efforts, emissions control, etc.) while the behavior in question is rather specific (glass recycling). More precisely, the actor’s attitude toward writing bi-annual editorials in the local newspaper to support stricter emissions controls would serve as an unreliable predictor of the individual’s effort to return beverage containers each week during regular shopping trips. This example demonstrates poor agreement across the spectrum, in terms of action, target, context and time.

Another limitation imposed on TRA by its creators is the idea that intentions mediate behavior. The very inclusion of “intentions” limits the theory to volitional or voluntary behavior. In accordance with this restriction, Eagly and Chaiken (1993) state that “behaviors requiring skills, resources or opportunities that are not necessarily available are not fully volitional” (p. 169). Therefore, recycling may not be altogether

volitional if a collection alternative is not available in some form. In addition, settings that mandate recycling also fail to be purely volitional since they assume compliance.

In sum, the theory of reasoned action is not a general theory but rather a theory of “immediately proximal causes of volitional behavior” (Eagly and Chaiken 1993, p. 173). Though critics cite many missing variables in the model (e.g. perceived moral obligation, self-identity), the theory demonstrates impressive predictive value even when researchers overstep boundary conditions (Sheppard, Hartwick, and Warshaw 1988). As Sheppard et al. (1988) note, researchers often wish to understand and predict behaviors that fail to fit the narrow framework formulated in the original model. In their meta-analysis examining 87 studies ranging in application of the TRA from marijuana smoking (Ajzen, Timco, and White 1982; Bearden and Woodside 1978) to re-enlistment in the National Guard (Hom and Hulin 1981; Hom, Katerberg, and Hulin 1979), Sheppard et al. found a frequency-weighted average correlation for the $A+SN \Rightarrow I$ relationship of 0.66 and a frequency-weighted average correlation for the $I \Rightarrow B$ relationship of 0.53 (statistically significant at the .001 level and .01 level respectively).

Sheppard et al. (1988) identify the most common misapplications of the original TRA to situations in which 1) the target behavior is not completely under the subjects’ volitional control and thus represents a goal rather than specific actions, 2) a choice of alternative behaviors is available to the actor, and/or 3) the actor is required to estimate his intentions rather than provide a carefully considered intention when full information is not available. While the authors found that surprisingly few researchers applied the TRA in a manner consistent with the theory’s original scope and intention, Sheppard et al.

(1988) find robust support for the model even when the aforementioned boundary conditions are clearly violated.

Criticisms directed toward the TRA model do not focus exclusively on scope, however. The dimensionality and interrelationships among the model's constructs, namely attitude toward behavior, have been also called into question over the years. Bagozzi and Burnkrant (1979), for instance, demonstrated that one's attitude toward religious activities consists of both cognitive and affective dimensions. However, Burnkrant and Page (1982) suggest that the complexity and learning process associated with the behavior confound the dimensionality of the attitude construct. In their study, Burnkrant and Page (1982) found convergent and discriminant validity for a model consisting of a unidimensional attitude construct and a unidimensional normative construct directed toward the act of donating blood (though the two antecedent constructs were significantly intercorrelated). The complexity of the behavior under consideration therefore should parallel the dimensionality of the attitude structures. The authors subsequently found support for a structural model utilizing unidimensional constructs of attitude and subjective norms as they relate to behavioral intention (Burnkrant and Page 1982).

The explicit application of the TRA to recycling behavior has been surprisingly rare. While Bagozzi and Dabholkar (1994), claim to be the first to apply the framework to recycling behavior, TRA was first proposed as an appropriate framework by Pieters (1991) and successively tested by Goldenhar and Connell (1991-92). As shown in Table 2.4, Goldenhar and Connell hypothesized that extrinsic motives would have both direct and indirect effects on recycling behavior. Their findings indicate that feedback alone or

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a combination of feedback and education result in positive effects on both the intrinsic motives and ultimate behavior. There was no support for the link between the intrinsic motives and behavior, however.

Bagozzi and Dabholkar (1994), on the other hand, found a positive link between one's attitude toward the act of recycling and behavioral intention but no link between subjective norms and behavioral intention (see Table 2.3). In a subsequent test, the authors also found a substantial positive effect between past behavior and future recycling intentions (Bagozzi and Dabholkar 1994).

In sum, while the theory of reasoned action has found acceptance across a broad range of social behaviors, its application to recycling behavior has been limited. Recycling researchers instead have primarily chosen to focus on the direct effect of one or more choice constructs on behavior. In the two studies that explicitly test the TRA model in a recycling setting, there are mixed results (Goldenhar and Connell 1991-92; Bagozzi and Dabholkar 1994).

The Theory of Planned Behavior

Ajzen (1985) enhanced the TRA by broadening the original theory's scope to include non-volitional behavior; or those requiring resources, opportunities, and specific skills. The theory extends to non-volitional behaviors by adding perceived behavioral control (PBC), an exogenous construct, to the TRA. Looking very much like the original theory, the theory of planned behavior is written symbolically as:

$$Behavior \sim Behavioral\ Intention = w_1A_B + w_2SN + w_3PBC$$

The PBC construct consists of two dimensions. The first dimension reflects the conditions external to the individual that may either enhance or impede his ability to

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perform the behavior in question. These facilitating conditions reflect the availability of resources, such as time, money, and effort required to fulfill the activity (Taylor and Todd 1995b; Triandis 1979). The second dimension reflects the actor's self-confidence or perceived ability to fulfill the behavioral task properly (Bandura 1977, 1982; Taylor and Todd 1995b). Therefore, as shown in Figure 2.4, distinct from one's attitude toward the act and the subjective norm, the individual's skills, confidence, and available resources that make up his PBC can have a considerable influence on his likelihood of performing the behavior. Not only can PBC affect behavior indirectly through intentions, but also in a direct manner when one's perceived ability and resources are equal to actual levels of ability and resources (Ajzen 1985).

The two dimensions of PBC are reflected in the construct's symbolic representation: $PBC = \sum cb_k pf_k$, where cb_k is the individual's control beliefs, or the considered level of difficulty one has toward the task, and pf_k refers to the one's perceived facilitation of the control factor, or his perceived ability to fulfill the task (Ajzen 1991; Taylor and Todd 1995a, 1995b).

To date, the effects of adding perceived behavioral control to the TRA across a variety of applications demonstrate inconclusive findings. Overall, of twelve studies reviewed by Ajzen in 1991, the direct causal influence of PBC on behavior was fair at best. Meanwhile, PBC's indirect route to behavior through intentions has demonstrated sound model improvement in different contexts (Eagly and Chaiken 1993).

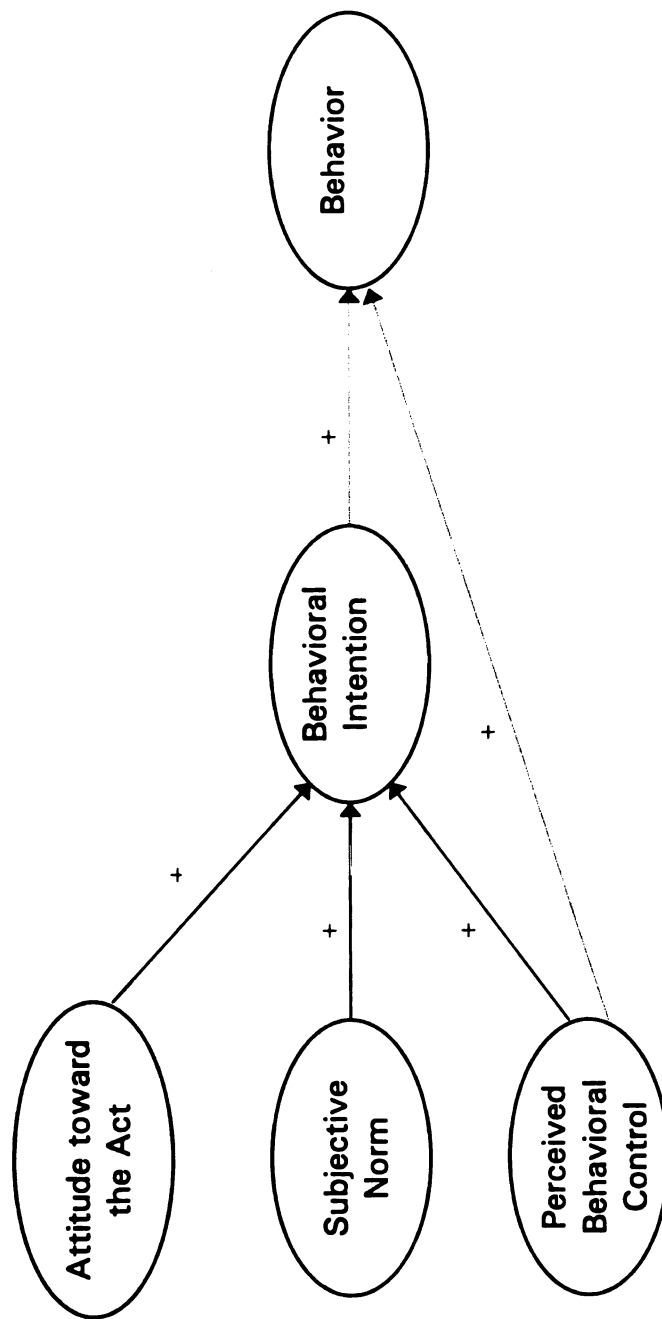


Figure 2.4 The Theory of Planned Behavior

Ajzen's enhanced version of the TRA appears to be an acceptable framework for recycling applications. The addition of the PBC construct adds a different, considerable dimension to the behavior analysis. It embraces the fact that we should not only concern ourselves with factors internal to the actor, but also his environment -- particularly factors that we can manage. Therefore, perhaps regardless of one's attitude or subjective norms, by making the behavior easier or enhancing the actor's relevant skills, the favored behavior may be yielded yet. More directly, however, one must see to changing the actor's perceptions of the task difficulty and/or his skill level. These are considerable factors in the recycling setting addressed explicitly in the enhanced version of TRA but not found in the original theory.

In sum, conceptually it seems that Ajzen's theory of planned behavior best encompasses the multiple factors underlying one's recycling behavior. The TPB is preferred to Ajzen and Fishbein's (1975; 1980) original theory of reasoned action in the recycling context. TPB embraces the idea that the considered action is *not* purely voluntary or completely at the actor's discretion. That is, in order to participate in a recycling program, there must be resources available (the program's facilities), a set of appropriate skills, and comprehension of the specific tasks required for behavior fulfillment. We see these added dimensions addressed explicitly with the inclusion of the perceived behavioral control construct in the TPB model.

The theory of planned behavior has actually been applied to recycling behavior on three occasions. Taylor and Todd (1995a, 1995b) have generated two publications from a single investigation of waste management behavior among Canadian consumers. In both cases, the authors applied the TPB to explain and predict both recycling and composting

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behavioral intentions. As shown in Table 2.4, Taylor and Todd (1995a) identified a number of antecedents to the TPB's exogenous constructs (attitude toward the act, subjective norms, and perceived behavioral control). Five of the seven TPB antecedents demonstrated their intended effects. As for the TPB constructs, the authors found attitude and perceived behavioral control to have a positive influence on behavioral intentions. The subjective norm, on the other hand, had a negative influence on behavior.

Overall, Taylor and Todd's (1995a) structural model demonstrated sound goodness-of-fit across three of four indices, indicating that the covariances suggested by the hypothesized model fairly matched that derived from the sample data. A significant chi-square statistic serves as the only indicator to suggest a poorly fitting model. The study fails to allude to the TPB model's improvement over the traditional TRA approach. Also, with exception of the inclusion of the resource-facilitating conditions construct, there is a lack of clearly practicable solutions offered explicitly by the model. By failing to include more extrinsic factors in their comprehensive model of recycling behavior, the model yields disappointingly few direct managerial implications. In addition, the authors indicate that the derived sample is likely to have a low level of generalizability since the study was conducted in a city with an extremely high rate of recycling participation.

In their second article, Taylor and Todd (1995b) again approach the problem with the TPB, but rework the model's antecedent constructs. Demonstrated in Table 2.4, it can be seen that the relative advantage construct that shapes the actor's attitude is broken down into two distinct dimensions. One dimension represents personal relative advantages (benefits and satisfactions) and the second represents social relative advantages. The authors also drop the compatibility construct that failed to influence

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PBC in the first article. In addition, it should be noted that the authors measure recycling behavior which serves as the ultimate dependent variable in this investigation.

This second study demonstrates an interesting set of findings. First, all three hypothesized predictors of behavioral intention demonstrate their anticipated effects, consistent with the TPB. Attitude toward the act of recycling demonstrated a particularly strong influence on behavioral intention. Second, both behavioral intention and perceived behavioral control find support for their hypothesized effects on ultimate behavior. Third, only four of the seven antecedents to the TPB demonstrate their hypothesized effect. In the cases of complexity and resource-facilitating conditions, support for the opposite effects is apparent. Inference from these findings suggests that more complex recycling tasks result in a more favorable attitude toward the act and that providing fewer resource-facilitating conditions (greater inconvenience) results in a higher level of perceived behavioral control. The authors admit to the puzzling nature of these findings.

In sum, the second piece by Taylor and Todd (1995b) was shown to have a sound goodness-of-fit across three of four measures (chi-square was significant). The same criticisms identified with the first piece apply to the second. Again, without the inclusion of more extrinsic variables, we are unable to derive a definitive set of managerial implications from the study. This is unfortunate given the generally sound execution of the study. Again, any conclusions evolving from the analysis must consider the remarkably homogenous sample of active recyclers that provided data for the study.

Boldero (1995) represents the third application of the theory of planned behavior to the recycling problem. While this piece is to be commended for measuring attitude

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and behavior at a higher level of specificity than the Taylor and Todd (1995a, 1995b) studies, it diverges from the original TPB without sound justification. The author considers two factors (evaluation of curbside service and storage space) distinct from the model's original three antecedents of behavioral intention (attitude, subjective norms, perceived behavioral control). The operationalization of curbside service evaluation, theoretically, should fit nicely within TPB's attitude construct. Likewise, the storage space construct belongs with the operationalization of PBC. Unfortunately, it appears as if exploratory factor analysis drove model development in Boldero (1995).

Interestingly, among the original theory's three antecedents to behavioral intention only attitude demonstrates its anticipated effect on intention in Boldero (1995). Subjective norms and perceived behavioral control are non-significant predictors of intention in the study. Again, this study operationalized inconvenience as a dimension of attitude rather than perceived behavioral control. The PBC construct may have demonstrated its anticipated effect had inconvenience been reflected in PBC, consistent with Taylor and Todd's two studies and the proposed research. Regression analysis rather than structural equations modeling was executed in the Boldero (1995) article, thereby providing no single estimate of overall model fit and no basis of comparison with the Taylor and Todd models.

In conclusion, the theory of planned behavior provides a sound comprehensive framework to help explain and predict recycling behavior. While the theory has been applied to recycling behavior on three occasions and has demonstrated significant ability to explain and predict recycling behavior in two cases, there is substantial room for the refinement of its application. Most notably, the infusion of managerially relevant factors

would provide recycling program directors with a clearer set of guidelines for deriving desired participant behavior. Also, the application of the model to a more disparate audience would provide a stronger indication of its generalizability and, perhaps, the universality of program guidelines.

SYNTHESIS

As noted in the introduction of this chapter, research investigating consumer recycling has emerged from two very distinct segments. A thorough examination of both the managerial and consumer research literature has yielded a number of lessons and clear paths for future research. One primary lesson is that the recycling program represents a customer service offering in which managers seek to meet specific customer needs in a cost efficient manner.

A second lesson to emerge from the survey of managerial literature is that while the various industrial entities of reverse channels have been identified and examined, interestingly, investigation of the consumer has been largely ignored. This is discouraging when one considers that the consumer serves as the supplier of secondary raw materials in the reverse channel of recycling. Fortunately, analysis of the consumer has received substantial attention in the consumer research literature.

Consumer recycling research has assumed a variety of approaches to best explain and predict participation. Authors have examined the influences of demographic characteristics (e.g. Vining and Ebreo 1990, Granzin and Olsen 1991), intrinsic motives (e.g. Oskamp et al. 1991, McCarty and Shrum 1994), and extrinsic motives (e.g. Luyben and Bailey 1979, Luyben and Cummings 1981-82) as well as various combinations of

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these factors (e.g. Hopper and Nielson 1991, Goldenhar and Connell 1991-92). The literature review suggests that the greatest insight results from the examination of the indirect effects of managerially relevant, extrinsic variables and the direct effects of intrinsic motives on behavior. Primary criticisms of the consumer research include the lack of accepted theoretical frameworks used to support hypothesized relationships, an inability to generalize findings outside of the specific test setting, and insufficient practicable implications.

STATEMENT OF PROBLEM

The synthesis of the literature review suggests that there remains a need to merge insights gained from consumer research with the practicality of the marketing and logistics literature. As Shrum et al. (1994) illustrate, a comprehensive model that integrates the various marketing tools we have available, rather than focusing on a few selected initiatives, makes the most sense when trying to develop the most effective total program. Therefore, the Model of Managerially-Influenced Recycling Behavior below builds upon theory developed and tested in the extant consumer research yet it comprises constructs of clear managerial importance. The next section restates the research questions identified in Chapter One, presents the research model and hypotheses to be tested in the study.

RESEARCH QUESTIONS, RESEARCH MODEL AND HYPOTHESES

The literature review illustrates the relevancy of the research questions offered previously in Chapter One. While many studies have sought to explain and predict recycling behavior, there are shortcomings associated with each effort. The current study

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is certainly not devoid of limitations, many of which will be specified in Chapter Three. However, each previous effort has contributed to the body of knowledge we now have regarding the influences of recycling behavior. The research model and associated hypotheses benefit directly from theories and findings of previous research. The hypotheses to be tested in the study are presented below with relevant research questions.

A. Factors of Consumer Participation and Relative Importance

1. What factors shape the consumer's willingness to recycle?

Consumer research of recycling behavior identifies several possible factors that shape the consumer's willingness to recycle. This study builds upon the extant literature and proposes the Model of Managerially-Influenced Recycling Behavior. Figure 2.5 depicts this model. It demonstrates an obvious resemblance to Ajzen's (1985) theory of planned behavior suggested above. The distinction from the TPB is the addition of several managerially relevant strategies that serve as antecedents to the intrinsic motives in the model. Specifically, it incorporates characteristics from all four strategic dimensions identified by Everett (1996-97). The following hypotheses are derived from the model's paths and will be empirically tested in the study. The first three hypotheses (H1a, b, and c) are taken directly from Azjen's theory of planned behavior.

H1a: One's attitude toward the act of recycling will have a positive effect on behavioral intention to recycle.

Consistent with both Fishbein and Ajzen's TRA and Ajzen's TPB models, the more favorable one's attitude is toward the act of recycling, the more likely he is to form the intention to recycle.

H1b: One's subjective norm will have a positive effect on behavioral intention to recycle.

Consistent with both Fishbein and Ajzen's TRA and Ajzen's TPB models, when the actor perceives that others who are important to him believe that he should recycle, the more likely he is to form the intention to recycle.

H1c: One's perceived behavioral control will have a positive effect on behavioral intention to recycle.

Consistent with Ajzen's TPB model, when the actor perceives that the choice of recycling is under his control or discretion, the more likely he is to form the intention to recycle. The actor has control over his decision to recycle when he believes he possesses the skills and resources required for proper recycling.

The following seven hypotheses (H1d, e, f, g, h, i and j) are derived from the four strategic dimensions identified by Everett (1996-97) and serve as the external variables that managers and policy makers have at their disposal to influence the factors of behavior. These variables (market incentives, coercive incentives, program promotion and convenience strategies) reflect the marketing mix that managers of traditional products utilize in their marketing efforts. These extrinsic motives influence recycling intentions indirectly, with intrinsic motives mediating their effects.

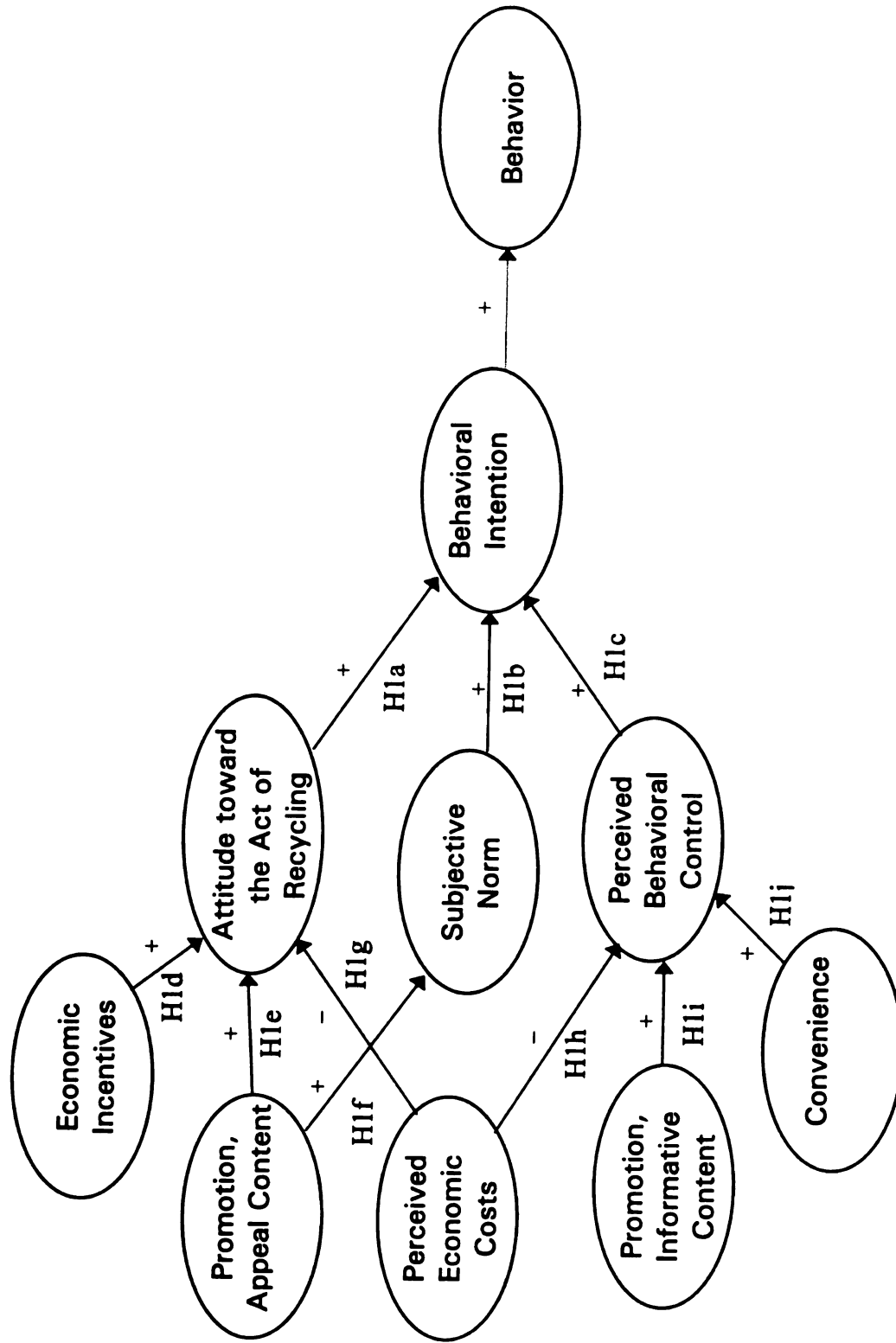


Figure 2.5 The Model of Managerially-Influenced Recycling Behavior

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H1d: Economic incentives will have a positive effect on one's attitude toward the act of recycling.

As suggested by Everett (1996-97), market incentives, or monetary returns for program participation, should favorably influence recycling behavior. This construct may also reflect coercive influences as well. As demonstrated above, coercive strategies often assume the form of fines for failing to comply with recycling mandates. The threat of fines also represents an economic incentive to recycle. Everett (1996-97) notes that mandatory recycling programs often achieve higher participation rates than purely voluntary programs. The threat of fines attributes, in part, to this increased level of participation. In accordance with Figures 2.2 and 2.5, economic incentives will first influence the actor's attitude toward the act and subsequent behavior. Few studies have demonstrated this effect though Vining and Ebreo (1990) found support for the positive relationship between economic motives and recycling behavior. In addition, Pelton et al. (1993) support the positive relationship between rewards for recycling participation and the willingness to recycle. Pelton et al. (1993) also support the positive relationship between punishments for non-compliance and the willingness to recycle. It should be noted, however, that the reward and punishment constructs of the Pelton et al. study were not measured purely in financial terms. That is, economic incentives represent only one of the multiple dimensions for each construct.

H1e: Appeal promotions will have a positive effect on one's attitude toward the act of recycling.

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Promotional messages that make potential participants aware of the personal and societal benefits of recycling are likely to have a positive influence on the actor's attitude toward the act of recycling (Pieters 1991). These messages may range in form from personal, direct appeals to mass media efforts in newspaper, radio, television, and mass mailing. Consistent with the managerial perspective of the study, appeal promotions will be operationalized as mass media efforts that seek to achieve greater awareness of recycling initiatives and broader environmental problems.

Research on appeal efforts and recycling behavior demonstrated mixed findings. Goldenhar and Connell (1991-92) report that education and feedback posters have a positive effect on attitudes toward the act of recycling as well as directly with recycling behavior. There is no support for the attitude-behavior link in this particular study, however. Hopper and Nielson (1991) found a positive relationship between promotional fliers and recycling behavior. Granzin and Olsen report no relationship between impersonal information sources and recycling behavior. Meanwhile, Lord (1994) found that both positively-framed and negatively-framed messages delivered by impersonal means had a positive influence on the actor's attitude toward the message and subsequently, recycling behavior. Clearly, further research of the proposed relationship is necessary before generalizations can be approached.

H1f: Appeal promotions will have a positive effect on one's subjective norm.

Just as appeal promotions are anticipated to influence one's attitude toward the act of recycling (as suggested in H1e above), it is likely that awareness of these advertised messages will also affect the actor's perception of referents' opinions. That is, the actor

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is likely to believe that his family and friends have seen the same advertisements, raising awareness of environmental issues and recycling, and subsequently elevating their expectation that the actor will behave in a manner consistent with the promotional message (per H1b). While studies have examined the influence of appeal promotions on one's attitude toward the act and recycling behavior respectively, none has examined the role of these promotions as they affect the actor's subjective norm. Therefore, appeal promotions are expected to influence recycling behavior by way of its effect on attitude toward the act (H1e) and subjective norm (H1f).

H1g: The perceived economic cost of participation will have a negative effect on one's attitude toward the act of recycling.

Should the actor perceive the economic cost of participating in recycling to be high then this will have a negative influence on his attitude toward the act or recycling. The construct of perceived economic cost of participation is rarely operationalized. Studies such as Granzin and Olsen (1991) have examined the effect of perceived costs of participation on recycling behavior, though their conception of perceived costs actually measures personal inconvenience rather than economic expenses.

This study proposes that participants actually incur economic costs associated with participation. These costs are distinct from the opportunity costs of time and energy. Rather, participants pay third-party collectors either directly or indirectly to collect materials. These payments are made either in the form of collection fees, taxes or higher prices paid for goods. In the case of curbside or dropoff collection, residents typically pay a fee directly to a private recyclables collector or have a portion of their taxes allocated to

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garbage and recyclables collection. Meanwhile, in the case of retail collection, the consumer can typically expect the costs of collecting, sorting and processing activities to be offset by both distributors and retailers through higher retail prices for goods. It is important to distinguish the difference between actual and perceived costs of recycling, however. That is, consumers may actually pay for these services without realizing the actual magnitude of the paid amount. Higher perceived costs are expected to negatively effect one's attitude toward the act of recycling.

H1h: The perceived economic cost of participation will have a negative effect on one's perceived behavioral control.

Just as the perceived economic cost of participation is expected to have a negative effect on attitude, the same holds true for its relationship with perceived behavioral control (PBC). Again, PBC represents one's perceived control over his actions. The literature review has demonstrated how recycling represents behavior that is not completely within the actor's discretion. The behavior is not purely volitional, or voluntary. Rather, recycling requires a significant degree of resources and limited skills in order to facilitate the contribution of materials to recyclers. In particular, a channel intermediary is necessary to provide consumers with a means of participating in recycling programs. These intermediaries may be either private or public entities. But, as noted in Hypothesis H1g above, there are expenses associated with providing consumers with recycling alternatives -- expenses that are subsequently passed along to consumers.

When these costs are passed along to consumers who benefit from the availability of recycling alternatives, the costs may prohibit participation by a segment of the

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population. This refusal of service may come in the form of peoples' inability to afford housing in areas that charge for recycling collection or avoiding products that have a deposit fee. In sum, when the costs of recycling participation are perceived as high, these perceived costs will have a negative effect on the actor's perceived behavioral control.

H1i: Informative promotions will have a positive effect on one's perceived behavioral control.

Promotional efforts that provide informative, instructional content are likely to have a positive effect on the actor's perceived ability to fulfill the requirements of recycling. In other words, having knowledge of which materials and exactly how to recycle should make the actor feel more in control over his recycling actions (Pieters 1991). The only study to examine the effects of program information on recycling behavior is Hopper and Nielsen (1991). As predicted, the researchers found a positive relationship between program information and recycling behavior. Taylor and Todd (1995a, 1995b) tested a similar, though internal construct, in their applications of TPB to recycling. In their work, Taylor and Todd found a positive relationship between self-efficacy and perceived behavioral control. Informative promotions represent an external variable that recycling managers can use to provide consumers with the knowledge to confidently fulfill the behavior.

H1j: Convenience will have a positive effect on one's perceived behavioral control.

Convenience represents the focal construct of the study. While providing consumers with the knowledge to confidently fulfill the recycling behavior is certainly important (as noted

in Hypothesis H1i), perhaps even more important is providing consumers with convenient access to recycling alternatives. Essentially, by providing convenient recycling alternatives, managers and policy makers provide consumers with the resources to more easily fulfill the behavior. This increased ease in recycling represents a rise in perceived behavioral control.

As illustrated in the literature review, convenience has three distinct characteristics: 1) proximity, 2) availability, and 3) sorting and storing complexity. These dimensions of convenience represent customer service offerings in the recycling transaction. Managers can enhance convenience by providing any one or combinations of the following: 1) closer proximity, 2) higher availability with regard to hours of operation, and 3) minimal complexity in sorting and storage for consumers (Pieters 1991). Prerequisite to convenience is the presence of intermediaries to provide the specific services required by consumers. Closely related to the construct of perceived economic cost, convenience is expected to be provided at a cost.

The literature review demonstrates that convenience has been operationalized in numerous ways and with mixed results. As hypothesized, Vining and Ebreo (1990) found that both personal inconvenience and household inconveniences were positively related to recycling behavior. Likewise, Pelton et al. (1993) found that the opportunity to participate increased one's willingness to recycle. Guagano et al. (1995) report that the presence of curbside facilities (the most convenient means of recycling in terms of proximity) increases one's awareness of recycling consequences and awareness of personal costs, and indirectly influences recycling behavior in a positive manner.

Taylor and Todd's (1995a) operationalization of resource-facilitating conditions demonstrated a positive relationship with perceived behavioral control. In a successive study, however, Taylor and Todd (1995b) found a negative relationship between the same two constructs. Corral-Verdugo (1996) also found a negative relationship between the presence of storage facilities in the home and recycling behavior in Mexico. Also, the presence of recycling collectors had no effect on recycling behavior in his study. Further investigation is clearly necessary to better understand the critical relationship between convenience, attitudes and ultimate recycling behavior.

The next set of research questions addresses the universality of the proposed model developed from the first research question. These questions investigate the application of the model across materials, legislative settings and city settings.

B. Universality of the Factors of Consumer Participation

1. Does the model of consumer recycling behavior identified in the first objective apply uniformly across different varieties of recyclable material?

This research question examines the model's application to alternative recyclable materials. It is common for different recyclable materials to require different techniques and levels of care in transporting, sorting, and storing. For example, beverage containers must often be clean of residues in order to be accepted by curbside or retail collectors. Care must also be taken to ensure that the containers remain undamaged for redemption. Meanwhile, newspapers require very little care in storage and transportation. These two

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materials (beverage containers and newspapers) serve as the target materials for this research question and its associated hypothesis.

H2: The hypothesized model will predict recycling behavior equally well across a variety of materials.

This hypothesis assumes a null effect across the two material groups. The extant recycling literature provides little insight to suggest that the hypothesis should assume differences between materials. Studies completed to date have either examined recycling in general or behavior directed toward a single recyclable material. The investigation of the model across multiple materials represents significant contribution of the study.

The second research question in this series is similar to the first but focuses on legislative and city settings rather than materials.

2. Does the model of consumer recycling behavior identified in the first objective apply uniformly across legislative and city settings?

Like hypothesis H2 above, the hypotheses associated with this research question assume a null position on the subject.

H3a: The hypothesized model will predict recycling behavior equally well across legislative conditions.

This research question suggests that it is possible for people under different legislative scenarios to have similar factors with varying degrees of influence, or different factors altogether, shape their recycling behavior. Again, the hypothesis assumes the position of a null hypothesis, expecting no differences in hypothesized effects across legislative

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settings. The legislative settings refer to the three different state-mandated bottle bill positions identified in Chapter One: the dime deposit of Michigan, the nickel deposit of Iowa and six other states and the lack of a bottle bill as in Kansas and 38 other states. Discussion regarding the selection of these three states is provided in Chapter Three. The next hypothesis examines the model's predictability across city settings.

H3b: The hypothesized model will predict recycling behavior equally well across rural, suburban and metropolitan areas.

This hypothesis is similar to Hypothesis H3a but refers to the model's application across a trichotomy of rural, suburban and metropolitan areas. This hypothesis also assumes the position of a null hypothesis with the expectation of no differences in hypothesized effects emerging across settings. As noted in the literature review, consumer research that has examined recycling behavior is characterized by single setting research. Just as studies have focused on general recycling behavior or a single material, these studies also tend to be conducted in a single location. A significant contribution of the proposed study is the closer examination of potential varying effects across settings.

The literature offers little insight to suggest that these hypotheses should assume alternative forms to the proposed null hypotheses. There is the possibility, however, that people who live in different settings are exposed to factors beyond the scope of the proposed model that will contribute to a greater likelihood to recycle. Those who live in cities, for instance, are more likely to have had access to recycling collection alternatives for a longer period of time than those who live in rural settings. Until recently, municipal recycling programs have largely been a phenomenon in the nation's metropolitan areas

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where signs of pollution are most apparent. These factors, however, should be captured by the model. That is, the comprehensiveness of the model should reflect the media and infrastructural differences in the dispositional constructs.

The third set of research questions has no accompanying hypotheses. These questions are exploratory in nature and will be addressed qualitatively given the empirical results of the first two sets of research questions. The literature and practical experience will provide additional insight toward these questions.

C. Opportunities and Compliance in the Reverse Channel

1. How should consumers be motivated, educated and assisted to achieve higher levels of recycling participation?
- 2a. Which channel participants are in the best position to provide the mix of marketing and logistics offerings that consumers desire?
- 2b. Given an identification of the ideal reverse channel configuration in question C.2a, how closely should the reverse channel reflect the forward channel?
3. What level of responsibility is the consumer willing to assume?
4. Is government involvement necessary to implement the desired recycling program?

Table 2.5 presents an overview of the research objectives, questions, and hypotheses to be investigated and tested in the study.

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Table 2.5 Framework of Research Objectives, Questions, and Hypotheses

Objectives	Questions	Hypotheses
A) Model	A.1	H1a - H1j
B) Application	B.1 B.2	H2 H3a and H3b
C) Implications	C.1 C.2a C.2b C.3 C.4	No Hypotheses

CONCLUSION

Chapter Two presented a review of literature related to the current study. The review examined previous research in the areas of marketing management of recycling programs and consumer research of recycling behavior. The review identified not only the contributions but also the limitations and deficiencies of studies in these two broad areas of investigation. Following a synthesis of the extant literature, a formalization of the research problem was presented. Research questions, the research model, and hypotheses were stated thereafter. Chapter Three describes the methods used to fulfill the study's research objectives.

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CHAPTER 3: RESEARCH DESIGN AND METHOD

INTRODUCTION

This chapter describes the research design and methods used to achieve the stated research objectives. The chapter begins with a review of the research purpose and objectives, and continues by identifying the framework for data collection. The data collection section elaborates on the survey design, the population and survey adequacy, instrumentation, and variables in the study. The chapter then illustrates the analysis procedures used to address each research question. A conclusion then brings a close to the research proposal and directs attention toward results and implications.

RESEARCH PURPOSE AND OBJECTIVES

The purpose of this research is to determine how managerial and policy mechanisms affect consumers' recycling attitudes, perceptions, and intentions. The research then tests the universality of these findings and develops guidelines for recycling program development and operation. To reiterate, the three specific objectives of this research are:

- A) To develop a model that identifies the factors shaping consumer participation in recycling programs and determine the relative influence of each factor in the model;
- B) To assess the model's application across a range of materials and settings; and
- C) To use the model to develop managerial and public policy guidelines that outline the opportunities available to private entities as well as the obligations of government involvement.

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This chapter proceeds by identifying the manner in which these objectives were addressed in the research.

FRAMEWORK FOR DATA COLLECTION

A survey instrument was used to collect data in the research. The next several sections outline and justify the steps utilized in the study to gather representative samples of the population. The specific areas of discussion include justification of the survey design method and, more specifically, the selection of a mail survey for data collection purposes. This section continues by elaborating on the population and sampling adequacy. The variables of interest in the study are then defined, complete with measurement sources and histories. This section then provides further description of the survey instrument and its implementation process. The section concludes with a discussion of the methods of data analysis used in the research.

THE SURVEY DESIGN

The study collected data by surveying the attitudes, perceptions, and behavioral intentions of subjects. Without providing a full elaboration of the advantages and disadvantages of surveys relative to experimental designs, this section briefly identifies the primary reasons for using a survey method to collect data. In addition, this section justifies the use of a mail survey.

As Creswell (1994) suggests, the use of instruments in measurement is consistent with the positivist tradition in marketing research. The specific instrument utilized to collect data in this study is a survey. Surveys provide a means of quantifying or

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numerically describing some fraction of a target population by way of sampling. This sample description is then thought to be generalizable to the full population (Fowler 1988). In other words, surveys that capture the characteristics of the population aptly achieve external validity in their findings.

While the study attempted to achieve sound external and internal validities, a cross-sectional survey design was the chosen data collection method based on pragmatic grounds. The rationale for conducting survey research rather than experiments is primarily due to the economies achieved in the survey design. As illustrated in the first two chapters, a primary contribution of the research is to examine the recycling characteristics of residents in three legislative settings. The time and effort required to conduct experiments uniformly in three different states proved prohibitive for this study.

Given careful execution of the survey design, the study benefits from the efficient collection of data. This data set is sufficient for testing several hypotheses. The research tests the many relationships established by the Model of Managerially-Influenced Recycling Behavior identified in Chapter Two. The scope of experiments is typically far more limited than that achieved in surveys. Therefore, experiments typically focus on relatively few relationships. Testing the full model would be very difficult with an experimental design alone. In addition, as noted above, the survey provides a better means of generalizing findings across the populations of interest.

The survey was distributed to subjects through mail distribution. This method of survey administration is preferred over face-to-face interviews and telephone interviews primarily for its efficiency, but also for the anticipated quality of responses. Table 3.1

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lists several key criteria relevant to the study. A review of these criteria illustrates the ultimate selection of mail surveys over face-to-face and telephone interviews.

While Table 3.1 clearly demonstrates that mail surveys maintain both advantages and disadvantages relative to face-to-face and telephone interviews, the criteria of particular importance in the proposed research justify the choice of mail surveys. Mail surveys perform particularly well in the areas of answer accuracy and administrative requirements. Answer accuracy is a particularly important criterion. When respondents do not interact with an interviewer, they are more likely to answer questions honestly (Dillman 1978).

As noted above in reference to the decision to use a survey design over experiments, the high marks across most administrative areas demonstrate the inherent efficiencies associated with mail surveys. Mail surveys offer the lowest cost per response and are less sensitive to the costs of geographical dispersion. Since the survey was distributed to several different states, the latter characteristic assumes even greater significance.

Before mail surveys were ultimately selected as the data collection method, however, one must consider the survey's ability to capture the desired sample. U.S. households represent the population of interest in the study. Sampling the general public presents particularly challenging problems for mail surveys. Among the multitude of difficulties, Dillman (1978) points out that the general public often fail to see the benefits of participating in research efforts. As a result, they tend to focus only on the costs associated with completing the survey. Dillman suggests that the ultimate responsibility for adequate response rests with the researcher. That is, the researcher can take action in

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Table 3.1 Relative Performance of Survey Methods across Key Criteria

	Criterion	Mail Surveys	Face-to-Face Interviews	Telephone Interviews
I. Obtaining a Representative Sample				
1)	Likelihood that selected respondents will be located.	High	Medium	Medium
2)	Response rates of the general public.	Medium	High	High
3)	Likelihood that unknown bias from refusals will be avoided.	Low	High	High
II. Questionnaire Construction/Design				
1)	Allowable length of the questionnaire.	Medium	High	Medium
2)	Allowable complexity of questions.	Medium	High	Low
3)	Success with controlling question sequence.	Low	High	High
4)	Success with tedious or boring questions.	Low	High	Medium
5)	Success in avoiding item non-response.	Medium	High	High
6)	Insensitivity to questionnaire construction procedures.	Low	High	Medium
III. Obtaining Accurate Answers				
1)	Likelihood that social desirability bias can be avoided.	High	Low	Medium
2)	Likelihood that interviewer distortion and subversion can be avoided.	High	Low	Medium
3)	Likelihood that contamination by others can be avoided.	Medium	Medium	High
4)	Likelihood that consultation will be obtained when needed.	Medium	Medium	Low
IV. Administrative Requirements				
1)	Likelihood that personnel requirements can be met.	High	Low	High
2)	Potential speed of implementation.	Low	Low	High
3)	Potential for low costs per case.	High	Low	Medium
4)	Insensitivity of costs to geographical dispersion.	High	Low	Medium

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the design of the survey to ensure maximum response. The three things that the researcher must do are: 1) minimize the costs for respondents, 2) maximize the rewards for responding, and 3) establish trust that those rewards will be delivered. References to costs and rewards do not merely reflect monetary amounts but also opportunity costs and intangible benefits. Dillman elaborates on these three objectives in outlining a general survey procedure that he calls the total design method (TDM).

The TDM provides a number of useful techniques to ensure higher volumes and higher quality responses in survey designs. The TDM demonstrates sound application to surveys of the general public and dramatically improves response rates. The central tenet behind the method is that careful planning and execution can eliminate many of the disadvantages associated with survey methods. Further elaboration of the survey instrument and the implementation process is provided in the Instrumentation section below.

THE POPULATION AND SAMPLING ADEQUACY

As indicated above, U.S. households serve as the population of interest in the research. While the sample should prove representative of U.S. households in terms of demographics and attitudinal characteristics, there are other dimensions of significance in the study. The sample must also be representative of the recycling alternatives available to households nationwide. Therefore, the sample must reflect the variety of recycling alternatives as well as the demographic and attitudinal characteristics of the population. Discussion now turns toward a brief description of the target population and then examines the chosen sampling method, sample frame and efforts to assess nonresponse bias.

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The Population

There were 99.0 million households in the U.S. in 1996 (U.S. Bureau of the Census 1997). With regard to recycling characteristics, Chapter One provides statistics that illustrate the availability of various programs in the U.S. To review, 8,817 curbside collection programs served approximately 135 million people or 51 percent of the total U.S. population. Meanwhile, 10,436 dropoff sites served approximately 20 percent of the population (Goldstein 1997). In addition, eleven states have a form of bottle bill legislation in effect in 1998, representing approximately 35 percent of all U.S. residents. Therefore, one would prefer a sampling method that most closely matches the heterogeneity of U.S. households and the recycling alternatives available to those households. As Chapter Two noted, a significant contribution of the proposed research is to investigate the attitudes and intentions of subjects across multiple locations and settings. A vast majority of research to date has examined only individual locations.

While the demographics of the sample *should* reflect the demographics of the population, it is more important that the dispositional (attitudinal) characteristics of the sample reflect the population. The constructs of the research model were created such that they capture the attitudes and beliefs that the subjects hold toward the recycling program characteristics. Therefore, while it is important that the data prove generalizable to the population, it is more important that the model prove generalizable to the theory.

Sampling Method

Kerlinger (1986) strongly suggests the use of random sampling techniques to better achieve generalizability across a population. According to Kerlinger (1986), random techniques are more likely to include the characteristics typical of the population

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so long as these characteristics appear regularly in the population. Every member of the population has an equal chance of being selected in a random sample (Miller 1983).

While random sampling perhaps achieves samples that are more representative of a population, there are a number of shortcomings that plague the technique in survey designs. Primary among the random technique's shortcomings is the inefficiency associated with mass survey production and mailings. Considerable expense accumulates in gathering the names and addresses of those in the target population. Random efforts also require disproportionately more survey instruments to be produced and mailed since, even with careful planning and execution, only a proportion of surveys will ever be returned. This is due to what Dillman (1978) refers to as an inability to make a disinterested sample see the benefits of their participation. Unfortunately, one can also expect that even fewer responses will be usable in the research.

Those that *do* respond to random mailings lend to the second key problem associated with random survey distribution: response bias. Since survey recipients are typically provided with little or no external incentive to complete and return the survey, the researcher can often suspect the motives of those who do respond. It is likely that respondents feel very strongly about the topic of the research; either very strongly in favor or disfavor toward the topic. Therefore, the researcher who fails to appeal to "ordinary" subjects can expect a bipolar trend among respondents. Essentially, with the expectation of a normally distributed sample, the researcher is provided only with opinions of left- and right-tail respondents. The derived sample therefore fails to represent the ordinary or "norm" group that makes up the bulk of the target population.

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Therefore, to overcome the shortcomings associated with random sampling, a purposive sample was drawn as the primary source of data in the research. A purposive sample requires judgment on behalf of the researcher to determine how to best sample the population of interest. Churchill (1991) indicates that purposive samples are appropriate when sound judgment is used to select the sample and when the derived sample serves the research purpose. The secondary source of data was a smaller-scale distribution of surveys at random to representative cities in each legislative setting (Lansing, Michigan, Wichita, Kansas and Ames, Iowa).

Sample Frame

The parents of college students at three large, midwestern universities serve as the primary sample frame. Essentially, the parents adequately represent the population and provided a convenient, efficient means of gathering necessary data. A multistage sampling design permitted the benefits of convenience and efficiency. Students in large sections of junior- and senior-level marketing classes at Iowa State University (ISU), Kansas State University (KSU) and Michigan State University (MSU) served as the initial contacts. The rationale for the selection of these particular states was discussed in Chapter Two. To reiterate, these three states assume differing positions toward bottle bill legislation. Michigan charges a ten-cent deposit per container on a wide variety of soft drink and alcoholic beverages. Iowa has a bottle bill similar to that of Michigan though the deposit charge is five cents per container rather than ten cents. Meanwhile, Kansas, like the vast majority of states, has no bottle bill legislation.

The reason parents and not the students themselves serve as the sample frame is because of the contrast between the typical student's living situation and that of

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traditional households. While students purchase products consisting of recyclable content, students often have a very different living situation. This difference in living situations usually presents students with an infrastructure for material collection distinct from that of the typical household. Quite simply, dormitory living fails to closely reflect household living with regard to recycling activity and, therefore, serves as a poor representation of the targeted population. However, students that live in apartments and rented houses do amply depict a segment of U.S. households. In addition, the inclusion of students in the sample provides a younger demographic character that is missing in the parent sample alone. Therefore, while suspicions occasionally arose regarding the relationship between the student and the addressee for the parent mailing, the survey was typically sent to the addressee regardless of these suspicions. The presence of non-parents in the final sample is characterized by the younger demographic found in the descriptive statistics of Chapter Four. In sum, however, the combination of these distinct groups is intended to conveniently, yet adequately, represent the target population.

By sampling the parents of college students, there is the possibility that the sample will demonstrate skewness toward higher educated and more affluent segments of the population. While this is a possibility, recent studies indicate that the demographic composition of those attending college is becoming more diverse. Among the many indications to this fact, the number of minority students in U.S. colleges rose from 15 percent of total enrollment in 1976 to 23 percent in 1993 (National Center of Education Statistics 1996). The inclusion of students in the sample should help to reflect the heterogeneity across the income variable. Dillman (1978) notes that higher educated, more affluent subjects tend to respond disproportionately more often to surveys of the

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general population anyway. Therefore, this problem would likely be present in a purely random sample as well.

Meanwhile, the three midwestern states were chosen based upon their legislative position on bottle bills and convenience. As noted above, each state maintains a different position on bottle bill legislation. This provides an opportunity to assess subjects in a naturally-occurring manipulation of the economic incentives variable. With regard to convenience, colleagues at the three institutions agreed to cooperate by offering access to students in their classes at the respective institutions.

On a voluntary basis, the students completed the survey (see Appendix B). In addition to completing surveys, students were instructed to address an envelope to their parents. The envelope was then used to send another survey directly to parents of participating students. The two surveys differed only in regard to the demographic information requested.

While participation in the research was voluntary on the part of both students and their parents, two appeals were issued to encourage survey completion. The first appeal was of an altruistic nature. The survey administrator in the classroom settings explained to the students the purpose of the research and the valuable role the students played in fulfilling the research objectives. Emphasis was also placed on the voluntary and anonymous nature of their participation. The second appeal granted a tangible incentive. It was explained that parents who returned completed surveys made their son or daughter eligible for valuable prizes (\$50 gift certificates redeemable at campus bookstores). Parents received the same information in a cover letter enclosed with the survey instrument (see Appendix B). Approximately four weeks after the initial mailing of the

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survey, a drawing will be held at each location for students whose parents successfully completed and returned the survey. The drawing was based upon code numbers assigned to students and parents in the initial survey distribution in the classroom settings. The implementation of altruistic appeals and small financial rewards are methods suggested by Dillman (1978) to improve response rates in mail surveys.

A second, distinct mailing was directed toward the general public in three different city settings. Each city (Lansing, MI; Wichita, KS; Ames, IA) was selected based upon its location within different bottle bill legislation settings (as described above). Subjects were randomly selected from local telephone book listings. This distinct sample of respondents serves the purposes of supplementing the college-derived sample and for the sake of comparative analysis among the two distribution methods.

The determination of the number of data cases for sufficient power of analysis is a matter of speculation among researchers of structural equations modeling (SEM). A commonly cited standard is that there should be five responses (cases) per free parameter (Bentler 1989). Another reference states that five cases are needed for every measured item in the full model (Joreskog and Sorbom 1988). Still others suggest that a minimum of 100 or 150 cases is sufficient for analysis in most cases for SEM (Bagozzi and Yi 1988; Anderson and Gerbing 1984, 1988; Hair et al. 1995).

Given this array of advice regarding sample sizes for sufficient power, the minimal number of responses for the study range from a low of 100 per Hair et al. (1995) to a far more stringent count of approximately 285 per Bentler (1989). The count of 285 cases is calculated based on the expectation that 57 free parameters are to be estimated in the initial confirmatory factor analyses. Further discussion of power adequacy is provided in

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Chapter Four. As a final note on the topic, however, one must keep in mind that respondents belong to various group affiliations depending upon the specific research question of interest. For instance, to address Hypothesis H3a that examines the research model's application across the three legislative settings, respondents are sorted according to their state of residence. To address Hypothesis H3b that examines the research model's application across rural, suburban and metropolitan areas, respondents are sorted accordingly. Therefore, the standard for sufficient power must be met for each individual data segment as well as for the sample as a whole.

Nonresponse Bias

An examination of nonresponse bias is necessary to determine whether the participation of non-respondents would have substantially changed the overall results of the survey (Creswell 1994). Since the anonymity of students and parents is guaranteed throughout the sampling process, it limits the researcher's ability to assess nonresponse bias in this study. Conventional methods such as telephone inquiries of non-respondents determining the reasons for their lack of participation and their basic attitudes toward the research are thereby prohibited. Rather, the date of returned surveys will be recorded so that a comparison between early and late respondents can be performed. According to Leslie (1972), late respondents typically reflect the attitudes of non-respondents. Given this assumption, an assessment of potential nonresponse bias may be performed by segmenting the returned surveys into early and late responses. So long as relatively few significant differences appear across the two groups, nonresponse bias can be assumed negligible.

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VARIABLES IN THE STUDY

This section discusses the individual constructs in the Model of Managerially-Influenced Recycling Behavior and illustrates the measurement items of each construct. The discussion examines the meaning and development of each construct in the literature as well as measurement history in terms of reliability and validity, where such history exists. Methods of assessing reliability and validity for all constructs are addressed in the preliminary analysis section later in this chapter. A summary of the construct definitions and associated measurements is provided in Appendix A.

Behavioral Intention (BI)

Behavioral Intention (BI) represents the ultimate dependent variable in the Model of Managerially-Influenced Recycling Behavior. The BI construct draws directly from the theory of reasoned action (TRA) and theory of planned behavior (TPB). This construct refers to an actor's determination to act in a certain way. As the "immediate determinant of action," BI reflects the actor's deliberate attempt to bring about action (Ajzen and Fishbein 1980, p. 5). Consistent with the theory of reasoned action, a person will act in accordance with his intention, barring any unforeseen events (Ajzen and Fishbein 1980). This definition is consistent with those applied to the behavioral intention to recycle. Note, however, that the BI construct must be measured at the same level of specificity (in terms of target, action, context and time) as the attitudes and subjective norm that serve as antecedents to BI. In order to satisfy research question B.2, material-specific measures must be gathered to identify behavioral differences resulting from different materials. Question B.2 examines the application of the Model of Managerially-Influenced Recycling Behavior to different materials. Therefore, measures

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of greater specificity with regard to targeted materials must be gathered for BI as well as all other model constructs.

While the definition for BI has been consistently applied, its operationalization in the recycling literature has varied somewhat. Studies by Goldenhar and Connell (1991-92), Bagozzi and Dabholkar (1994), and Taylor and Todd (1995a, 1995b) have all provided distinct angles on the construct's measurement. This study utilizes measures forwarded by Taylor and Todd (1995a, 1995b). Reliability assessments across the two-item scales resulted in acceptable coefficient alpha values of 0.77 and 0.99 respectively in the Taylor and Todd studies.

Attitude toward the Act of Recycling (A)

A primary predictor of Behavioral Intention is one's Attitude toward the Act (A). Like BI, the A construct is a critical component of the TRA and TPB models. This construct refers to the individual's positive or negative evaluation of performing a general behavior; the person's judgment that performing the behavior is good or bad. The construct basically defines whether the actor is in favor of or against performing the behavior (Ajzen and Fishbein 1980). These attitudes are said to be a function of behavioral beliefs; beliefs regarding the outcome of a behavior as well as the actor's evaluation of that outcome.

The review of the literature in Chapter Two demonstrates the wide application of this construct to various behaviors. One's Attitude toward the Act of Recycling has received substantial attention among these broad treatments. The general conceptualization above is consistent with applications to recycling behavior from the

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literature, including works by Goldenhar and Connell (1991-92), Bagozzi and Dabholkar (1994), Smith et al. (1994), and Taylor and Todd (1995a, 1995b).

While the literature review suggested that the measurement of attitude is a composition of attitudinal beliefs (b_i) and the evaluation of outcomes associated with those beliefs (e_i) in an expectancy value product ($A = \sum b_i e_i$), this research will utilize a series of global measurements for attitude. There has been much speculation regarding which approach best measures the attitude construct. Fishbein (1963) found a correlation between the global measurement method and expectancy value method of 0.80. While other meta-analyses have not generated correlations of this magnitude, the global measures and composite measures are considered very closely related (East 1997). Thøgersen (1994) concludes that the inclusion of the evaluation term does not improve the prediction of attitudes.

Subjective Norm (SN)

Ajzen and Fishbein (1980) define Subjective Norm (SN) as the actor's "perception of the social pressures put on him to perform or not perform the behavior in question" (p. 6). This construct is influenced by normative beliefs; beliefs regarding whether specific individuals or groups (referents) think the actor should or should not perform the behavior. An accompanying influence is the actor's motivation to comply with his perception of referents' beliefs. Referents may be segmented into internal and external groups. Family members represent internal referents while friends, neighbors and social groups outside the family represent external referents.

The operationalization of SN is based upon the Likert-type measurement techniques utilized by Taylor and Todd (1995a, 1995b). The items measure specific

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normative beliefs. The Taylor and Todd studies dichotomized normative beliefs across internal and external dimensions. The coefficient alpha values for the internal construct were 0.89 and 0.95 respectively. The alpha values for the external construct were 0.84 and 0.87 respectively. For the sake of model parsimony, this study combines the two sources into a single construct though measures of internal and external sources will be gathered in the research.

Perceived Behavioral Control (PBC)

This construct refers to “the perceived ease or difficulty of performing the behavior . . . reflecting past experience as well as anticipated impediments and obstacles” (Ajzen 1988, p. 132). PBC was subsequently added to the original theory of reasoned action (TRA) in formulating the theory of planned behavior (TPB). Ajzen’s TPB better explains non-volitional behavior, or behavior that is not purely under the actor’s discretion. The PBC construct reflects the realistic constraints that the actor faces in fulfilling a behavioral goal, addressing internal and external control factors. Internal factors include the actor’s information, skills, abilities, emotions and compulsions. External factors include situational or environmental factors such as opportunity and dependence upon others (Ajzen 1988).

With regard to recycling behavior, Taylor and Todd (1995a, 1995b) are the only authors to test PBC in their applications of the theory of planned behavior. While their study’s achieved sound reliability with coefficient alphas of 0.73 and 0.94, this study attempts to better capture the essence of this construct. Specifically, an effort is made to measure the two distinct dimensions of control offered in the literature. Two measures of internal control (physical ability and knowledge) and one measure of external control

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(resources) will be utilized to provide a more in-depth examination of the sources of perceived control.

Economic Incentives (EI)

The Economic Incentives (EI) construct refers to the actor's perceptions of availability and adequacy of monetary returns that reward recycling program participation. In voluntary systems, these returns may take the form of redemption for beverage containers, compensation for bulk material contributions, or lower garbage fees. In mandatory systems, however, the threat of fines for non-compliance represents an economic incentive. Both dimensions are reflected in this construct. Pelton et al. (1993) dichotomized the positive and negative reinforcements into rewards and punishments. Many of these rewards and punishments, however, were intangible, non-monetary reinforcements that lend little direct managerial insight.

While the measures used in Pelton et al. (1993) were not managerially oriented, the measurements for this construct are adapted from this study. Likert-type scales are used to measure agreement with statements that address both the influence and importance of positive economic reinforcement. A review of the recycling literature fails to identify a study to measure economic incentives in this manner.

Promotion, Appeal Content (PA)

This construct refers to the awareness and effectiveness of promotional messages that make people conscious of the personal and societal benefits of recycling. These appeals may come from personal or impersonal sources and can be positively- or negatively-framed with regard to content. The managerial perspective embraced by this

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study suggests that impersonal message sources (e.g. television, radio, newspapers and magazines) represent the more practical means of message distribution.

Measures of the PA construct ask the subjects to identify their level of agreement items regarding the persuasive quality of impersonal messages to which subjects have been exposed. This series of questions is provided for four different media sources: 1) television, 2) radio, 3) newspapers, and 4) magazines. A review of the literature fails to identify a survey design that has measured awareness and effectiveness of appeal efforts. Of the works identified in the review, each utilized an experiment that, by design, assigned subject groups to various kinds of promotional efforts. Therefore, no history exists of survey measurements for this construct.

Perceived Economic Cost Of Participation (PEC)

The construct of Perceived Economic Cost reflects the consumer's financial outlay for service. PEC may be viewed as a relative measure of one's willingness to pay for the service. Note that the construct does not necessarily reflect the actual costs that consumers pay, but rather their perceptions of those costs. The literature review noted, for instance, that consumers pay far more to finance recycling programs than they realize. Note, however, that the construct does not address the opportunity costs and personal inconveniences associated with program participation but rather the *economic* expense of the program. PEC serves as a proxy for the pricing mechanism that typical product managers have at their discretion, though the construct represents the consumer's perspective.

As the literature review noted, no recycling study has fully addressed the construct of economic costs assumed by consumers. Studies have focused instead on the

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opportunity costs or personal inconveniences associated with program participation. In maintaining the managerial focus of this study, it is worthwhile to investigate consumers' perceptions toward financial outlays that fund program startup and operations. In order to address this unique construct, the study introduces a series of measurement items. The items utilize Likert-type scales to measure the consumers' willingness to pay for recycling service.

Promotion, Informative Content (PI)

Informative promotional efforts (PI) refer to the means by which program managers instruct consumers of the specific materials accepted by the program and methods of program participation. The construct closely relates to Taylor and Todd's (1995a, 1995b) conceptualization of internal self-efficacy, or perceived ability to fulfill a behavior. This study seeks to test the effectiveness of external, managerial implementations while Taylor and Todd examined internal constructs almost exclusively.

The construct of informative promotional efforts has yet to be operationalized in a survey design. Hopper and Nielsen (1991) control informational interventions in an experiment, but no survey design has captured the essence of this construct. The measurement of PI is unique to this study.

Convenience (CON)

As a construct of particular interest in this study, convenience is defined as a composite of three characteristics: 1) transport ease, 2) availability, and 3) sorting and storing complexity. Transport ease refers to the consumer's responsibility for moving recyclables from the his collection point (the household) to the program's collection point (either the curbside, dropoff location or retail center). A number of studies have

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combined this measure of convenience with broader constructs. Proximity was one dimension of convenience identified by Pieters (1991). Proximity to collection alternatives is typically measurement of distance. The measurement for transport ease borrows heavily from Taylor and Todd's (1995a, 1995b) operationalization of resource-facilitating conditions.

Availability refers to temporal accessibility (hours of operation) that consumers have for recyclable collection alternatives. With regard to curbside programs, availability refers to the frequency and dependability of pickups. While availability reflects one of the three dimensions of convenience identified by Pieters (1991), no study has examined this critical motivational element of recycling behavior. One scale item is used to measure the consumer's assessment of his program's availability. This item has been created for this study.

Sorting and storing complexity refers to the ease or difficulty that consumers face in sorting, collecting and, when necessary, cleaning materials for recycling contribution. Complexity can be increased by requiring materials to be sorted, cleaned and self-stored when storage bins are not provided. As Corral-Verdugo (1996) points out, household settings can also play a role in the ease or difficulty associated with storage. Measures for this operationalization of convenience are derived from the extant literature. The two items are adapted from McCarty and Shrum's (1994) measurement of inconvenience. One item is an adaptation of a personal cost measurement developed by Guagano et al. (1995). The second item is taken from Corral-Verdugo's (1996) measurement of the actor's situational assessment. Like all convenience measurements, these items will be

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reverse-scored to maintain the scaling for convenience construct, where a high score represents a high level of perceived convenience.

INSTRUMENTATION

The discussion of the survey design in an earlier section of this chapter noted that a mail survey served as the data collection method for this study. The previous section discussed the development of the measurements used in the survey. This section illustrates the steps involved in designing and executing the survey.

Table 3.2 outlines the specific steps utilized in the design of the survey and data collection processes. The survey design utilized numerous suggestions offered in Dillman's (1978) total design method (TDM) of survey execution. The TDM emphasizes the careful planning and administration of every step in the data collection process, from survey design to data entry.

Table 3.2 Steps in the Survey Design and Data Collection Processes

Step	Activity
1)	Design a questionnaire that is: a) sufficient for data requirements, b) interesting, c) attractive in appearance, d) considerate of length and time, e) easy to understand, and f) free of embarrassment.
2)	Write a cover letter that: a) illustrates the purpose of the research, b) indicates the importance of the respondent's participation, c) demonstrates the legitimacy of the research, d) shows positive regard for the respondent, e) provides brief instructions for participation, f) expresses appreciation for participation, and g) presents the potential for rewards.

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Table 3.2 (cont'd)

Step	Activity
3)	Pretest the cover letter and survey instrument on a small, representative sample of the population.
4)	Refine the cover letter and survey instrument in accordance with pretest findings.
5)	Receive final approval from university human subjects review committee.
6)	Produce a sufficient number of coded surveys, return envelopes and cover letters to achieve adequate power of analysis given the model complexity and anticipated response rates.
Steps 7 through 11 were completed at each of the three survey distribution locations:	
7)	Distribute coded surveys and return envelopes to students.
8)	Provide students with a brief background of the research initiative, purposes of the research, and their role in data collection process.
9)	Emphasize the voluntary, yet valuable and anonymous nature of participation as well as the potential for prizes with completed surveys returned from parents.
10)	Provide instructions for student participation, including: 1) the completion of a student survey and 2) addressing the envelope for the parent survey
11)	Collect materials from students.
12)	Mail parent surveys with relevant cover letters attached.
13)	Collect surveys and begin data entry.
14)	One month after initial mailing, audit returned parent surveys and make the sons and daughters of these respondents (who are identified by code number) available for door prizes.
15)	Conduct drawings at each location to reward students whose parents responded to the survey.

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Specific TDM considerations utilized in the study that distinguish it from surveys that achieve non-representative samples, poor response rates and insufficient data, include the following efforts:

- avoiding excessive survey length,
- minimizing the intimidation and difficulty associated with completing the survey,
- making the instrument interesting,
- promising anonymity throughout the process,
- offering the opportunity for the subject's son or daughter to win valuable prizes, and
- clearly stating the purposes of the research and the important role that each subject plays in fulfilling the objectives in a cover letter.

Appendix B provides copies of the cover letter and full survey instrument. The random mailing utilized the same survey as the primary, purposive distribution.

A pretest of the survey was administered to establish face validity for the constructs as well as an opportunity to improve questions, general format and scales (Creswell 1994). The pretest was administered to a convenience sample consisting of the primary investigator's colleagues, neighbors and co-workers of his spouse. In all, sixty pretest surveys were returned for analysis. This group provided instant, insightful feedback on the original survey instrument. Significant effort was made to incorporate the pretest group's comments and ideas in the final draft of the instrument.

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RESEARCH QUESTIONS AND ANALYSIS PROCEDURES

This section is divided into two parts. The first section discusses the preliminary analyses executed prior to the testing of research hypotheses. The preliminary analyses examine the qualities of the data and measurement sufficiency. The second section describes the methods used in testing the study's hypotheses. The research questions identified earlier in this report are presented along with the analytical methods used to address each question.

PRELIMINARY ANALYSIS

Prior to examining the research questions and testing hypotheses, one must assess the adequacy of the sample, descriptive statistics for all variables, measurement reliability and construct validity. Each of these important assessments receives treatment in the sections below.

Sample Adequacy

Sample adequacy refers to the number of usable surveys returned from the sampling effort. Insufficient usable responses result in a lack of power for analysis. It was stated earlier that minimal number of 100 to 285 completed surveys must be available depending upon the recognized standard. The chosen standard will apply to the full sample as well as each segment of the sample for multiple group analyses.

Descriptive Statistics

Descriptive statistics include means, standard deviations, score ranges and measures of skewness and kurtosis for all continuous variables. Frequencies are determined for the study's few categorical variables. These statistics serve the purpose of comparing the observed variable patterns with anticipated distributions. Descriptive

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statistics also verify the accuracy of data input. In addition, assessments of univariate and multivariate normality are essential for determining the proper estimation technique to be used in the structural equation modeling approach described below.

Measurement Reliability

Assessing the soundness of the measurement model in terms of reliability and validity is the most important function of preliminary analysis. Reliability refers to the “accuracy or precision of a measuring instrument” (Kerlinger 1986, p. 405). An instrument becomes precise by minimizing the amount of error in measurement. The most common estimate of reliability is to calculate the internal consistency, or correlation among measurement items. Reliability as demonstrated by internal consistency essentially asks: “Are these measurement items measuring the same thing?” Cronbach’s alpha (1951) is the most prevalent method of measuring internal consistency. Nunnally’s (1978) commonly cited cutoff for acceptable alpha coefficients is 0.70. Construct measurements that exceed this standard for the Cronbach alpha are typically considered reliable on the basis of high internal consistency.

Construct Validity

Assessments of construct validity essentially ask: “Are we measuring what we think we are measuring?” (Kerlinger 1986, p. 417). This is a more thorough evaluation of the soundness of a construct’s operationalization than measurement reliability. Construct validity is actually one among several important validities (e.g. internal, external, statistical) to be considered in the study. Construct validity is the only one to receive explicit treatment in this chapter, however.

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Peter (1981) emphasizes that construct validity should be assessed by examining its traits. Construct traits include internal consistency, convergence and discriminability. Internal consistency is a dimension of reliability discussed above. Convergence “means that evidence from different sources gathered in different ways all indicates the same or similar meaning of the construct [or that] different methods should converge on the construct” (Kerlinger 1986, p. 421). In other words, the construct should mean the same thing to different people in different places in order to have convergent validity.

Anderson (1987) suggests using the CFA approach to assess convergent validity. When factor loadings (lambdas) demonstrate that measurement items load significantly on their latent variables, one has support for convergent validity. Support for convergent validity is also provided by the lack of significant modification indices (e.g. the Wald and Lagrange Multiplier Tests in EQS). Significant modification indices suggest that better model fit is possible by either dropping a “trouble” item (per the Wald Test) or respecifying a measurement item to a latent variable other than that proposed in the CFA (per the Lagrange Multiplier Test). Note that the lambda loadings test and modification indices are readily available in the EQS program output.

The third trait, discriminability, is defined as the differentiation of constructs that may be similar and the ability to point out where these constructs differ (Kerlinger 1986). In other words, variables that are conceptualized differently should be empirically differentiable. According to Peter (1981), discriminant validity is supported when a variable does not correlate significantly with another from which it should differ. When support for all three traits (reliability, convergent validity and discriminant validity) is

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apparent, one has support for the unidimensionality of a construct (Anderson and Gerbing 1982).

Confirmatory factor analysis can be called upon once again to assess discriminant validity. The most common method is to use a nested model approach to compare the original measurement model with successive models where correlations (phis) among latent variables (ksis) are fixed equal to one. So long as the alternative measurement models fail to demonstrate better fit (significantly lower chi-square goodness-of-fit values) than the original, support for discriminant validity among constructs exists.

An Overview of Preliminary Analysis

This section has provided a description of the analyses performed on the data prior to testing the hypotheses of the study. It is imperative that issues of measurement soundness be resolved prior to testing the hypotheses. The measurement model represents the foundation of any empirical study (Dunn et al. 1994). Churchill (1979) goes so far as to say that much marketing research practices the GIGO (Garbage In Garbage Out) concept. According to Churchill, many researchers fail to examine the soundness of the measurement foundation before testing hypotheses, severely limiting confidence in the findings.

In addition to sound assessments of trait validity, the measurement model should also demonstrate sound goodness-of-fit. Goodness-of-fit refers to how well the model-implied covariances match covariances in the sample data (Hayduk 1987). Goodness-of-fit indications to be considered include:

- 1) a non-significant chi-square value
- 2) a normed chi-square value within acceptable ranges (< 5 per Bentler 1989),

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- 3) a Bentler-Bonett Normed Fit Index (BBNFI) value of .85 or greater,
- 4) a Bentler-Bonett Non-Normed Fit Index (BBNNFI) value of .85 or greater, and
- 5) a Comparative Fit Index (CFI) of .85 or greater.

Given sound assessment of the measurement model, attention will turn to the structural model and hypothesis testing. Should evidence of model misspecification arise across any of the criteria described above, a theory-driven respecification effort will be directed toward the model. Any such changes in model specification will be addressed in the results of the study.

HYPOTHESIS TESTS

Given sound assessments of measurement reliability and construct validity, the analysis will shift its focus toward the research questions outlined in Chapter Two. These research questions are restated below and accompanied by a description of the analysis procedures necessary to address each question.

A. Factors of Consumer Participation and Relative Influence

1. What factors shape the consumer's willingness to recycle?

Research question A.1 tests the adequacy of the Model of Managerially-Influenced Recycling Behavior proposed in Chapter Two. A structural equation modeling (SEM) approach will be used to assess the model's overall goodness-of-fit. The same six indications listed above for assessing goodness-of-fit will be utilized in this stage as well.

Whereas the CFA above focused on the measurement model, this analysis focuses on the structural model. The structural model refers to the hypothesized relationships

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among latent constructs. These relationships are represented by hypotheses H1a through H1j (see Figure 3.1). These hypotheses indicate the anticipated direction of effects associated with the various model relationships. In order to support each of these hypotheses, the structural model must first demonstrate sound fit per the six criteria above. Given sound goodness-of-fit, the gamma or beta weight (parameter estimates) attached to the paths of hypothesized relationships must have the anticipated sign (positive or negative) and be significantly different from zero (as indicated by a t-value greater than 1.96 at an alpha level of .05).

To summarize, sound model fit indicates that the variables identified in the Model of Managerially-Influenced Behavior and the relationships among these variables acceptably represent the data. Confirmation that betas and gammas are significant and have the anticipated sign demonstrates support for the individual hypotheses (H1a through H1j).

The second set of research questions (set B) builds upon the findings of the first set. These questions examine the application of the Model of Managerially-Influenced Recycling Behavior across a variety of materials, legislative settings and city settings. The different materials and settings represent different segments of the sample data. The appropriate data will be separated from the total sample to address particular hypotheses.

Multiple-group analysis will be used to address all hypotheses in this research question set. Multiple-group analysis is appropriate for inquiries of model or parameter stability across settings and samples (Bagozzi and Yi 1988). A procedure outlined by Bagozzi and Yi (1988) will be used to first assess measurement model invariance, or assurance that the measurement model properties are uniform across samples. The

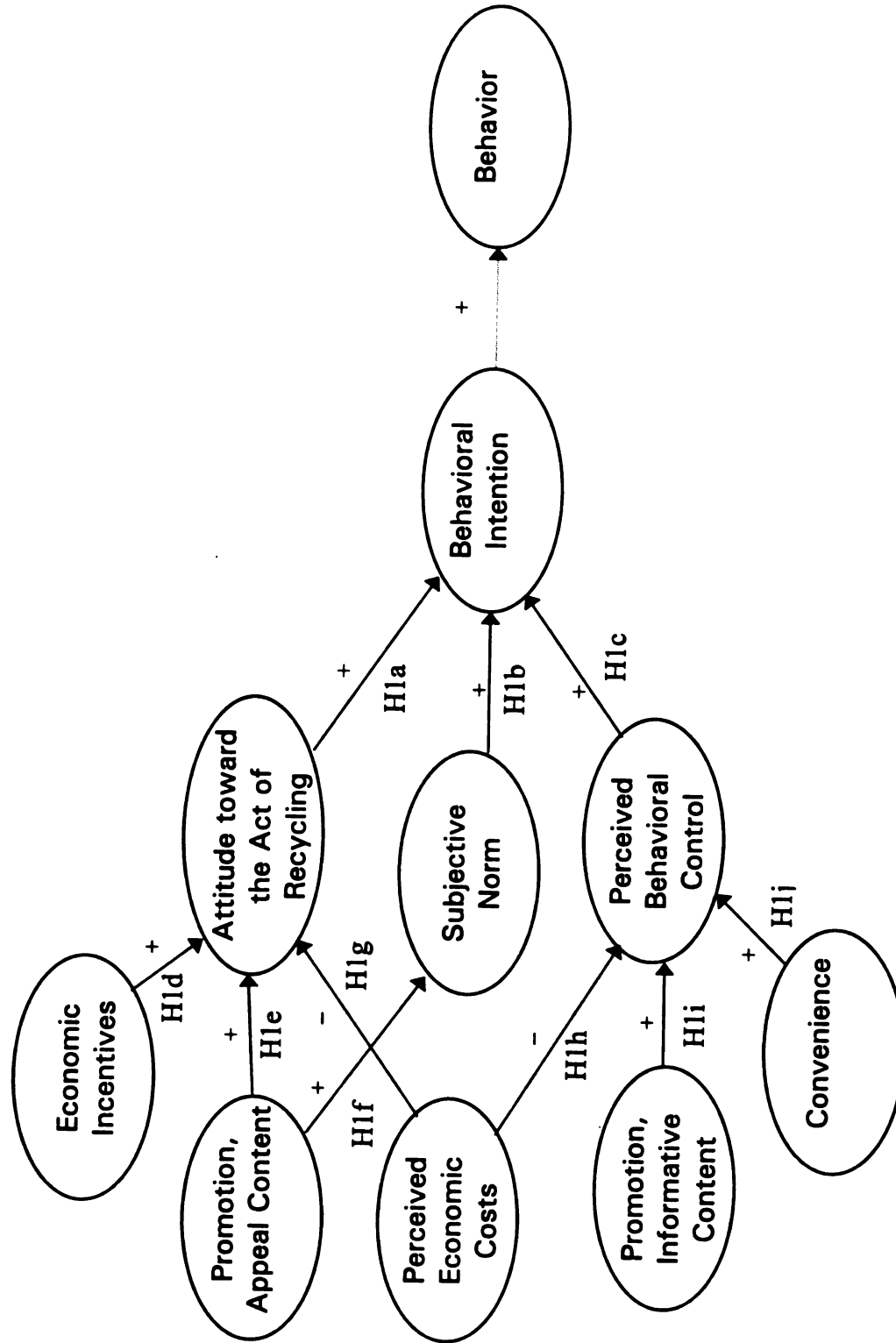


Figure 3.1 The Model of Managerially-Influenced Recycling Behavior

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second step in the analysis, assuming support for measurement model invariance, is to test the equivalence of the structural relationships across groups. This second step represents the analysis used to test the hypotheses of this research question set. According to Bagozzi and Yi (1988), non-significant LM Test results from a simultaneous (SEM) multiple- group analysis means that the models are invariant; support for Hypotheses H2, H3a and H3b. The research questions and hypotheses for this set B are discussed below.

The first research question of set B asks whether the Model of Managerially-Influenced Behavior applies to different recyclable materials. Research question B.1 is restated as:

B. Universality of the Factors of Consumer Participation

1. Does the model of consumer recycling behavior identified in the first objective apply uniformly across different varieties of recyclable material?

Hypothesis H2 states that the Model of Managerially-Influenced Recycling Behavior will apply uniformly across a variety of materials. The materials of interest in this study are beverage containers and newspapers. The data will not be further segmented by state of residence or city setting. Responses for beverage containers and newspapers will represent the two samples to determine the support for hypothesis H2. A non-significant LM Test result in the simultaneous multiple-group analysis will suggest that the model applies uniformly across the two materials.

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2. Does the model of consumer recycling behavior identified in the first objective apply uniformly across legislative and city settings?

Two different settings are of interest in the study. The first setting of interest is the bottle bill legislation examined in Hypothesis H3a. This hypothesis states that the model applies uniformly across the three legislative settings (non-deposit, five-cent deposit and ten-cent deposit settings). Stated in terms of statistical significance, these hypotheses claim that the Model of Managerially-Influenced Behavior will achieve comparable goodness-of-fit and parameter estimates across the different settings. In order to test these hypotheses, the sample of respondents will be divided according to their place of residence.

To test hypothesis H3a, the sample will be divided into three groups according to residency in states with the various bottle bill deposits: 1) no deposit (e.g. Kansas), 2) five-cent deposit (e.g. Iowa), and 3) ten-cent deposit (Michigan only). The subject's residency will be determined by items asking for the subject's home state and zip code in the demographics section of the survey instrument. A sample of 100 respondents from each of the three states will be required to fulfill the least stringent power standard for this analysis. A non-significant LM Test result in the simultaneous multiple-group analysis will suggest that the model applies uniformly across the three legislative settings.

The second setting of interest is examined in Hypothesis H3b. This hypothesis states that the model applies uniformly across rural, suburban and metropolitan settings. To test hypothesis H3b, the sample will be divided into three groups according to the rural, suburban or metropolitan nature of their city of residence. A sample of 100

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respondents for each of the three city settings will be required to fulfill the least stringent power standard for this analysis. A non-significant LM Test result in the simultaneous multiple group analysis will suggest that the model applies uniformly across the three residential settings.

The third set of questions (set C) examines the roles of reverse channel participants given findings from the first two objectives. Research questions in this area are based upon the ability and willingness of consumers and channel intermediaries to participate in the reverse channel. When participants appear to be either unable or unwilling to participate, the role of government intervention is investigated. The research questions of set C are listed below.

C. Opportunities and Compliance in the Reverse Channel

1. How should consumers be motivated, educated, and assisted to achieve higher levels of recycling participation.
- 2a. Which channel participants are in the best position to provide the mix of marketing and logistics offerings that consumers desire?
- 2b. Given an identification of the ideal reverse channel configuration in question C.2a, how closely should the reverse channel reflect the forward channel?
3. What level of responsibility is the consumer willing to assume?
4. Is government involvement necessary to implement the desired recycling program?

These research questions will not be tested empirically. Rather, the results of the first two research question sets will provide insight that will help to address the questions of set C.

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Based upon the findings gathered in identifying the factors and influence of the hypothesized model as well as the application of that model to different settings and materials, the study will be able to shed light on the complex subjects of recycling channel structure and operations. In addition, knowledge from practical experience and the existing literature base will assist in these investigations.

CONCLUSION

This chapter provided an overview of the research design and method of the study. The research purpose and objectives were initially reviewed prior to elaboration of the framework for data collection. The framework for data collection discussed the survey design, the population and sampling adequacy, variables in the study, and instrumentation. A review of the research questions was accompanied by discussions of the preliminary analyses and hypothesis tests involved in the study. Further observation is provided in the appendices. Appendix A provides a summary of construct definitions and measurement items. Appendix B illustrates copies of the sample cover letter and survey instrument utilized in the study. This report continues by discussing the study's results in Chapter Four and implications in Chapter Five.

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CHAPTER 4: ANALYSIS OF DATA

INTRODUCTION

This chapter presents the results of the research. The first section discusses the preliminary analyses that assess the sample characteristics and measurement validation. This discussion is followed by tests of the hypotheses. Each research question is presented with its associated hypotheses. The chapter concludes with a summary of the research findings.

PRELIMINARY ANALYSES

This section examines the characteristics of the sample. Specific characteristics include the survey response rates, geographical and personal demographics of the sample, and recycling characteristics of the sample. Discussion then shifts toward assessments of measurement validity. This section presents descriptive statistics as well as assessments of measurement reliability and construct validity for the study's measured items and latent variables. Tests of hypotheses follow this discussion of preliminary analyses.

CHARACTERISTICS OF THE SAMPLE

As prescribed in Chapter Three, surveys were distributed to the parents of college students at three large, midwestern universities. This distribution method served as the primary means of gathering data. Surveys were also sent randomly to residents of each of the three states as a secondary approach to data collection. This section examines the rate and character of responses collectively as well as from these two distinct distribution methods.

Table 4.1 below presents the statistics for the survey distribution efforts. Parent response rates ranged from a high of 63.4 percent for those distributed to Michigan State

University parents to a low of 43.5 percent for Iowa State University parents. Even this lower figure of 43 percent is impressive for a mass mailing to the general population. When compared to the random response rates that ranged from a high of 35.8 percent for Michigan residents and a low of 27.9 percent for Kansas residents, it appears that the reward mechanism and personal, altruistic appeal efforts resulted in a significantly higher response rate among parents. The total design method suggested by Dillman (1978), however, looks to have been effective across the full sample, resulting in 570 usable surveys and a 46 percent response rate overall.

Table 4.1 Survey Response Rates

Sample	Mailed	Undeliverable	Usable Returns	Effective Response Rate
ISU Parents	314	1	136	43.5%
KSU Parents	221	2	123	56.2%
MSU Parents	285	4	178	63.4%
Method Total	820	7	437	53.8%
Iowa Random	150	6	44	30.6%
Kansas Random	150	3	41	27.9%
Michigan Random	150	16	48	35.8%
Method Total	450	25	133	31.3%
Overall Total	1270	32	570	46.0%

ISU refers to Iowa State University; KSU to Kansas State University; MSU to Michigan State University

T-test comparisons of means for the measurement items demonstrated no pattern of inconsistency between the parent and random samples within each state setting. In other words, differences between the responses from parents residing in Michigan and responses to the random mailing in that state were not prevalent. This conclusion applies to Iowa and Kansas mailings as well as Michigan. The lack of apparent biases among

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parent and random samples suggests that the two samples may be merged for subsequent analyses.

A second possible bias is the lack of representation by non-respondents. As discussed in Chapter Three, it is conceivable that the respondents will represent only those parties who feel strongly in favor or disfavor of recycling. The method suggested by Leslie (1972) was utilized to assess the possibility of nonresponse bias. Essentially, this method is based on the premise that late respondents typically reflect the attitudes of non-respondents. The samples were segmented into quartiles based upon the date of survey receipt. The quartile representing the slowest respondents were compared to those of the first three quartiles per Armstrong and Overton (1977). The t-test comparisons of means indicated that there were, in fact, differences across the full sample. Subsequent analysis, however, demonstrated that these differences could be explained by mean differences across geographic settings (states). No significant differences were apparent within each of the three primary states surveyed. Therefore, nonresponse bias appears to be negligible in the full sample.

Table 4.2 presents geographical characteristics of the sample. These sample groups are important since several hypothesis tests center around these geographic segments. To review, recall that research question B.2 examines the application of the hypothesized recycling behavior model across bottle bill legislative settings and city settings. The table indicates that the sample sizes for non-deposit, five-cent deposit and ten-cent deposit settings are 185, 166 and 219 respondents respectively. While these sample sizes may not achieve the Bentler (1989) power-of-analysis standard of five cases per estimated parameter, they are adequate according to the Hair et al. (1995) standard of

100 to 200 cases. The same may be said of the city setting groups that range in sample size from 146 to 213 cases per group.

Table 4.2 Geographical Demographics of the Sample

Characteristics		Frequency Count	% of Responses
State of residence:	Iowa	166	29.1
	Kansas	153	26.8
	Michigan	219	38.4
	Other states	32	56.1
Bottle bill legislation:	No deposit	185	32.5
	Five-cent deposit	166	29.1
	Ten-cent deposit	219	38.4
City setting:	Rural	213	37.4
	Suburban	211	37.0
	Metropolitan	146	25.6

Table 4.3 presents personal demographics of the full sample. The first notable statistic is the two-to-one ratio of female respondents to male respondents. While this may raise concern initially, one must keep in mind that households represent the study's unit of analysis. It is possible that the female head-of-household is more likely to complete the survey among married couples. Other statistics of note include the fair degree of representation present in the sample across demographic characteristics. Exceptions to the sample's sound representation of the population include: 1) a disproportionately small representation of those between the ages of 23 and 39 as well as those above 60 years, 2) the presence of a somewhat more educated cross-section, 3) an under-representation among minorities (namely African Americans), and 4) indications of a somewhat more affluent sample. Points one, two and four can be explained largely by the sample's targeting of college students' parents.

Table 4.3 Personal Demographics of the Sample

Characteristics		Frequency Count	% of Responses
Gender:	Females	380	66.7
	Males	190	33.3
Marital Status:	Single	168	29.5
	Married	388	68.1
	Widowed	12	2.1
Age:	17 - 22 years	90	15.8
	23 - 29 years	67	11.8
	30 - 39 years	31	5.4
	40 - 50 years	225	39.5
	51 - 60 years	125	21.9
	61 - 70 years	16	2.8
	Above 70 years	13	2.3
Education Level:	High school diploma	109	19.1
	Some college	152	26.7
	Associate's degree	53	9.3
	Bachelor's degree	143	25.1
	Master's degree	75	13.2
	Doctorate, MD or JD	16	2.8
	Other	20	3.5
Residence Type:	House	436	76.5
	Apartment	120	21.1
	Mobile Home	5	0.9
	Other	7	1.2
Race:	African American	14	2.5
	Asian	26	4.6
	Caucasian	493	86.5
	Hispanic	10	1.8
	Native American	12	2.1
	Other	10	1.8
Household Income:	Less than \$20,000	30	5.3
	\$20,000 - \$40,000	77	13.5
	\$40,001 - \$60,000	130	22.8
	\$60,001 - \$90,000	111	19.5
	\$90,001 - \$125,000	83	14.6
	More than \$125,000	39	6.8

Note: Categorical sums may not add up to 570 as a result of missing values.

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While the differences between the sample and population demographics might pose as threats to external validity directly, they pose as no threat to the generalizability of the theory. That is, so long as the hypothesized model accurately captures the attitudinal dispositions of the sample and the actors' subsequent behavior, the model will generalize the theory and apply reasonably to the full population regardless of race, income, education and the such. Therefore, when generalizing theory, the assessment of respondents' attitudes and behaviors is of greater value than merely examining their traditional demographic characteristics (Hollenbeck 1996).

Of the 570 respondents, 519 (or 91 percent) claim to recycle to some degree. The variety of materials recycled and alternatives utilized by these recyclers is presented in Table 4.4. The table contains information that is very telling of the sample's available recycling alternatives and use of those alternatives. For instance, soft drink containers are by far the most popularly recycled materials. This looks to be, in large part, a factor of the sample's composition of respondents residing in bottle bill states. Of the 570 respondents, 385 (or 67.5 percent) reside in one of the nation's eleven bottle bill states. Bottle bill legislation provides: 1) redemption value for the beverage containers, 2) convenient access to recycling alternatives (namely grocery locations), and 3) high levels of awareness -- all characteristics captured by the proposed model. Newspapers were the second most popular material recycled, closely followed by beer and wine cooler containers. Aside from beverage containers collected at grocery locations, curbside collection looks to be somewhat more popular than dropoff alternatives for recyclers. The popularity of beverage container recycling and newspaper supports the selection of these materials as targets of the research.

Table 4.4 Recycling Characteristics of the Sample

Material	Collection Alternative			Total
	Curbside	Dropoff center	Grocery location	
Soft drink containers	61	113	342	516
Beer/wine cooler containers	50	71	237	358
Juice, water and tea	156	77	43	276
Milk containers	203	87	26	316
Newspapers	202	152	16	370

MEASUREMENT VALIDATION

As discussed in Chapter Three, assessments of the measurement model and satisfaction with its soundness precede any tests of hypotheses. Critical among the assessments of measurement model soundness are evaluations of measurement reliability and construct validity. This section reports the measurement qualities of the data set for newspaper recycling across the full sample of 570 respondents. While the same steps were utilized in the assessment of measurements for the variety of samples of interest, the detailed reporting of these evaluations (in tabular form) is found in Appendix C. Only summaries of these other variables' measurement assessments will be reported in the text of this chapter.

Descriptive Statistics

An overview of the univariate characteristics of the data serves as a prelude to the measurement scales' reliability and validity assessments. Table 4.5 below reports the descriptive statistics for each of the study's 25 measurement items. These statistics represent the responses directed toward newspaper recycling for the full sample of 570

respondents. The items themselves and their respective scales will assume meaning in the discussion of reliabilities to follow.

Among the descriptive statistics are the mean, standard deviation, range (minimum and maximum values), skewness and kurtosis. Skewness measures the sample distribution's degree of asymmetry around the mean while kurtosis measures the relative "flatness" or "peakedness" of the data. Measurements of skewness and kurtosis are valuable in the assessment univariate normality. Assessments of univariate normality have a bearing on multivariate normality that, in turn, influences the estimation method used in subsequent structural equation models.

The table illustrates that while many variables indicate tendencies toward normality with means of approximately 4.00 (across the seven-point scales) and low values for skewness and kurtosis, several others demonstrate non-normal tendencies. The most blatant violations of normality look to occur with the Attitude variables (A1 through A5) with means ranging from a low of 6.45 to a high of 6.59. Clearly, these variables as well as a few others in Table 4.5 present strong evidence of univariate non-normality. With non-normality present in the univariate case, the assumption of multivariate normality will fail as well. Univariate normality is necessary, though not sufficient, evidence of multivariate normality (West et al. 1995). Bentler's (1997) EQS software calculated the Mardia coefficient of kurtosis for the above measurement items to be 392.05. While distinct cut-off levels for the Mardia coefficient have not yet reached consensus, most would agree that a figure of this magnitude demonstrates a strong tendency toward multivariate non-normality (West et al. 1995).

Table 4.5 Descriptive Statistics, Full Sample (Newspapers)

Item	Mean	Std. Dev.	Min.	Max.	Skewness	Kurtosis
BI1	4.83	2.11	1	7	-0.546	-1.032
BI2	5.04	2.19	1	7	-0.748	-0.883
A1	6.56	0.90	1	7	-2.511	7.159
A2	6.46	1.11	1	7	-2.553	7.074
A3	6.57	0.85	1	7	-2.318	5.764
A4	6.59	0.85	1	7	-2.497	6.844
A5	6.45	1.04	1	7	-2.288	5.886
SN1	4.92	1.67	1	7	-0.463	-0.324
SN2	4.34	1.38	1	7	-0.107	0.712
SN3	4.20	1.34	1	7	-0.101	0.992
PBC1	6.11	1.33	1	7	-1.818	3.158
PBC2	6.01	1.40	1	7	-1.615	2.216
PBC3	5.54	1.80	1	7	-1.197	0.383
EI1	2.83	1.75	1	7	0.715	-0.343
EI2	2.52	1.66	1	7	0.861	-0.128
PA1	4.40	1.14	1	7	0.166	1.012
PA2	4.14	0.96	1	7	0.250	3.323
PA3	4.32	1.00	1	7	0.439	2.208
PA4	4.24	0.98	1	7	0.415	2.619
PEC1	3.62	1.13	1	7	-0.867	1.705
PI1	4.32	1.88	1	7	-0.035	-1.045
CON1	4.00	2.03	1	7	0.101	-1.230
CON2	4.75	1.75	1	7	-0.273	-0.664
CON3	4.41	1.79	1	7	-0.142	-0.852
CON4	4.51	1.85	1	7	-0.197	-0.965

Measurement Reliability

As stated in Chapter Three, reliability refers to the “accuracy or precision of a measuring instrument” (Kerlinger 1986, p. 405). Reliability as demonstrated by internal consistency essentially asks: “Are these measurement items measuring the same thing?” Table 4.6 presents Cronbach’s alpha coefficients as estimates of reliability. Note that alphas are missing for the perceived economic cost of participation (PEC) and promotions, informative content (PI) constructs. This is a result of the single-item

approach utilized to measure these two unique constructs. Poor reliabilities and cross-loading tendencies apparent in exploratory factor analyses (EFAs) suggested, regrettably, that these two items did not reflect the same construct.

The basis for choosing single-item scales for PEC and PI is rooted in the fact that these constructs and their subsequent measurements were “pioneering” efforts of the study. The three PEC items and three PI items selected for the survey were either created for this study or considerably adapted from the extant literature. While single-item scales are often criticized in latent variable models, one should keep in mind that the chosen items reflect the nature of the latent variable to a substantial degree. Had space in the survey permitted, additional measurement items for these two constructs would definitely have been included. As such, a more thorough examination of the PEC and PI constructs and their improved measurement serve as topics of further investigation in Chapter Five.

As for the remaining seven constructs that utilize multiple-item scales in their measurement, Cronbach alphas range in value from a low of 0.7615 to a high of 0.9335 -- all considerably above Nunnally's (1978) commonly cited cutoff of 0.70. These constructs demonstrate reliability as a result of their high levels of internal consistency. As noted earlier, exploratory factor analysis (EFA) provided further evidence of the commonality among each construct's measurement items with no significant cross-loading.

Table 4.6 Measurement Reliabilities, Full Sample (Newspapers)

Construct	Reference	Item	Scale Type	Alphas
Behavioral Intention	BI1	I intend to recycle newspapers at every opportunity over the next two weeks.	7-point Likert	0.8962
	BI2	Over the next two weeks, I intend to recycle newspapers	7-point Semantic Differential (Never/At every opportunity)	
Attitude toward the Act of Recycling	A1	I feel that recycling newspapers is ...	7-point Semantic Differential (Bad/Good)	0.9335
	A2	I feel that recycling newspapers is ...	7-point Semantic Differential (Wise/Foolish) ^R	
	A3	I feel that recycling newspapers is ...	7-point Semantic Differential (Harmful/Beneficial)	
	A4	I feel that recycling newspapers is ...	7-point Semantic Differential (Wrong/Right)	
	A5	I feel that recycling newspapers is ...	7-point Semantic Differential (Worthless/Valuable)	
Subjective Norm	SN1	My family thinks that I should recycle newspapers.	7-point Likert	0.8262
	SN2	My friends think that I should recycle newspapers.	7-point Likert	
	SN3	My neighbors think that I should recycle newspapers.	7-point Likert	
Perceived Behavioral Control	PBC1	I feel that I have the physical ability to recycle newspapers effectively.	7-point Likert	0.8040
	PBC2	I feel that I have the knowledge to recycle newspapers effectively.	7-point Likert	
	PBC3	I feel that I have the resources I need to recycle newspapers effectively.	7-point Likert	

^R Denotes an item that has been reverse-scaled

Table 4.6 (cont'd)

Construct	Reference	Measurement Item	Scale Type	Alphas
Economic Incentives	E11	I expect to be monetarily compensated for recycling my newspapers.	7-point Likert	0.7615
	E12	It is important to make money by recycling newspapers.	7-point Likert	
Promotions, Appeal Content	PA1	I find recycling advertisements on television to be very persuasive.	7-point Likert	0.8612
	PA2	I find recycling advertisements on radio to be very persuasive.	7-point Likert	
	PA3	I find recycling advertisements in newspapers to be very persuasive.	7-point Likert	
	PA4	I find recycling advertisements in magazines to be very persuasive.	7-point Likert	
	PEC1	I pay too much for the newspaper recycling service I currently receive.	7-point Likert	
Perceived Economic Cost of Participation	P11	Providing better instructions would help me to recycle newspapers more effectively.	7-point Likert ^k	--
Promotions, Informative Content	CON1	Moving newspapers to their collection point is inconvenient.	7-point Likert ^k	0.8085
	CON2	I have difficulty providing newspapers to the collector at the appropriate time.	7-point Likert ^k	
	CON3	Sorting out different kinds of newspapers from one another is too much trouble.	7-point Likert ^k	
	CON4	Storing empty newspapers until they can be given to the collector is too much trouble.	7-point Likert ^k	

^k Denotes an item that has been reverse-scaled

Construct Validity

Whereas reliability assesses of the precision in measurement, validity asks whether we are measuring what we *think* we are measuring (Kerlinger 1986). Utilizing the confirmatory factor analysis (CFA) approach suggested by Anderson (1987), a thorough evaluation of the measurement model's construct validity was performed. The measurement model tested in the analysis appears in Figure 4.1. Note that several latent variables are allowed to correlate with one another as noted by the two-headed arrows spanning the constructs. These factors are thought to "travel together" independent of causal relations that may exist among them (Byrne 1994).

Chapter Three provided an overview of the critical assessments of validity. To review, the primary outputs of the CFA are the assessments of measurement model fit. The traditional chi-square test indicates how well the model-implied covariance matrix matches the covariances among the measured variables in the sample data (Bollen 1989; Hayduk 1987). In a reversal of the typical positioning, support for the null hypothesis of equal covariance structures is sought to provide support for sound model fit.

Given the sensitivity of the chi-square estimate to biases such as model complexity and sample size, researchers have developed an array of complementary goodness-of-fit assessments (Hu and Bentler 1995). Primary among the complementary measures of model fit are: the normed chi-square, the Bentler-Bonett Normed Fit Index (BBNFI), the Bentler-Bonett Nonnormed Fit Index (BBNNFI), and the Comparative Fit Index (CFI). The normed chi-square statistic assesses model parsimony and can be easily calculated by dividing the model's chi-square estimate by the model's degrees of freedom. While consensus regarding acceptable ratios for the normed chi-square is

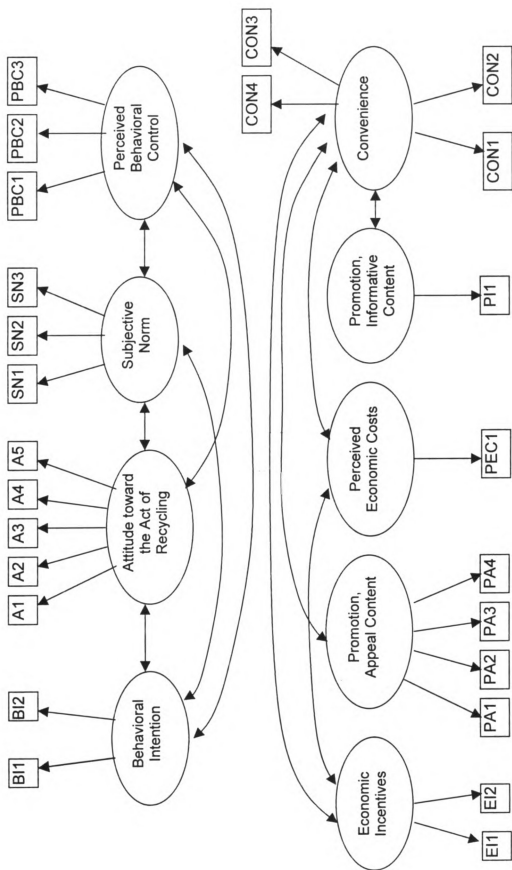


Figure 4.1 The Measurement Model

lacking, ratios ranging from a maximum of 2:1 to as high as 5:1 have been offered as acceptable, parsimonious model fit (Arbuckle 1997). The remaining fit indices (BBNFI, BBNNFI and CFI) are provided automatically with EQS output. Values exceeding 0.85 are generally considered acceptable for these indices (Bagozzi and Yi 1988).

Table 4.7 reports the fit statistics for the measurement model applied to the full sample of respondents (N = 570) to newspaper items. The table reports results for both maximum likelihood (ML) and elliptical reweighted least squares (ERLS) estimation procedures. The purpose of reporting both methods is to demonstrate the model's improved fit when multivariate non-normality previously identified in the data is taken into account. While the model fails to indicate acceptable fit with the traditional chi-square test under both estimation procedures, the dramatic improvement in model fit with the ERLS estimation procedure is evident. The chi-square statistic is lowered by 422.98 with the ERLS estimation that better adapts to the non-normality of the data. So long as variables continue to demonstrate non-normality at the univariate and multivariate levels of analysis, the ERLS method will be used in successive SEM analyses and reported solely.

Table 4.7 Measurement Model Fit Statistics, Full Sample (Newspapers)

ML Estimate*			ERLS Estimate**		
Chi-square	1091.91	p < 0.001	Chi-square	668.93	p < 0.001
Normed Chi-square	4.10	(df = 266)	Normed Chi-square	2.51	(df = 266)
BBNFI	0.875		BBNFI	0.931	
BBNNFI	0.890		BBNNFI	0.952	
CFI	0.902		CFI	0.957	

* Maximum Likelihood (ML) estimation method

**Elliptical Reweighted Least Squares (ERLS) estimation method

Both estimation procedures demonstrate acceptable fit according to the array of other fit indices. The normed chi-square estimate of 2.51 with the ERLS method is much closer to meeting the stringent 2:1 ratio for parsimonious fit. The ML estimate of 4.10 for the same statistic is safely under the 5:1 ratio suggested by other methodologists (Arbuckle 1997). Acceptable fits are also suggested by the ML and ERLS estimates across the three fit indices (BBNFI, BBNNFI and CFI), given values exceeding the 0.85 standard. Like the chi-square statistics, however, the ERLS method demonstrates better fit across each of these indices as well, meeting the more rigorous standard for fit statistics in excess of 0.90 (Byrne 1994).

Further analysis of the CFA provides assessment of convergent and discriminant validities. By definition, convergent validity means that “evidence from different sources gathered in different ways all indicates the same or similar meaning of the construct [or that] different methods should converge on the construct” (Kerlinger 1986, p. 421). Primary assessments of convergent validity include an overview of the CFA factor loadings (lambdas) and modification indices. Table 4.8 reports the standardized factor loadings and t-values for the measurement model. The parameter column in the table refers to the factor loading of the measurement item to its respective factor. The magnitude of the loadings and the associated t-values indicate that the items load heavily on their hypothesized factors given that they are all significant at .05 level of significance, with t-values exceeding 1.96.

Table 4.8 Confirmatory Factor Analysis for Measurement Model

Parameter	Standardized Estimate	t-Value^a
BI1	0.888	--- ^b
BI2	0.915	18.367
A1	0.914	--- ^b
A2	0.744	18.574
A3	0.956	34.046
A4	0.955	33.912
A5	0.799	21.299
SN1	0.621	--- ^b
SN2	0.922	12.873
SN3	0.881	12.877
PBC1	0.701	--- ^b
PBC2	0.801	12.712
PBC3	0.806	12.754
EI1	0.851	--- ^b
EI2	0.724	7.024
PA1	0.656	--- ^b
PA2	0.676	11.193
PA3	0.877	13.605
PA4	0.883	13.639
PEC1	1.000	--- ^b
PI1	1.000	--- ^b
CON1	0.704	--- ^b
CON2	0.711	11.327
CON3	0.688	11.037
CON4	0.732	11.568

^a t-values are derived from the unstandardized solution

^b t-values for these parameters are not available since they were fixed for scaling purposes

In addition to the factor loadings presented in Table 4.8, several factors were allowed to covary in the measurement model. A few additional covariances among exogenous variable were anticipated, namely EI-PA and PA-PI, but these were dropped as a result of Wald Test results. The values derived for the estimated parameters (phis) are shown in Table 4.9. All covariances were significant as indicated by the high t-values. This demonstrates the considerable inter-relatedness among the constructs. Of

particular interest are the negative economic incentives-convenience (EI-CON) and perceived economic costs-convenience (PEC-CON) covariances. The results in the table provide substantial foresight of the structural model to follow

Table 4.9 Estimated Covariances among Latent Factors

Parameter	Unstandardized Estimate	t-Value
A-BI	0.636	6.457
SN-BI	0.890	6.224
PBC-BI	1.091	7.567
A-SN	0.243	4.563
A-PBC	0.243	4.878
SN-PBC	0.380	5.286
EI-PEC	0.437	4.147
EI- CON	-0.887	-5.643
PA-CON	0.146	2.426
PEC-CON	-0.505	-5.073
PI-CON	0.740	4.785

Aside from the few covariance parameters noted above, the Wald Test modification index indicated that no other parameters should be dropped from the measurement model. The Lagrange Multiplier (LM) Test, another modification index, was then used to identify potential improvements in model fit resulting from measurement model respecification, or the re-assignment of items to factors. While the LM Test indicated that model fit could be improved through respecification, these suggestions could not be supported in a nomonological sense. That is, the LM Test suggestions were counter to any a priori characterizations of the constructs and, therefore, were not approached. In sum, the preponderance of significant loadings and rational assessments of modification indices provide considerable support for convergent validity

in the measurement model.

Discriminant validity refers to the differentiation among constructs that may be similar (Kerlinger 1986). Support for discriminant validity can be found by running successive confirmatory factor analyses where correlations (phis) among latent variables thought to be similar are fixed equal to one. If model fit does not improve significantly as result of this fixed parameter, as measured by the chi-square difference test, there is support for discriminant validity in the model (Bagozzi and Yi 1988). Application of this nested-model approach suggested by Bagozzi and Yi (1988) demonstrated that model fit failed to improve significantly in successive CFA models. This serves as support for discriminant validity among the constructs.

A final estimation of validity, nomological validity, assesses how well the measurement items represent the construct of interest. To a large extent, nomological validity is a judgment call (Kerlinger 1986). Discussion of the single-item measurements for PEC and PI has already presented the difficulties incurred in measuring these constructs. The only other construct with questionable nomological validity is economic incentives. The operationalization of this construct utilizes two measures that together look to identify a different latent variable. A review of the measurements used for this construct in Table 4.6 indicates that rather than economic incentives, economic expectations were measured in the study. With this in mind, the interpretation of relationships involving this construct diverge substantially from the original conception of economic incentives.

Given a sound overall assessment of the measurement model, attention now turns toward the tests of hypotheses. Again, while only the full sample of newspaper data was

discussed here, all relevant samples received similar assessments of measurement model soundness. These results are presented in tabular form in Appendix C and briefly summarized in appropriate sections of this chapter.

HYPOTHESIS TESTS

This section presents the results of primary interest in the study. Each research question is restated below with its accompanying hypotheses and results. To review briefly, the first research question (A.1) examines a proposed model of recycling behavior. The second set of research questions (B.1 and B.2) assesses the universality of the proposed model across a series of materials as well as legislative and city settings. The final set of research questions (C.1 through C.4) has no accompanying hypotheses but rather explores the managerial implications of the study's findings. This section proceeds by examining each hypothesis in detail. We begin with research question A.1:

A. Factors of Consumer Participation and Relative Influence

1. What factors shape the consumer's willingness to recycle?

Research question A.1 tests the adequacy of the Model of Managerially-Influenced Recycling Behavior proposed in Chapter Two. The proposed model appears again in Figure 4.2. A structural equation modeling approach will be used to assess the model's overall goodness-of-fit using the same criteria outlined above in the CFA.

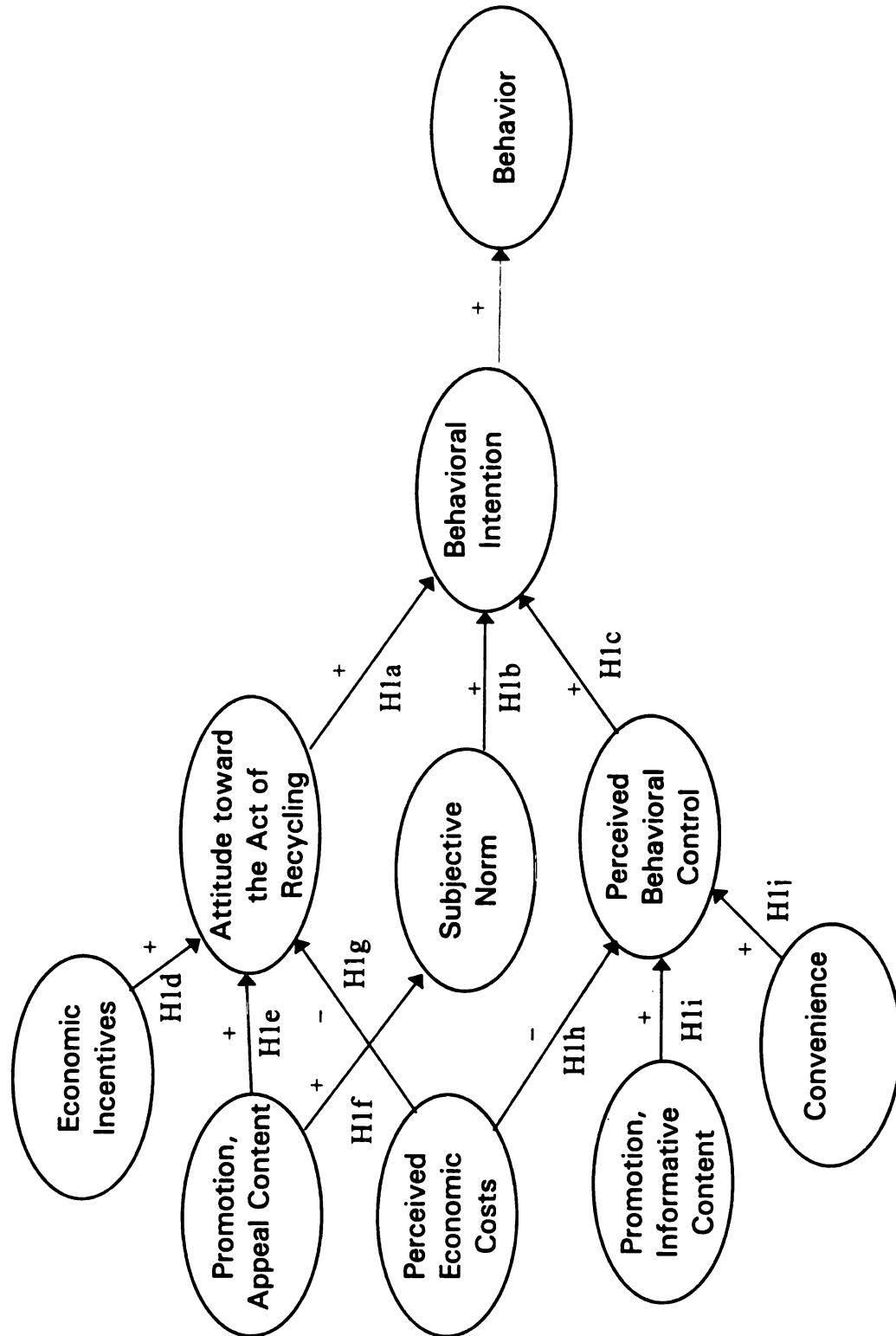


Figure 4.2 The Model of Managerially-Influenced Recycling Behavior

Whereas the CFA above focused on the measurement model, this analysis focuses on the full model -- a combination of the measurement and structural models. The structural model refers to the hypothesized relationships among latent constructs. These relationships are represented by hypotheses H1a through H1j (see Figure 4.2). The hypotheses indicate the anticipated presence and direction of effects associated with the various model relationships. In order to support each hypothesis, the full model must first demonstrate acceptable goodness-of-fit per the criteria above. Given acceptable model fit, the parameter estimates (gamma or beta regression weights) attached to the paths of hypothesized relationships must have the anticipated sign (positive or negative) and be significantly different from zero (as indicated by a t-value greater than 1.96 at an alpha level of .05).

The model proposed in Figure 4.2 obtained the goodness-of-fit statistics reported in Table 4.10 below. These statistics are based upon the elliptical reweighted least squares (ERLS) estimation method given the sample's non-normality. Like with the measurement model, the chi-square alone would suggest a poorly fitting model. However, the sum of the remaining four indices all point toward sound model fit. The normed chi-square is acceptable at 2.83, demonstrating parsimonious fit. The BBNFI, BBNNFI and CFI statistics all provide support of acceptable fit as well by exceeding 0.90. Given this preponderance of evidence, the model looks to fit the data soundly and suggests that one may continue by examining the model paths that represent hypotheses. Each hypothesis will be examined in order.

Table 4.10 Full Model Fit Statistics

Chi-square	755.67	p < 0.001
Normed chi-square	2.83	(df = 267)
BBNFI	0.922	
BBNNFI	0.941	
CFI	0.948	

Figure 4.3 and Table 4.11 below present the results of the full model analysis. The left side of the table reports the factor loadings of the measurement model while the right side illustrates the gamma and beta regression weights attached to the model's hypothesized paths. The first of the model's ten hypotheses is stated as follows:

H1a: One's attitude toward the act of recycling will have a positive effect on behavioral intention to recycle.

It is hypothesized that, consistent with both Fishbein and Ajzen's (1980) theory of reasoned action (TRA) and Ajzen's (1985) theory of planned behavior (TPB), the more favorable one's attitude is toward the act of recycling, the more likely he is to form the intention to recycle. The estimates for the A-BI parameter (0.234) and its t-value (4.859) reported in the table provide support for H1a. The t-value exceeds the t-critical value of 1.96 to demonstrate statistical significance at an alpha level of .05. It appears as though one's attitude toward the act of recycling newspapers is influential in shaping behavioral intention to recycle newspapers. The positive nature of this relationship suggests that those with more favorable attitudes will be more likely to recycle. This result is consistent with the theories of reasoned action and planned behavior.

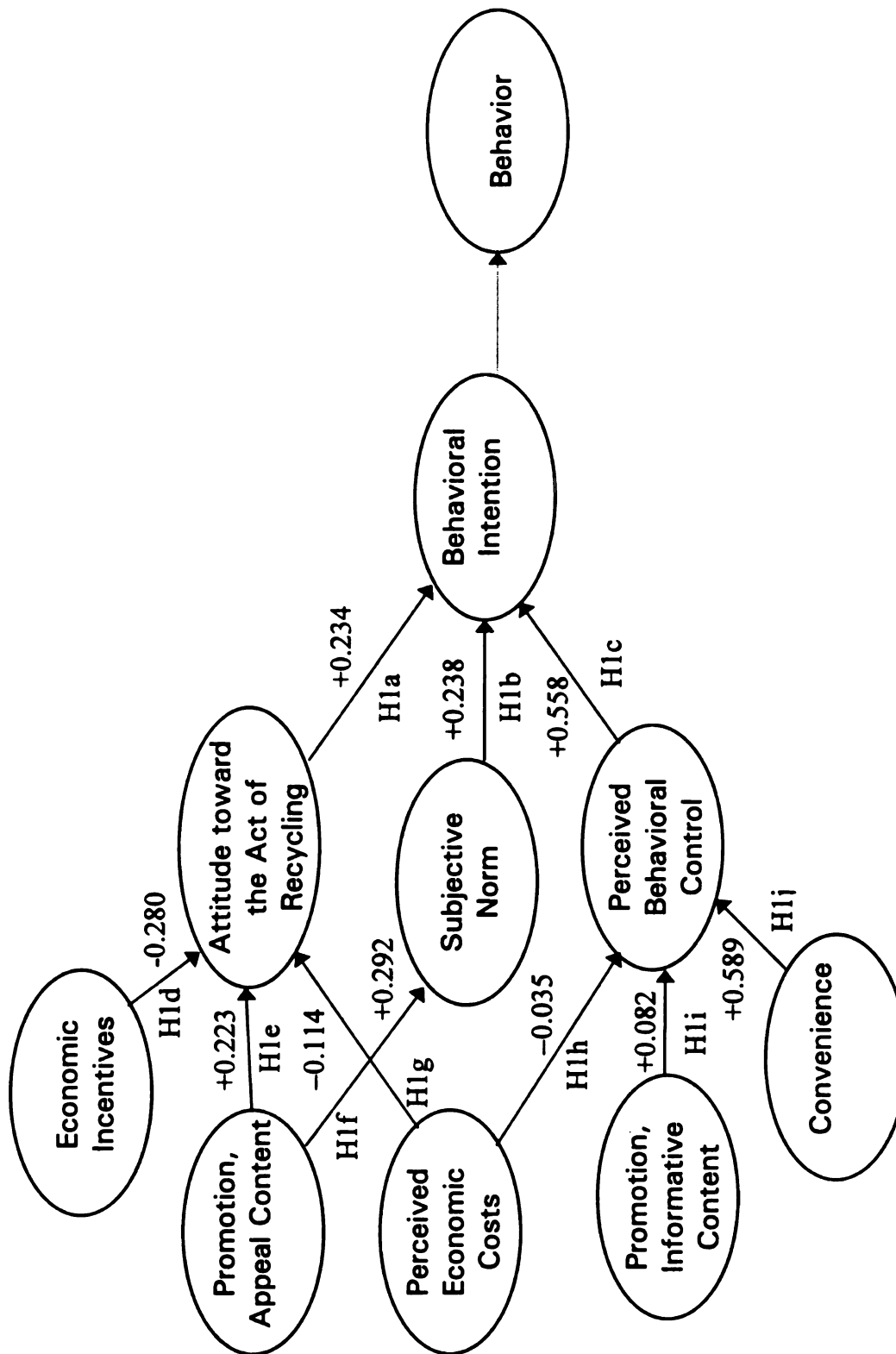


Figure 4.3 Results of the Full Model Analysis (Standardized Estimates)

Table 4.11 Parameter Estimates for the Full Model

Measurement Model			Structural Model		
Parameter	Standardized Estimate	t-Value ^a	Parameter	Standardized Estimate	t-Value ^a
BI1	0.870	--- ^b	A-BI	0.234	4.859
BI2	0.902	15.556	SN-BI	0.238	4.585
A1	0.912	--- ^b	PBC-BI	0.558	8.590
A2	0.741	18.396	EI-A	-0.280	-3.997
A3	0.956	33.666	PA-A	0.223	4.031
A4	0.954	33.509	PA-SN	0.292	4.661
A5	0.797	21.098	PEC-A	-0.114	-2.264
SN1	0.612	--- ^b	PEC-PBC	-0.035	-0.685
SN2	0.930	12.523	PI-PBC	0.082	1.617
SN3	0.876	12.631	CON-PBC	0.589	7.897
PBC1	0.673	--- ^b			
PBC2	0.776	11.935			
PBC3	0.811	12.191			
EI1	0.846	--- ^b			
EI2	0.728	4.745			
PA1	0.661	--- ^b			
PA2	0.676	11.268			
PA3	0.878	13.767			
PA4	0.879	13.632			
PEC1	1.000	--- ^b			
PI1	1.000	--- ^b			
CON1	0.710	--- ^b			
CON2	0.726	11.761			
CON3	0.676	11.088			
CON4	0.758	12.128			

^a t-values are derived from the unstandardized solution

^b t-values for these parameters are not available since they were fixed for scaling purposes

H1b: One's subjective norm will have a positive effect on behavioral intention to recycle.

Consistent with both the TRA and TPB models, it is believed that the actor's perceptions of others' opinions are integral when shaping behavioral intention. When the actor perceives that others want for him to recycle, the actor is more likely to form the

intention to recycle. This hypothesis finds support in the current analysis as well. Table 4.11 reports that the SN-BI relationship is positive and significant. The full sample data indicate that the opinions perceived to be held by significant others (family, friends and neighbors) influenced the respondents' own intentions to recycle newspapers.

H1c: One's perceived behavioral control will have a positive effect on behavioral intention to recycle.

Consistent with Ajzen's (1985) theory of planned behavior, it is believed that when the actor perceives the recycling decision to be under his own control, the more likely he is to form the intention to recycle. Hypothesis H1c also finds support in the current analysis. The PBC-BI parameter is positive and significant as anticipated. Not only is the relationship positive and significant, but the magnitudes of the effect size and t-value demonstrate the considerable effect this construct directs toward intention. It is very clear from these results that the actor's perceived level of behavioral control is perhaps most influential in shaping intentions. The actor is thought to have control over his recycling behavior when he perceives himself to have the knowledge, skills and resources required to fulfill the behavior. Quite simply, the actor is more likely to recycle newspaper when he perceives the task to be easy.

The following seven hypotheses (H1d, e, f, g, h, i and j) are derived from the four strategic dimensions identified by Everett (1996-97). The external variables identified by these hypotheses represent tools that managers and policy makers have at their disposal to influence behavior. These variables (market incentives, coercive incentives, program promotion and convenience strategies) reflect the marketing mix that managers of traditional products utilize in their marketing efforts. These extrinsic motives are

believed to influence recycling intentions indirectly, with intrinsic motives mediating their effects.

H1d: Economic incentives will have a positive effect on one's attitude toward the act of recycling.

As suggested by Everett (1996-97), market incentives, or monetary returns for program participation, should favorably influence recycling behavior. In accordance with Figure 4.2, economic incentives (EI) will first influence the actor's attitude toward the act (A) and subsequent behavior. While Table 4.11 indicates that there is a significant relationship between economic incentives and attitude, the relationship is an inverse one. Recall that economic incentives were to serve as either positive or negative reinforcement of one's attitude toward recycling. This finding would argue the contrary.

One must examine the operationalization of the construct to justify the break from the expected outcome. As noted in Chapter Three, the measurement items for economic incentives were adapted from Pelton et al. (1993). The first item examines one's expectations of monetary return for recycling. The second item examines the importance of the return. As noted previously, these measures tend to point to economic expectations rather than the influence of incentives. In hindsight, one might expect that economic expectations measured as such act independently of attitude. That is, the presence of economic incentives may not necessarily affect one's attitude, yet still be influential toward one's ultimate behavior. The discussion of economic incentives as such should be conditioned with the given operationalization in mind.

In another regard, it may be unrealistic to expect monetary returns for newspaper recycling efforts given the relatively low value of the material. Even during peak

demand periods, one can only expect a few pennies per pound of newspapers. Therefore, the EI-A relationship will be of particular interest when investigating the more valuable beverage containers. The managerial implications of the current finding will be explored in Chapter Five.

H1e: Appeal promotions will have a positive effect on one's attitude toward the act of recycling.

It is hypothesized that promotional messages that make potential program participants aware of the personal and societal benefits of recycling are likely to have a positive influence on the actor's attitude toward the act of recycling (Pieters 1991). These messages may range in form from personal, direct appeals to mass media efforts. Consistent with the managerial perspective of the study, appeal promotions were operationalized as mass media efforts that seek to achieve greater awareness of recycling initiatives and broader environmental problems. The PA-A parameter supports this contention. The data show that the persuasiveness of recycling advertisements across a variety of media outlets demonstrates considerable influence on one's attitude. This finding is consistent with those of Goldenhar and Connell (1991-92) as well as those of Hopper and Nielson (1991).

H1f: Appeal promotions will have a positive effect on one's subjective norm.

Just as appeal promotions are anticipated to influence one's attitude toward the act of recycling (as suggested in H1e above), it is hypothesized that awareness of these advertised messages will also affect the actor's perception of referents' opinions. The data support this contention. It appears that the actor is likely to believe that his family

and friends have seen the same advertisements. This subsequently elevates his belief that others expect him to behave in a manner consistent with the promotional message (per H1b). While studies have examined the influence of appeal promotions on one's attitude toward the act and recycling behavior respectively, none has examined the role of these promotions as they affect the actor's subjective norm. Therefore, appeal promotions look to influence recycling behavior by way of their effects on attitude toward the act (H1e) and subjective norm (H1f).

H1g: The perceived economic cost of participation will have a negative effect on one's attitude toward the act of recycling.

The hypothesis states that should the actor perceive the economic cost of participating in recycling to be high, then this will have a negative influence on his attitude toward the act or recycling. The construct of perceived economic cost of participation is rarely operationalized. The single-item scale used to measure this construct indicates that the hypothesized PEC-A relationship holds. Should the actor feel that he pays too much for his recycling service, his attitude toward the act of recycling is anticipated to be lower and, as shown in hypothesis H1a, he will be less likely to recycle. While a degree of caution might be considered given the operationalization of this construct, the single item used to measure the construct convincingly captures its essence.

H1h: The perceived economic cost of participation will have a negative effect on one's perceived behavioral control.

Just as the perceived economic cost of participation was shown to have a negative effect on attitude, the same is thought to be true for its relationship with perceived behavioral

control (PBC). The non-significant parameter for the PEC-PBC relationship shown in Table 4.11 indicates that there is no such effect. The negative sign of the parameter is consistent with the expected sign though the parameter's magnitude is insufficient to support the inference. Therefore, it does not appear that the perceived cost of newspaper recycling prohibits the behavior economically though it can influence one's attitude toward the act. Again, like the PEC-A link, this relationship will assume greater interest in the beverage container scenario where the material is viewed as more valuable and the cost of service considerably higher, particularly in bottle bill states.

H1i: Informative promotions will have a positive effect on one's perceived behavioral control.

Promotional efforts that provide informative, instructional content were hypothesized to have a positive effect on the actor's perceived ability to recycle effectively. In other words, having knowledge of which materials and exactly how to recycle should make the actor feel more in control over his recycling actions (Pieters 1991). The data provide no support for this hypothesis. This finding suggests that high levels of instruction information do not necessarily contribute to one's confidence of able recycling. On the other hand, low levels of information do not apparently hinder one's feeling of control.

H1j: Convenience will have a positive effect on one's perceived behavioral control.

Again, convenience is a construct of primary interest in the study. While providing consumers with the knowledge to fulfill the recycling behavior was thought to be important (as noted in Hypothesis H1i), perhaps even more important is providing

consumers with convenient access to recycling alternatives. The very strong relationship between convenience and perceived behavioral control is apparent in the magnitude of the parameter estimate (0.589). As a result, we can say that convenience has substantial influence on perceived behavioral control, but also given the strength of the PBC-BI link, convenience has a very strong indirect, total effect on behavioral intention. These findings support the idea forwarded by Pieters (1991) that managers can enhance convenience by providing any one or combinations of the following: 1) closer proximity, 2) higher availability with regard to hours of operation, and 3) minimal complexity in sorting and storage for consumers.

In summary, the hypothesized measurement and structural models demonstrated sound fits with the full sample of newspaper data. Seven of the ten hypotheses that composed the Model of Managerially-Influenced Recycling Behavior were supported in the analysis. Table 4.12 below provides a brief overview of the findings. Hypothesis H1d was not supported. In fact, the relationship hypothesized to be positive was found to be significant but inverse. This finding is thought to be a function of the operationalization of economic incentives in the study. The remaining two unsupported hypotheses (H1h and H1i) demonstrated the anticipated sign though lacked the magnitude in effect sizes to infer a significant relationship. The model and its findings are laden with theoretical and managerial implications to receive fuller treatment in Chapter Five.

Table 4.12 Overview of Hypothesis Test Findings, Newspapers

Hypothesis	Model Path	Findings
H1a	A-BI	Supported
H1b	SN-BI	Supported
H1c	PBC-BI	Supported
H1d	EI-A	Not supported -- inverse relationship
H1e	PA-A	Supported
H1f	PA-SN	Supported
H1g	PEC-A	Supported
H1h	PEC-PBC	Not supported -- non-significant relationship
H1i	PI-PBC	Not supported -- non-significant relationship
H1j	CON-PBC	Supported

The analysis to this point has focused on the full sample of newspaper responses. While hypothesis H2 examines the comparable predictability for the model across newspaper and beverage containers, a brief examination of beverage containers in a single-group SEM analysis would prove insightful. Appendix C reports the descriptive statistics and scale reliabilities for this sample in Tables C.1 and C.2. The beverage container data demonstrate tendencies toward non-normality similar to the newspaper sample. The ERLS estimation method will, therefore, be used in subsequent SEM analysis of the beverage container data. Reliability estimates for the seven multiple-item scales range between 0.7531 and 0.9154, all above the 0.70 standard established by Nunnally (1978).

Table C.3 reports the acceptable fit of the measurement model applied to the full sample of beverage container responses with a chi-square statistic of 638.38 (266 degrees of freedom) and fit indices ranging from 0.916 to 0.949. Factor loadings, the lack of significant, theoretically sound modification indices and non-significant chi-square difference tests provide support for convergent and discriminant validity.

The full model demonstrated sound fit as well with a chi-square of 723.21 (267 degrees of freedom) and fit indices ranging from 0.905 to 0.938. Table 4.13 provides parameter estimates and t-values for the measurement and structural parameters of the full model. The structural model results provide a test of hypotheses H1a through H1j for the full sample of beverage container data.

Table 4.13 Parameter Estimates for the Full Model, Beverage Containers

Measurement Model			Structural Model		
Parameter	Standardized Estimate	t-Value ^a	Parameter	Standardized Estimate	t-Value ^a
BI1	0.779	--- ^b	A-BI	0.264	4.855
BI2	0.859	10.939	SN-BI	0.349	5.545
A1	0.893	--- ^b	PBC-BI	0.437	6.496
A2	0.822	20.858	EI-A	0.014	0.261
A3	0.817	20.651	PA-A	0.199	3.441
A4	0.882	23.891	PA-SN	0.258	4.058
A5	0.751	17.801	PEC-A	-0.069	-1.294
SN1	0.624	--- ^b	PEC-PBC	-0.025	-0.472
SN2	0.801	11.390	PI-PBC	0.090	1.656
SN3	0.858	11.371	CON-PBC	0.508	6.667
PBC1	0.687	--- ^b			
PBC2	0.681	10.540			
PBC3	0.799	11.241			
EI1	0.610	--- ^b			
EI2	1.000	14.694			
PA1	0.664	--- ^b			
PA2	0.678	11.400			
PA3	0.877	13.894			
PA4	0.878	13.900			
PEC1	1.000	--- ^b			
PI1	1.000	--- ^b			
CON1	0.663	--- ^b			
CON2	0.698	10.411			
CON3	0.728	10.671			
CON4	0.676	10.192			

^a t-values are derived from the unstandardized solution

^b t-values for these parameters are not available since they were fixed for scaling purposes

Table 4.14 below presents an overview of the findings for the beverage container sample. Six of the ten hypotheses found in the Model of Managerially-Influenced Recycling Behavior were supported with this data set. Recall that seven of the ten paths were supported with the newspaper sample. The supported hypotheses include H1a, b, c, e, f and j. Hypothesis H1d (EI-A) is not supported for a different reason in the beverage sample than in the newspaper sample. The relationship in the beverage sample demonstrates the anticipated positive sign though it lacks the magnitude to be statistically significant. This relationship was significant, though inverse, for newspapers. Hypothesis H1g (PEC-A) was supported in the newspaper sample, but not with the beverage containers. This finding is interesting given the higher value and higher cost of collection typically associated with beverage containers. Like with newspapers, H1h (PEC-PBC) and H1i (PI-PBC) were not significant in the beverage sample.

Table 4.14 Overview of Hypothesis Test Findings, Beverage Containers

Hypothesis	Model Path	Findings
H1a	A-BI	Supported
H1b	SN-BI	Supported
H1c	PBC-BI	Supported
H1d	EI-A	Not supported -- non-significant relationship
H1e	PA-A	Supported
H1f	PA-SN	Supported
H1g	PEC-A	Not supported -- non-significant relationship
H1h	PEC-PBC	Not supported -- non-significant relationship
H1i	PI-PBC	Not supported -- non-significant relationship
H1j	CON-PBC	Supported

This comparison of measurement and structural models previews analysis associated with hypothesis H2, where the predictability of the Model of Managerially-Influenced Recycling Behavior is anticipated to be equivalent across newspaper and

beverage container samples. This cursory investigation of the two models demonstrates considerable parallels in model fit and hypothesized relationships though a few key differences are apparent in the samples.

Investigation of the next set of research questions provides a more rigorous assessment of measurement and structural model invariance across the materials and settings of interest. This series of research questions as a whole addresses the universality of the model developed in the first research question. More specifically, these questions investigate the application of the Model of Managerially-Influenced Recycling Behavior across materials, legislative settings and city settings. While the same data already examined in the first two analyses are used for these investigations, the inquiries are independent of one another. Therefore, the findings in one cross-section of the data need not suggest biases present in subsequent analyses.

B. Universality of the Factors of Consumer Participation

1. Does the model of consumer recycling behavior identified in the first objective apply uniformly across different varieties of recyclable material?

This research question examines the model's application to alternative materials. The extant recycling literature provides little insight to suggest that there would be differences between materials. It is common, however, for different recyclable materials to require different techniques and varying levels of care in transporting, sorting, and storing. For example, beverage containers must often be clean of residues in order to be accepted by curbside or retail collectors. Care must also be taken to ensure that the containers remain undamaged for redemption. Meanwhile, newspapers require very little care in storage

and transportation.

As noted previously, however, these differing characteristics may be captured in the model's constructs. That is, these differences will be embodied in the varying levels of incentives, costs, promotions and convenience and should be reflected in varying levels of the dependent variables they affect. This analysis is interested in effect sizes rather than individual means. These effects are represented by factor loadings in the measurement model and path sizes in the structural model. So long as relationships hold across settings of interest, mean differences across the settings are irrelevant in this particular analysis. This possibility is captured in the first hypothesis of this research question set.

H2: The hypothesized model will predict recycling behavior equally well across a variety of materials.

The process for testing hypotheses of this research question set include an independent investigations of measurement model invariance and structural (causal) model invariance. Figure 4.4 below illustrates the basic approach to multiple-group analysis of measurement and structural models suggested by Byrne (1994). While the most managerially relevant inferences are gained from the comparisons of causal path effect sizes (structural model invariance), one must first assess the invariance or comparability of the underlying measurement model across samples. Measurement model invariance suggests that the factor loadings across two or more samples are essentially equivalent. The invariance of model fit across samples is assessed by constraining the model parameters to be equal across samples. A single set of goodness-of-fit statistics is derived for the multiple groups to determine how well the model-implied covariances of

model the fit the multiple data sets. A multivariate LM Test is then used to determine whether the model fit could be significantly improved by releasing (freeing) one or more constraints (Byrne 1994). If constraints must be released, only partial measurement model invariance is achieved. Bentler (1989) and Bollen (1989) note, however, that partial measurement model invariance is sufficient when structural model equivalency is of primary interest.

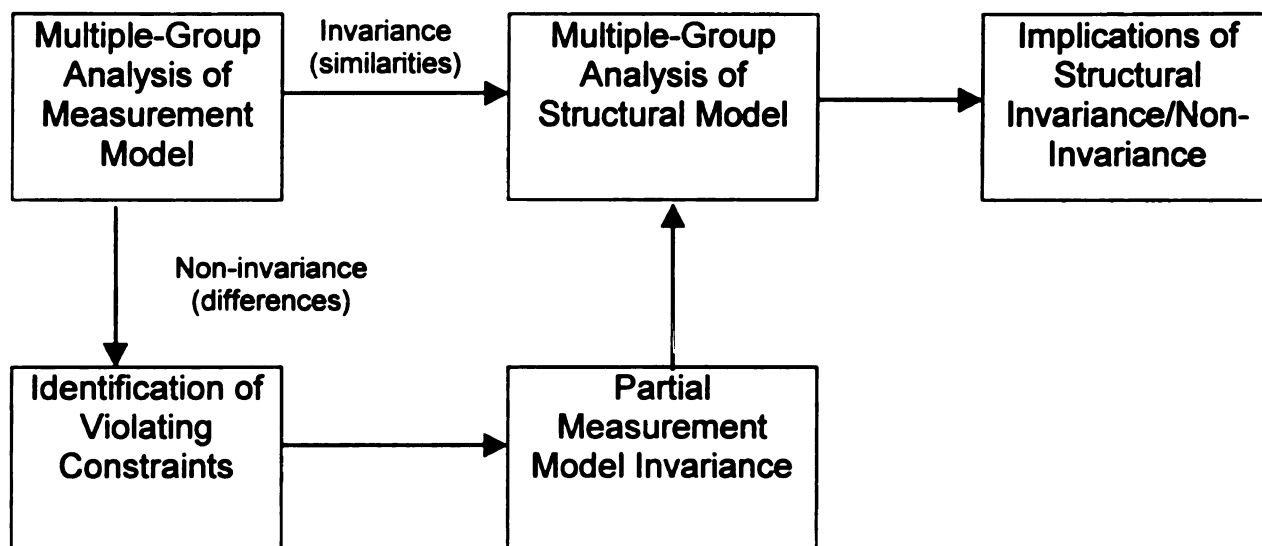


Figure 4.4 Testing for Model Invariance across Samples

The multiple-group measurement model for newspapers and beverage containers resulted in a chi-square statistic of 1324.24 with 548 degrees of freedom. This equates to an acceptable normed chi-square ratio of 2.41. The BBNFI, BBNNFI and CFI values ranged from a low of 0.924 (BBNFI) to a high of 0.954 (CFI), demonstrating sound overall model fit. The results of the individual tests of factor loading invariance across

the newspaper and beverage container samples appear in Table 4.15 below. Note that only those factor loadings that can be freely estimated are included in the analysis. Those loadings fixed to one for scaling purposes cannot be included in the analysis (Byrne 1994). The lack of any constraints with p-values below .05 suggests that the factor loadings do not vary significantly across samples. This provides support for measurement model invariance across the two materials.

Table 4.15 LM Test Results for Multiple-Group Measurement Model, Materials

Constrained Parameter	Chi-square Increment^a	p-Value
BI2-BI	1.903	0.168
A2-A	0.826	0.363
A3-A	2.813	0.093
A4-A	0.050	0.824
A5-A	0.071	0.789
SN2-SN	0.259	0.611
SN3-SN	1.808	0.179
PBC2-PBC	0.469	0.493
PBC3-PBC	0.049	0.825
EI2-EI	0.203	0.652
PA2-PA	0.000	0.985
PA3-PA	0.000	0.992
PA4-PA	0.000	0.996
CON2-CON	0.006	0.938
CON3-CON	2.603	0.107
CON4-CON	0.416	0.519

^a The univariate chi-square increment is derived from the multivariate LM Test

Given the outcome of measurement model invariance, interest can now turn to the structural model comparison. Recall that the test of structural model invariance examines the equivalency of causal paths (effect sizes) across samples. Table 4.16 below provides the results of this analysis. Note that only the causal paths are constrained in this

analysis. The results indicate that two paths are invariant across the material samples given their p-values below .05. The economic incentives-attitude (EI-A) path represents the relationship with the greatest disparity in effect size. This result should be anticipated given the findings from the previous, independent analyses of newspaper and beverage container recycling. Recall the surprising result of the negative, significant EI-A path in the newspaper sample in contrast to the non-significant effect of this path in the beverage sample.

Table 4.16 LM Test Results for Multiple-Group Structural Model, Materials

Constrained Parameter	Chi-square Increment^a	p-Value
A-BI	0.006	0.936
SN-BI	0.230	0.631
PBC-BI	4.818	0.028
EI-A	13.478	0.000
PA-A	2.387	0.122
PEC-A	2.028	0.154
PA-SN	0.024	0.876
PEC-PBC	0.220	0.639
PI-PBC	0.024	0.876
CON-PBC	1.606	0.205

^a The univariate chi-square increment is derived from the multivariate LM Test

As expected, the multiple-group analysis suggests that the effect of economic incentives on one's attitude is different depending upon the material to be recycled. This can likely be explained by the relative size of the respective incentives one can expect from recycling the two materials. The operationalization of economic incentives did not measure the presence or magnitude of incentives but rather the motivation provided by some unquantified incentive. The respondents perhaps have the expectation that

incentives for newspaper recycling pales in comparison to that of beverage containers, particularly in the bottle bill states. With this expectation in mind, the incentives placed on newspaper recycling may almost appear whimsical, resulting in a poorer attitude toward newspaper recycling.

The second path to demonstrate non-invariance (effect size difference) is the perceived behavioral control-behavioral intention (PBC-BI) path. While the path was positive and significant across both materials, the larger magnitude of the newspaper parameter apparently was enough to suggest a non-invariant effect. Therefore, it seems that one's perceived behavioral control, or control that one feels he has over the recycling activity, is more influential when newspapers serve as the targeted material. Given the presence of these two invariant paths, hypothesis H2 is completely not supported in this analysis under a strict omnibus interpretation of equivalence throughout the model. The model does demonstrate considerable predictability across materials, however.

The next series of multiple-group analyses examines the application of the Model of Managerially-Influenced Recycling Behavior across geographical settings. Research question 2 is restated below.

2. Does the model of consumer recycling behavior identified in the first objective apply uniformly across legislative and city settings?

This research question inquires of the model's application across two different geographic cross-sections of the data. The legislative settings refer to the presence of and deposit amount associated with bottle bill legislation in various states. Given that the bottle bill

is applied to the redemption of empty beverage containers, beverage containers will serve as the material of interest in this analysis. The city settings also mentioned in the research question refer to the trichotomy of rural, suburban and metropolitan localities. Newspapers will serve as the targeted material for this investigation given that little to no incentive is usually attached to these materials. This should help to eliminate potential biases that may be found with beverage containers within a state. The first hypothesis of this question set is stated below.

H3a: The hypothesized model will predict recycling behavior equally well across legislative conditions.

This research question suggests that it is possible for people, under different legislative scenarios, to have similar influences shape their recycling behavior. The hypothesis assumes the position of a null hypothesis, expecting no effect differences across legislative settings. The legislative settings refer to the three different state-mandated bottle bill positions identified in Chapter One: the ten-cent deposit of Michigan, the five-cent deposit of Iowa and six other states and the lack of a bottle bill as in Kansas and 38 other states.

The individual reliability and CFA results for these samples appear in Appendix C. To summarize, the multiple-group measurement model for the legislative setting resulted in a chi-square statistic of 1260.45 with 830 degrees of freedom. This equates to an excellent normed chi-square ratio of 1.52. The BBNFI, BBNNFI and CFI values ranged from a low of 0.852 (BBNFI) to a high of 0.944 (CFI), demonstrating sound overall model fit. The results of the individual tests of factor loading invariance across

the legislative settings appear in Table 4.17 below.

Table 4.17 LM Test Results for Multiple-Group Measurement Model, Legislative

Non-deposit and 5-cent deposit			Non-deposit and 10-cent deposit		
Constrained Parameter	Chi-square Increment ^a	p-Value	Constrained Parameter	Chi-square Increment ^a	p-Value
BI2-BI	0.660	0.416	BI2-BI	1.001	0.317
A2-A	2.040	0.153	A2-A	0.506	0.477
A3-A	11.622	0.001	A3-A	0.003	0.958
A4-A	0.986	0.321	A4-A	5.642	0.018
A5-A	3.142	0.076	A5-A	2.766	0.096
SN2-SN	0.152	0.697	SN2-SN	4.315	0.038
SN3-SN	0.024	0.877	SN3-SN	0.077	0.782
PBC2-PBC	0.438	0.508	PBC2-PBC	1.862	0.172
PBC3-PBC	0.757	0.384	PBC3-PBC	0.165	0.685
EI2-EI	0.359	0.549	EI2-EI	0.516	0.473
PA2-PA	0.003	0.955	PA2-PA	0.058	0.809
PA3-PA	0.184	0.668	PA3-PA	0.111	0.739
PA4-PA	1.515	0.218	PA4-PA	0.181	0.671
CON2-CON	1.187	0.276	CON2-CON	4.607	0.032
CON3-CON	0.216	0.642	CON3-CON	0.779	0.377
CON4-CON	0.133	0.715	CON4-CON	0.095	0.757

^a The univariate chi-square increment is derived from the multivariate LM Test

Note that the EQS program creates a total of 32 constraints from the original 16 factor loading constraints across the three groups. The 32 constraints provide full information of the sample comparisons by way of the commutative property (where if X equals Y and Y equals Z, then X equals Z). A review of the table points out that four constrained parameters have significant p-values according to the LM Test. These parameters include A3-A in the non-deposit and five-cent deposit samples and A4-A, SN2-SN and CON2-CON in the non-deposit and ten-cent deposit samples. By way of the commutative property, it is apparent that the A3-A loading is unique to the five-cent

setting with the remaining significantly different loadings (A4-A, SN2-SN and CON2-CON) unique to the ten-cent setting. The release of these four constraints would allow only for partial measurement model invariance across the groups, but it would improve the model fit significantly. Given that no pattern is apparent among the violating factor loadings, these constrained parameters were allowed free across settings. This action lowered the chi-square statistic by 38.27 (with four fewer degrees of freedom). The effect on the fit indices was minimal. The fact that only four of the 32 constraints proved troublesome provides support for incomplete, though considerable, measurement model invariance across the three settings.

Attention now turns to the structural model comparisons. The model demonstrated comparably good fit to the measurement model with a chi-square statistic of 1336.27 and 821 degrees of freedom. The goodness-of-fit estimates ranged from 0.843 (BBNFI) to 0.933 (CFI). Table 4.18 below provides the individual path results of this analysis. The results indicate that two paths are invariant across the legislative settings given their p-values below .05. The first difference is found in the appeal promotions-subjective norm (PA-SN) path across the non-deposit and five-cent deposit settings. The second difference is found in the informative promotions-perceived behavioral control (PI-PBC) path across the non-deposit and ten-cent deposit settings. Application of the commutative property identifies the PA-SN path unique for the five-cent setting and the PI-PBC path unique for the ten-cent setting (Michigan).

The individual full model analyses for these samples appear in Appendix D. An examination of these analyses demonstrates the differences in effects suggested by the present multiple-group analysis. As for the PA-SN non-invariance between the five-cent

and other two settings, the relationship was positive and significant in the non-deposit and ten-cent settings. The same relationship was non-significant in the five-cent deposit setting. This finding suggests that appeal promotions carry have greater influences in the non-deposit and ten-cent settings. A definitive explanation of this finding is difficult.

Table 4.18 LM Test Results for Multiple-Group Structural Model, Legislative

Non-deposit and 5-cent deposit			Non-deposit and 10-cent deposit		
Constrained Parameter	Chi-square Increment ^a	p-Value	Constrained Parameter	Chi-square Increment ^a	p-Value
A-BI	0.114	0.736	A-BI	0.018	0.893
SN-BI	0.357	0.550	SN-BI	0.007	0.934
PBC-BI	0.813	0.367	PBC-BI	0.038	0.845
EI-A	0.659	0.417	EI-A	3.705	0.054
PA-A	3.349	0.067	PA-A	0.048	0.827
PEC-A	0.405	0.525	PEC-A	0.017	0.897
PA-SN	4.035	0.045	PA-SN	0.168	0.682
PEC-PBC	1.346	0.246	PEC-PBC	1.140	0.286
PI-PBC	0.080	0.777	PI-PBC	7.116	0.008
CON-PBC	1.466	0.226	CON-PBC	2.020	0.155

^a The univariate chi-square increment is derived from the multivariate LM Test

While interest is placed in the effect sizes of the paths, examination of analysis of variance (ANOVA) tests find no mean differences between the three groups across the individual promotion items. ANOVAs for the subjective norm items found differences between the settings across all three items. These differences, however, identified that the subjective norm items were significantly lower in the non-deposit setting. This lends little insight as to why the strength of the PA-SN path is considerably lower (non-significant) in the five-cent setting. Further examination of this finding is provided in Chapter Five.

A closer look at the PI-PBC difference between the non-deposit and ten-cent

deposit settings indicates that the path is positive and significant in the non-deposit setting. The same relationship is non-significant in the five- and ten-cent deposit settings. This result suggests that an awareness of the proper approach to recycling is of considerably more importance in the non-deposit setting, where the common retailer is unlikely to provide a collection alternative. Such an awareness is generally considered common knowledge in bottle bill states where retailers are typically mandated to collect empty beverage containers covered by the legislation. This is particularly true when the legislation has been law for as long as it has been in Michigan, the sole ten-cent deposit state. Therefore, while knowledge of the recycling alternative is not likely to serve as a barrier in Michigan, it is likely to impede people's perceived ability to recycle in other states, namely those without a bottle bill. Given the presence of these two invariant paths, hypothesis H3a lacks complete support in this analysis though the model demonstrates considerable predictability across legislative settings.

Attention is now directed toward another geographical segment of the full data set. This segmentation of the data is accorded by the various city settings. Newspaper recycling serves as the behavior of interest in the analysis. The associated hypothesis for this analysis is restated below.

H3b: The hypothesized model will predict recycling behavior equally well across rural, suburban and metropolitan areas.

This hypothesis is similar to Hypothesis H3a but refers to the model's application across a trichotomy of rural, suburban and metropolitan areas. This hypothesis also assumes the position of a null hypothesis with the expectation of no effect differences emerging across settings. As noted in the literature review, consumer research that has examined

recycling behavior is characterized by single setting research. That is, studies have been conducted in a single location. A significant contribution of the study is the closer examination of potential varying effects across settings. The literature offers little insight to suggest that this hypothesis should assume an alternative form to the proposed null hypothesis.

The multiple-group measurement model for the city setting resulted in a chi-square statistic of 1304.96 with 830 degrees of freedom. This equates to an excellent normed chi-square ratio of 1.57. The BBNFI, BBNNFI and CFI values ranged from a low of 0.884 (BBNFI) to a high of 0.954 (CFI), demonstrating sound overall model fit. The results of the individual tests of factor loading invariance across the legislative settings appear in Table 4.19 below.

A review of the table points out that five constrained parameters have significant p-values according to the LM Test. These parameters include A3-A, PBC2-PBC and CON2-CON in the rural and suburban deposit samples and BI2-BI and SN3-SN in the rural and metropolitan samples. By way of the commutative property, it is apparent that the A3-A, PBC2-PBC and CON2-CON loadings are unique in the suburban setting while the remaining significantly different loadings (BI2-BI and SN3-SN) are unique for the metropolitan setting. The release of these five constraints would allow only for partial measurement model invariance across the groups, but improve the model fit significantly. Given that no pattern is apparent among the violating factor loadings, these constrained parameters were allowed free across settings. This action lowered the chi-square statistic by 31.174 (with five fewer degrees of freedom). The effect on the fit indices was minimal. The fact that only five of the 32 constraints proved troublesome provides

support for partial, yet considerable, measurement model invariance across the three settings.

Table 4.19 LM Test Results for Multiple-Group Measurement Model, City

Rural and Suburban settings			Rural and Metropolitan Settings		
Constrained Parameter	Chi-square Increment ^a	p-Value	Constrained Parameter	Chi-square Increment ^a	p-Value
BI2-BI	1.164	0.281	BI2-BI	8.872	0.003
A2-A	1.489	0.222	A2-A	0.330	0.565
A3-A	8.675	0.003	A3-A	0.066	0.797
A4-A	1.171	0.279	A4-A	0.858	0.354
A5-A	0.703	0.402	A5-A	0.001	0.973
SN2-SN	0.595	0.440	SN2-SN	0.584	0.445
SN3-SN	0.273	0.601	SN3-SN	4.564	0.033
PBC2-PBC	4.235	0.040	PBC2-PBC	0.681	0.409
PBC3-PBC	0.003	0.960	PBC3-PBC	1.776	0.183
EI2-EI	0.068	0.795	EI2-EI	0.000	0.996
PA2-PA	4.828	0.028	PA2-PA	0.342	0.558
PA3-PA	1.814	0.178	PA3-PA	1.661	0.197
PA4-PA	0.267	0.605	PA4-PA	2.074	0.150
CON2-CON	1.355	0.244	CON2-CON	0.002	0.960
CON3-CON	0.217	0.641	CON3-CON	0.319	0.572
CON4-CON	0.341	0.559	CON4-CON	3.271	0.070

^a The univariate chi-square increment is derived from the multivariate LM Test

Attention now turns to the structural model comparisons. The model demonstrated comparably good fit to the measurement model with a chi-square statistic of 1367.61 and 821 degrees of freedom. The goodness-of-fit estimates ranged from 0.879 (BBNFI) to 0.947 (CFI). Table 4.20 below provides the individual path results of this analysis. The results indicate that only one path is non-invariant across the city settings. This difference is found in the subjective norm-behavioral intention (SN-BI) path across the rural and metropolitan settings. Application of the commutative property

identifies the SN-BI path unique for the metropolitan setting, where the relationship is non-significant. The same relationship is positive and significant in the rural and metropolitan settings. This finding could possibly be explained by the fact that people who live in the city often tend not to know and communicate with their neighbors on a level comparable to those who live in the rural and suburban communities. Lessened communication might tend to make the opinions held by these peers maintain less value and thereby diminish the subjective norm's influence on behavioral intentions. While only one path demonstrated a significant difference across the city settings, we must still reject the null position of hypothesis H3b under the strict interpretation of the omnibus null hypothesis. The model again demonstrates sound predictability in general, however.

Table 4.20 LM Test Results for Multiple-Group Structural Model, City

Rural and Suburban settings			Rural and Metropolitan settings		
Constrained Parameter	Chi-square Increment ^a	p-Value	Constrained Parameter	Chi-square Increment ^a	p-Value
A-BI	0.043	0.836	A-BI	0.558	0.455
SN-BI	0.747	0.387	SN-BI	5.281	0.022
PBC-BI	0.007	0.932	PBC-BI	1.419	0.234
EI-A	0.090	0.764	EI-A	0.000	0.985
PA-A	1.242	0.265	PA-A	0.999	0.318
PEC-A	0.720	0.396	PEC-A	0.556	0.456
PA-SN	0.005	0.941	PA-SN	0.184	0.668
PEC-PBC	0.902	0.342	PEC-PBC	0.108	0.742
PI-PBC	0.885	0.347	PI-PBC	0.651	0.420
CON-PBC	1.527	0.216	CON-PBC	0.140	0.708

^a The univariate chi-square increment is derived from the multivariate LM Test

Table 4.21 below summarizes the findings of research question set B. Note that none of the three hypotheses was supported in this analysis. The omnibus positioning of the null hypotheses required that all parameters be equivalent across materials and

settings of interest. When one parameter violates the assumption of equivalence, the omnibus null is rejected by definition. Despite not having absolute support from the three hypotheses, the Model of Managerially-Influenced Recycling Behavior performed very well across the independent settings. The model demonstrated sound model fit across the multiple-group analyses and indicated only a handful of effect size differences throughout the independent analyses. These differences are summarized in the table below.

Table 4.21 Summary of Findings for Research Question Set B

Hypothesis	Violating Paths	Unique Sample	Finding
H2	EI-A	--	Negative effect for newspapers, non-significant for beverages
	PBC-BI	--	Both significant, lower with beverages
H3a	PA-SN	5-cent	Non-significant for 5-cent setting
	PI-PBC	10-cent	Non-significant for 10-cent setting
H3b	SN-BI	Metropolitan	Non-significant in metropolitan setting

The third set of research questions has no accompanying hypotheses. These questions are exploratory in nature and will be addressed qualitatively in Chapter Five. The findings from the first two sets of research questions, the literature and practical experience will provide insight toward these questions. The structure of Chapter Five will resemble this framework of research questions.

C. Opportunities and Compliance in the Reverse Channel

1. How should consumers be motivated, educated and assisted to achieve higher levels of recycling participation?

- 2a. Which channel participants are in the best position to provide the mix of marketing and logistics offerings that consumers desire?
- 2b. Given an identification of the ideal reverse channel configuration in question C.2a, how closely should the reverse channel reflect the forward channel?
- 3. What level of responsibility is the consumer willing to assume?
- 4. Is government involvement necessary to implement the desired recycling program?

SUMMARY

This chapter presented the results of the research effort. The chapter began by examining the characteristics of the sample. A review of the sample characteristics found the sample to be adequate in number for analytical power, fairly representative of the targeted population and free of potential nonresponse biases.

The chapter then examined the descriptive statistics of the measured variables. A review of the means, skewness and kurtosis indicated that many variables demonstrated considerable departures from normality. The preliminary data analysis continued by assessing the construct's reliability, convergent validity and discriminant validity. This discussion concluded that seven of the model's nine variables displayed sound reliability and validity assessments. The remaining two constructs resorted to single-item scales given difficulties with internal consistency. Successive assessment of nomological validity suggested that interpretation of relationships involving the economic incentives construct should be conditioned with its operationalization in mind.

Hypothesis testing began by testing the Model of Managerially-Influenced

Recycling Behavior with the full sample of newspaper data. This analysis confirmed the model's sound goodness-of-fit and found support for seven of its ten hypotheses. The economic incentives-attitude (EI-A) relationship was found to be significant though negative, rejecting the anticipated positive relationship established in hypothesis H1d. This finding again must be conditioned by the operationalization of the EI construct in the study. The remaining two unsupported hypotheses, perceived economic costs of participation-perceived behavioral control (PEC-PBC) and informative promotions-perceived behavioral control (PI-PBC) were found to be non-significant in the analysis. The same hypotheses were then tested with the beverage container data. Only six of the model's ten hypotheses were supported in this analysis. The unsupported relationships included the economic incentives-attitude (EI-A), perceived economic cost-attitude (PEC-A), perceived economic cost-perceived behavioral control (PEC-PBC), and promotional information-perceived behavioral control (PI-PBC) paths. These hypotheses failed to find support as a result of non-significant parameter estimates for the paths.

Attention then turned toward the multiple-group analyses of hypotheses H2, H3a and H3b. Hypothesis H2 tested the full newspaper and beverage container samples for measurement model and structural model invariance (similarity). The test of measurement model invariance found the two samples' factor loadings to be comparable. The test of structural model invariance concluded that two paths were non-invariant across the samples. The first violation of model equivalence, the economic incentives-attitude (EI-A) path, was anticipated given the differences found in the previous single-group analyses. The EI-A path was significant but negative in the newspaper sample and non-significant with beverage containers. Operationalization of the EI construct explains

the unanticipated results. The second difference was found with the perceived behavioral control-behavioral intention (PBC-BI) path across the two samples. The path was positive and significant in both samples though the newspaper's effect size was considerably larger than that of the beverage containers.

The next multiple-group analysis focused on the beverage container sample across the three bottle bill legislative settings. Upon settling for partial measurement model invariance, the structural model test found that two paths were non-invariant across the twenty constraints. The appeal promotions-subjective norm (PA-SN) path was not significant in the five-cent deposit setting, but maintained the hypothesized positive effect in the non-deposit and ten-cent deposit settings. The second non-invariant path was informative promotions-perceived behavioral control (PI-PBC) path. The path was only significant in the non-deposit setting.

The final multiple-group analysis examined model equivalency with the newspaper data across the three city settings. Only partial measurement model invariance was achieved in this analysis as well. The structural model analysis indicated that of the twenty constraints placed on the model, only one failed to demonstrate non-invariance. This non-invariant path, the subjective norm-behavioral intention (SN-BI) relationship, was non-significant only in the metropolitan setting. All other paths were consistent across the three city settings.

In sum, the Model of Managerially-Influenced Recycling Behavior demonstrated considerable application and sound predictability across the wide range of settings. Independent analyses found acceptable model fit in each sample as well as in the multiple-sample analyses. Chapter Five discusses the theoretical and managerial

implications of these findings. Research question set C will provide the framework for the chapter. This final chapter of the study will highlight its contributions and directions for future research.

CHAPTER 5: IMPLICATIONS AND CONCLUSION

INTRODUCTION

This chapter presents the contributions of the research. Managerial implications of the study's findings are discussed first. The five research questions of set C serve as the framework for this discussion. The theoretical contributions of the research are then presented. The document concludes with directions for future research.

MANAGERIAL IMPLICATIONS

As noted above, the research questions of set C serve as the framework for discussion in this section. The five research questions of this set were not addressed explicitly by the research and, therefore, were not accompanied by hypotheses. The hypothesis tests associated with research questions A.1, B.1 and B.2 provide support for the managerial implications presented in the current discussion. The managerial implications are of importance to business strategists and public policy makers alike.

Research question set C has been presented under the heading of "Opportunities and Compliance in the Reverse Channel." The first research question reads as follows:

- 1. How should consumers be motivated, educated, and assisted to achieve higher levels of recycling participation?**

This research question can be addressed by reviewing the sum of the findings from previous research questions. The previous research questions examined a model of consumer recycling behavior and subsequently tested its applicability across material

types and settings. While significant differences were occasionally found among the model's parameter estimates across settings, a number of meaningful generalizations can be derived from the analyses.

The analyses of Chapter Four demonstrated that each of the three antecedents to behavioral intention were instrumental in shaping recycling intentions. While awareness of these intrinsic motives' influence is valuable knowledge, the indirect influence of the managerially-controlled extrinsics provides generous usable information. Three different factors were hypothesized to shape one's attitude toward the act of recycling. An interesting finding of Chapter Four was the conclusion that economic incentives had a negative influence on one's attitude toward newspaper recycling. However, given the operationalization of economic incentives as a construct more closely reflecting the economic *expectations* of participants, findings regarding the relationship between incentives and attitudes remain elusive. The finding does seem to indicate, however, that those who expect compensation for recycling newspapers tend to have a negative attitude toward newspaper recycling. The economic construct and its relationship with attitudes toward beverage container recycling were non-significant, suggesting that the one's economic expectations of compensation are unrelated to his attitude toward recycling beverage containers. Any further conclusions derived from these results would be unjustified by the research.

Among the other possible influences of one's attitude toward recycling are promotional appeal (PA) efforts. The appeal efforts examined include those found in the media of television, radio, magazines and newspapers. The persuasiveness of these advertisements demonstrated a positive effect on one's attitude toward recycling

newspapers and beverage containers. The effect was non-significant though in the suburban setting for newspapers and the non-deposit and ten-cent deposit settings for beverage containers. Three explanations might be offered for these non-significant results. An obvious explanation is that the advertisements simply have no influence in these particular settings. The remaining two explanations suggest that an inference of a positive promotional appeals-attitude (PA-A) relationship is justified. The sample size in the sub-samples noted above may have been inadequate to support the inference. As with any statistical test, the effect size must be substantially different from zero to statistically support a relationship with smaller sample sizes. The effect size was close to the critical value in the suburban and ten-cent deposit settings though insufficient to safely make the inference (at the .05 level of significance).

Another reason the PA-A relationship might lack consistent support is the fact that the attitude construct demonstrated very little variance. As noted in Chapter Four, the five measurements of attitude showed uniformly high means and very tight variances (see Tables 4.5 and C.1). Similar to regression techniques, structural equation modeling relies on variance to support the existence of a relationship. Greater variance in the independent variable(s) and dependent variable(s) make support for hypothesized relationships more tenable. The lack of variance present in the attitude construct could explain its problematic, inconsistent results that limit generalizability.

Given that the PA-A relationship was supported in the full samples is ample evidence that promotional appeals have a degree of influence on one's attitude and subsequent recycling behavior. The influence of promotional appeals is enhanced by looking at their effect on subjective norms. Their positive effect on the subjective norm

was consistent across the analyses with the sole exception of the five-cent deposit setting where the relationship was non-significant. The balance of evidence again indicates that promotional appeals are a valuable tool for motivating recycling behavior. Of particular significance is the level of persuasion apparent with television advertisements. Of the four media forms examined, television advertisements demonstrated the highest level of persuasion. Television's ability to communicate both verbally and visually most likely contributes to its persuasive ability.

The third and final hypothesized antecedent to one's attitude is perceived economic costs (PEC). This proxy for price was shown to have the anticipated negative effect with the full sample of newspapers but was non-significant with beverage containers. One interpretation of these findings is that consumers mind paying for newspaper recycling but not beverage container recycling. In general, however, the respondents felt indifferent to the price they pay for recycling service across the materials. Apparently, consumers either feel that the price is low, nonexistent or worth the value delivered. This finding is significant given that Michigan consumers pay \$168 million each year to finance the state's reverse distribution of empty beverage containers. Closs et al. (1997) found that the average household pays \$76.50 annually, or 4.43 cents per container, to cover these operations. An explicit price charged to the individual consumer would likely not be met with the same indifference. This finding warrants a more in-depth investigation of the nature of this relationship.

It was also found that the perceived economic costs of recycling rarely serve as a deterrent to participation given the non-significant link between the construct and perceived behavioral control (PBC) across all samples. In other words, consumers rarely

see the price paid for recycling as an impediment given their resources and ability to pay the price. Again, caution should be placed on any substantive conclusions drawn from the analysis of this construct and its relationships given the pioneering, single-item measurement of this concept.

Based purely on effect size, perceived behavioral control was the single most influential intrinsic motive of recycling behavior. As noted, perceived economic costs did not influence perceived behavioral control. The same holds true with informative promotions (PI). Only in the non-deposit setting did instructions have a significant effect. This points to the likelihood that those states with bottle bills (the five- and ten-cent deposit settings) tend to be more progressive recycling states with histories of recycling compliance. Such legislation, while often controversial, gives recycling considerable notoriety through news articles and commentary reported in the media. The tasks associated with recycling become common knowledge very quickly in bottle bill states as a result of this media attention. While bottle bills only apply to beverage containers typically, the recycling of these materials raises awareness of proper recycling for other materials. Therefore, informative promotions are of considerable importance in those locales that lack this recycling history or where new policies are under development.

The extrinsic motive that demonstrated the most consistent, strongest influence on perceived behavioral control directly, and behavioral intention indirectly, was convenience. When asked what the community could do to encourage respondents to recycle more, 43.5 percent said that making recycling more convenient would be the first step. While not formally hypothesized, the convenience factor was expected to

demonstrate this considerable influence. Making it easier for people to recycle is the single most important thing a firm or governmental body can do to encourage recycling.

As noted in Chapter Two, convenience strategies are the embodiment of customer service in the consumer recycling transaction. Lambert and Stock (1993) define customer service as the output of logistics. Convenience can be improved by: 1) shortening the distance that participants must move recyclable materials to a collection point, 2) providing greater temporal availability either through more frequent curbside pick-up or longer hours of drop-off operation, or 3) minimizing the consumer's sorting and storage responsibilities. Interestingly, across the full sample of newspaper and beverage container responses, it was the limited time availability that proved most difficult for people to overcome. Dropoff locations, for instance, are often open only during the hours of the typical work week. Improvements in household sorting and storing represented the next greatest challenge for recycling service providers. Surprisingly, respondents found distance to be of less concern. This has certainly only held true in recent years with the proliferation of curbside and dropoff locations. The vast growth in the number of these programs has made recycling readily accessible to the average person.

In sum, it is apparent that promotional appeals have been effective in shaping peoples' desire to recycle and generated a sense of obligation among potential participants. Aside from the use of these promotional efforts, however, it is clear that program managers must make it relatively easy to recycle in order to gain widespread participation. Attention must be directed toward the consumer/collector logistical interface. Based upon the discussion to this point and that forthcoming with question C.3

below, it must be the collector that exerts the cumbersome effort to ensure that materials are made available in the reverse channel.

The next two research questions (questions C.2a and C.2b) are complementary and will be approached in unison.

- 2a. Which channel participants are in the best position to provide the mix of marketing and logistics offerings that consumers desire?**
- 2b. Given an identification of the ideal reverse channel configuration in question C.2a, how closely should the reverse channel reflect the forward channel?**

Given the conclusions derived from the previous research question, the reverse channel should consist of the party or parties that can offer the greatest convenience and have an interest in promoting recycling. Convenience, as measured by proximity, temporal availability, and sorting and storage simplicity, is the single most important factor. However, to be motivated to provide higher, more costly levels of convenience, there must be a return on the investment. Therefore, firms that either use the recyclable material as a production input or resell the material to others at a profit represent the likely channel participants.

Merchandise retailers represent the consumer's primary supplier of household goods in the forward channel. Retailers also commonly serve as primary collectors of recyclable materials, as is the case in most bottle bill states. These firms, however, rarely assume ownership of the material nor have any direct use for the material. Therefore, the typical retailer that participates in the reverse channel usually experiences the costs but

rarely generates returns on the activity. The retailer forced to participate in the reverse channel under such conditions is understandably resistant. However, should retailers opt to independently collect and subsequently resell the materials, benefits are gained by all -- including the retailer. While curbside collection is thought to be more convenient for the consumer, bottle bill states have demonstrated that collection facilitated by grocery locations offers significant convenience and typically enjoys high participation rates. Bottle bill states enjoy participation rates of approximately 86 percent, while curbside and dropoff programs have been shown to yield 81 and 50 percent participation respectively (Ware 1998, Steuteville et al. 1994, Gies 1995). Retailers are often reluctant to assume such responsibilities, however, given that recyclable material collection lies beyond the scope of their ordinary day-to-day operations.

Manufacturers, on the other hand, who may wish to use recyclable inputs in the production process rarely have the local presence to viably collect materials within a community. Direct delivery of individual recyclable materials back to the manufacturer is prohibitively expensive and is only feasible with fairly high-value goods. With this in mind, a sensible alternative is for the manufacturer to pay the retailer for the collection of recyclable materials that meet their specific production needs. The retailer may either assume ownership of the materials upon collection and subsequently sell the materials to manufacturers willing to pay the highest price. The retailer might otherwise establish contractual relations with a manufacturer to collect materials for a fee. Reverse channel configurations of this nature virtually mirror the forward flow of product, only with the roles of buyers and sellers reversed from their typical arrangement.

Also, as commonly found in the forward channel, the emergence of wholesalers becomes necessary when retailers and manufacturers cannot economically interface in the reverse channel. These wholesalers often specialize across either geographic bases, material (product) lines, or both. As depicted in Figure 2.2, intermediaries become valued channel members when heterogeneous demand fails to be efficiently met by heterogeneous supply. This holds true in the reverse channel just as it does with the typical forward flow of materials and products. The presence of refuse collectors facilitates the interface between the residential (forward channel) consumer and the recycler in the reverse channel. In many ways, these refuse collectors reflect the functions performed by the wholesale intermediary of the forward channel. Also, consistent with the forward channel is the motivation to handle only the more profitable materials. Metal collectors will therefore tend to experience intense competition while the more speculative, low-value newspaper market is unapproached by most intermediaries.

Recycling intermediaries will also choose to serve high-volume recycling locales where economies-of-scale are greatest. Just as a consumer goods wholesaler might opt to locate in a highly populated area to minimize outbound transportation costs, the recyclable material intermediary might choose to locate in a highly populated area to minimize *inbound* transportation costs. Once it is determined that profits can be derived by supplying a manufacturer with a particular material, the intermediary will establish the appropriate levels of service for both consumers supplying the material and the manufacturer demanding the material. Marketing efforts are thereby required to establish both supply and demand. On the side of material procurement, the intermediary will

effectively promote the benefits of consumer recycling when supply is lacking and demand during times of oversupply.

Municipal governments often assume a leadership role in community recycling programs. Government typically establishes involvement either to maintain control or when no private parties are interested in facilitating the recyclables collection. If there is considerable profit potential, private firms are likely to volunteer their services. This is commonly the case when communities outsource the collection responsibilities to a third-party refuse collector. These parties are often responsible for collecting trash deliverable to the municipal landfill as well as recyclable materials that may be subsequently resold to recyclers, either on the behalf of the municipality or the refuse collector itself. There should be a return in the offing when collected materials are in demand. Determination of the party with the rights to any returns, the municipality or collector, is debatable. When profit potential is not viable, the recycling effort itself should be questioned. Often times, collected materials are dumped in the landfill along with other household refuse when the market price fails to match the cost of service.

This discussion clearly hinges on the market viability of goods made of recycled inputs. With this in mind, all members of the reverse channel should be aligned with promoting the sale of these recycled goods. The concept of “customer success” that is becoming widely embraced in the forward channel therefore applies here as well. The concept states that in order for a firm to succeed in the long term, it should do what it can to ensure that its customers succeed. Belief in this concept naturally leads to the formation of cooperative channel arrangements such as alliances and joint ventures that

pursue the unified objective of a thriving supply chain. The formation of such arrangements is, therefore, as critical in the reverse channel as it is in the forward channel.

In sum, the optimal reverse channel may look very much like that of the forward channel with the typical roles of buyers and sellers reversed. Where profit potential exists, intermediaries are likely to offer their assistance in matching heterogeneous supply with heterogeneous demand. Refuse collecting intermediaries that resemble the forward channel wholesaler have been the most active firms to date to specialize in collecting consumer recyclables for remanufacturing purposes. The discussion, however, noted how the typical retailer could assume these responsibilities on either a transactional or contractual basis for manufacturers though it is beyond their ordinary scope of operations.

3. What level of responsibility is the consumer willing to assume?

As noted on a number of occasions throughout the document, the typical forward channel consumer assumes a very different, integral role in the reverse flow of materials. When the forward channel consumer serves as the reverse channel supplier, the very existence of the channel is contingent upon his willing participation. The movement away from mandatory programs to voluntary participation places even greater onus on the consumer's basic willingness to recycle. Relying on the potential participant's altruistic desire to participate and making it easy enough for him to do so are critical to program success.

Given the consumer's awareness of his responsibilities, an examination of the convenience construct and respondents' comments to open-ended questions provide

guidance for addressing this question. As noted in the research questions above, program participants have grown accustomed to delivering recyclables to their respective collection point, whether it is the curbside or the dropoff location. Where they indicate that assistance is needed are in the areas of temporal availability and, to an extent, less sorting and storage complexity. Either providing more frequent pickup or allowing the collection site to remain open for longer hours would help many people to recycle more material. Respondents also commonly indicated that providing a storage bin would facilitate their recycling. While the instructive promotions-perceived behavioral control (PI-PBC) path was non-significant as discussed above, a considerable number of respondents (40 percent of those who responded to the question) mentioned that providing more or better information would help them to recycle more.

The effect of economic incentives on recycling intentions was inconclusive in the study. Again, the operationalization of this construct more closely reflected the economic expectations of respondents. It is probable that the presence of economic incentives would have a positive effect on attitude and subsequent intentions and behavior though one cannot reach this conclusion from this research. The specific level of any such incentives is a topic of even further investigation

In sum, while consumers display extremely favorable attitudes toward recycling, it is imperative that the reverse channel provides easy, convenient collection alternatives to gain widespread participation. There will always be a segment of the population willing to exert considerable effort in recycling but the research findings suggest that in order to make the average person recycle, it must virtually be as easy as throwing the material into the garbage can.

4. Is government involvement necessary to implement the desired recycling program?

The discussion of research questions C.2a and C.2b above pointed out that government often assumes a leadership role in consumer recycling programs. This involvement may range from the municipal facilitation of collection alternatives to the establishment of federal regulations. At one end of the spectrum, the municipal collection of recyclable materials is generally warranted when: 1) market inefficiencies prevent those with recyclable material demand from transacting with suppliers, or 2) the free market fails to reflect the considerable societal benefits of collecting recyclable materials. Therefore, when an economic return is apparent, private firms often avail themselves to serve the demand. When economic returns are not available, government must then balance the costs of facilitating recycling with its societal benefits. These benefits are extremely difficult to calculate. Typically, market value serves as the single best estimate of societal value as well.

Many survey respondents indicated their aversion for government action in an open-ended survey question. A common response was one of approval toward recycling but disapproval toward government's involvement in any such program. Mandatory programs, in particular, were met with considerable aversion. This common reaction helps to explain why mandatory programs are in a process of decline in the United States (Everett and Pierce 1993).

While government involvement is resisted by many, there do appear to be instances when municipal action is essential. Justifiable occasions of government action

include program startup and maintenance, particularly in smaller communities where economies are initially uninviting for private firms. In such instances, it is possible that societal and eventual economic benefits are abundant. In many cases, the municipality can even benefit through the collection and subsequent sale of materials to recyclers. The return from such sales has been shown to exceed collection costs in many cities, serving as a contribution to municipal funds (Steuteville 1996b). In other cases, the municipality may seek to divert materials from the waste stream to lessen the costs of refuse collection and landfill deposit. Government can therefore facilitate the collection of recyclables for the purposes of societal and economic benefit.

While an extreme measure, government may also initiate legislation that forces recycling compliance on the part of citizens and/or industry. Such measures have achieved mixed success over the years (Steuteville 1996). Recent history has demonstrated that rather than legislation, awareness programs can be initiated to shape behavior. The reemergence of Earth Day in 1990 and its widespread recognition in the years since demonstrate that legislation need not be passed to evoke desirable behavior (Kopicki et al. 1993). The current research provides considerable support for the notion that promotional appeal efforts effectively influence recycling intentions. Government bodies at all levels can help to distribute persuasive messages to this end.

THEORETICAL IMPLICATIONS

While the research demonstrated findings of significant import to managers and policy makers, fellow researchers will benefit from the findings as well. The research provides continued support for the attitude-behavior model proposed by Ajzen (1985).

The theory of planned behavior that served as the fundamental framework for the Model of Managerially-Influenced Recycling Behavior demonstrated the anticipated effects of intrinsic motives (attitude, subjective norm and perceived behavioral control) on behavioral intention. Of particular interest is the considerable effect perceived behavioral control exhibited toward recycling intentions.

As noted by the managerial implications above, the inclusion of extrinsic motives in the hypothesized model is a contribution as well. As noted in the literature review, there is the continued call to make the often abstract theories of consumer behavior research more directly implementable by the practitioner. This research linked managerially-controlled factors to internal, intervening behavioral determinants and behavioral intentions. More specifically, the research examined the extrinsic motives that serve as the stimuli that indirectly influence recycling behavior through intrinsic motives. The research effort therefore resulted in an interesting examination of the extrinsic-intrinsic motive interface and implementable findings for the practitioner.

The research also contributed to the emerging reverse channels literature by focusing on the pivotal role fulfilled by consumers in the reverse flow of product. To date, the role of the consumer in the reverse channel has been largely assumed or ignored. As a result, consumer activities have not been thoroughly investigated by most channels researchers. As is apparent in this research, however, a better understanding of the consumer's motivation to participate is central to ensuring that consistent supplies of recyclable material are available upon demand. Given that consumers require high levels of convenience and continued persuasion to facilitate recycling, researchers can more

precisely determine channel configurations that optimize efficiency in the forward and reverse flows.

A final theoretical contribution is the fact that the theory was tested across multiple materials and settings. Recycling research to date has tended to focus on a single community and on recycling in general, without regard to specific materials. While occasional effect differences were identified across the materials and settings, the model demonstrated a notable ability to predict relationships throughout the variety of settings. This broad-based support provides indication of the model's appreciable generalizability.

DIRECTIONS FOR FUTURE RESEARCH

Despite the generally affirmative findings and sound execution of the research, the work is not without its limitations. Primary among its limitations is the inconclusive measurement of the of the study's unique constructs. As noted in Chapter Four, single-item scales were used to measure perceived economic costs (PEC) and informative promotions (PI). The single-item scales chosen do, however, reflect the nature and character of the latent variables to a substantial degree. Also lacking is the sound operationalization of the economic incentives (EI) construct that more closely reflected economic expectations in this research. Improved measurement of these three constructs would allow one to place more faith in the study's substantive findings.

Despite difficulties in measuring these unique constructs, one should not be discouraged from considering alternative factors that might better explain and predict recycling behavior. It is clear that an actor's personal recycling history is a significant consideration in the establishment of his on-going behavior. Comfort with the recycling tasks build over time such that recycling eventually becomes routinized and habitual.

Consistent with the original theory of reasoned action (TRA), this research assumed that behavior is preceded by a determined, independent intention. Research might also examine the influence of personal appeals in addition to those distributed by the mass media. The role of mandatory programs and fines for non-compliance would be of interest as well.

A more in-depth investigation of the current relationships should also be considered. In particular, the perceived economic cost-attitude relationship demonstrated unique findings depending upon the material of interest. The relationship was significant and negative (as hypothesized) among newspapers, but non-significant among beverage containers. As noted in the discussion, consumers either do not mind paying for beverage container recycling, perceive the cost as low, or have no idea that they are actually paying for the service. An investigation to determine a better understanding of consumers' opinions toward costs would be beneficial.

As noted in the previous section, one contribution of the research was its testing of the theory across multiple materials and settings. Future studies should seek to examine an even wider variety of materials and settings. The inclusion of brand-specific reusable inputs (e.g. Hewlett-Packard laser print cartridges) or compostables, for instance, might be of interest. Of even greater contribution might be the administration of surveys to a wider geography. The current research focused on midwestern states with different bottle bill settings. Future research should extend beyond the midwestern setting and perhaps examine cross-cultural attitudes and behaviors. Care should also be taken to ensure that the sample accurately reflects the various dimensions and characteristics of the targeted population.

APPENDICES

APPENDIX A

SUMMARY OF CONSTRUCT DEFINITIONS AND MEASUREMENTS

BEHAVIORAL INTENTION (BI)

Definition: An actor's determination to act in a certain way. As the "immediate determinant of action," BI reflects the actor's deliberate attempt to bring about action (Ajzen and Fishbein 1980, p. 5).

Measurement Sources: Taylor and Todd (1995a, 1995b).

Measurement Items:

BI1:	I intend to recycle (material) at every opportunity over the next two weeks.	Strongly Disagree	1	2	3	4	5	6	7	Strongly Agree
BI2:	Over the next two weeks, I plan to recycle (material)	Never	1	2	3	4	5	6	7	At every opportunity

ATTITUDE TOWARD THE ACT OF RECYCLING (A)

Definition: The individual's positive or negative evaluation of performing a general behavior -- the person's judgment that performing the behavior is good or bad. The construct basically defines whether the actor is in favor or against performing the behavior (Ajzen and Fishbein 1980).

Measurement Sources: Goldenhar and Connell (1991-92)
Smith et al. (1994)
Taylor and Todd (1995a, 1995b)

Measurement Items:

A1:	I feel that recycling (material) is	Bad					Good
		1	2	3	4	5	6 7
A2:	I feel that recycling (material) is (reverse-scale)	Wise					Foolish
		1	2	3	4	5	6 7
A3:	I feel that recycling (material) is	Harmful					Beneficial
		1	2	3	4	5	6 7
A4:	I feel that recycling (material) is	Wrong					Right
		1	2	3	4	5	6 7
A5:	I feel that recycling (material) is	Worthless					Valuable
		1	2	3	4	5	6 7

SUBJECTIVE NORM (SN)

Definition: The actor's "perception of the social pressures put on him to perform or not perform the behavior in question" (Ajzen and Fishbein 1980, p. 6).

Measurement Sources: Taylor and Todd (1995a, 1995b)

Measurement Items:

SN1:	My family thinks that I should recycle (material).	Strongly Disagree	1	2	3	4	5	6	7	Strongly Agree
SN2:	My friends think that I should recycle (material).	Strongly Disagree	1	2	3	4	5	6	7	Strongly Agree
SN3:	My neighbors think that I should recycle (material).	Strongly Disagree	1	2	3	4	5	6	7	Strongly Agree

PERCEIVED BEHAVIORAL CONTROL (PBC)

Definition: The “perceived ease or difficulty of performing the behavior and it is assumed to reflect past experience as well as anticipated impediments and obstacles” (Ajzen 1988, p. 132).

Measurement Sources: Taylor and Todd (1995a, 1995b)

Measurement Items:

PBC1: I feel that I have the physical ability to recycle (material) effectively.	Strongly Disagree	1	2	3	4	5	6	Strongly Agree
PBC2: I feel that I have the knowledge to recycle (material) effectively.	Strongly Disagree	1	2	3	4	5	6	Strongly Agree
PBC3: I feel that I have the resources I need to recycle (material) effectively.	Strongly Disagree	1	2	3	4	5	6	Strongly Agree

ECONOMIC INCENTIVES (EI)

Definition: The actor's perceptions of availability and adequacy of monetary returns rewarding recycling program participation.

Measurement Sources: Pelton et al. (1993)

Measurement Items:

EI1:	I expect to be monetarily compensated for recycling my (material).	Strongly Disagree					Strongly Agree	
		1	2	3	4	5	6	7
EI2:	It is important that I make money by recycling (material).	Strongly Disagree					Strongly Agree	
		1	2	3	4	5	6	7

PROMOTION, APPEAL CONTENT (PA)

Definition: The actor's awareness of promotional messages that make people conscious of the personal and societal benefits of recycling.

Measurement Sources: Lord (1994) (adapted)

Measurement Items:

PA1:	I find recycling advertisements on television to be very persuasive.	Strongly Disagree	1	2	3	4	5	6	7	Strongly Agree
PA2:	I find recycling advertisements on radio to be very persuasive.	Strongly Disagree	1	2	3	4	5	6	7	Strongly Agree
PA3:	I find recycling advertisements in newspapers to be very persuasive.	Strongly Disagree	1	2	3	4	5	6	7	Strongly Agree
PA4:	I find recycling advertisements in magazines to be very persuasive.	Strongly Disagree	1	2	3	4	5	6	7	Strongly Agree

PERCEIVED ECONOMIC COST OF PARTICIPATION (PEC)

Definition: The consumer's perceived financial outlay for the recycling service. This is a relative measure of willingness to pay for the service. Note that the construct need not necessarily reflect the actual costs that consumers pay, but rather their perceptions of those costs.

Measurement Sources: These measures are created for this study.

Measurement Item:

PEC1: I pay too much for the (material)	Strongly						Strongly
recycling service I currently receive.	Disagree						Agree
	1	2	3	4	5	6	7

PROMOTION, INFORMATIVE CONTENT (PI)

Definition: The consumer's perceived knowledge of what and how to recycle. This is a product of efforts to instruct consumers of the specific materials accepted by the program and methods of program participation.

Measurement Sources: Taylor and Todd (1995a, 1995b)

Measurement Item:

PI1:	Providing better instructions would help me to recycle effectively. (reverse-scale)	Strongly Disagree						Strongly Agree
		1	2	3	4	5	6	7

CONVENIENCE (CON)

Definition: Defined across its three characteristics: 1) transport ease, 2) availability, and 3) sorting and storing complexity. *Transport ease* is the consumer's perceived ease of moving recyclables from his collection point (the household) to the program's collection point (either the curbside, dropoff location or retail center). *Availability* refers to temporal accessibility (frequency and hours of operation) that consumers perceive for recyclable collection alternatives. With regard to curbside programs, availability refers to the frequency and dependability of pickups. With regard to dropoff and retail collection, availability refers to the hours of operation for these collection points. *Sorting and storing complexity* refers to the ease or difficulty that consumers face in sorting, storing and, when necessary, cleaning materials for recycling contribution.

Measurement Sources: Taylor and Todd's (1995a, 1995b)
 McCarty and Shrum (1994) (adapted)
 Guagano et al. (1995)
 Corral-Verdugo (1995) (adapted)

Measurement Items:

CON1:	Moving (material) to their collection point is inconvenient. (reverse-scale)	Strongly Disagree	1	2	3	4	5	6	Strongly Agree	7
CON2:	I have difficulty providing (material) to the collector at the appropriate time. (reverse-scale)	Strongly Disagree	1	2	3	4	5	6	Strongly Agree	7
CON3:	Sorting out different kinds of (material) from one another is too much trouble. (reverse-scale)	Strongly Disagree	1	2	3	4	5	6	Strongly Agree	7
CON4:	Storing (materials) until they can be given to the collector is too much trouble. (reverse-scale)	Strongly Disagree	1	2	3	4	5	6	Strongly Agree	7

APPENDIX B

COVER LETTER AND SURVEY INSTRUMENT

March xx, 1998

Dear xSU Parent:

Your son or daughter has indicated that you might be willing to participate in a very important research project currently underway at Michigan State University. As you may be aware, many states have recycling goals that are to be met in the coming years. In addition, a number of states have legislation known as "bottle bills" that require consumers to pay deposits on beverage containers. Similar legislation has been proposed at the federal level as well. This research examines the attitudes and opinions that consumers have toward recycling in general and toward recycling legislation.

Your thoughts and opinions on these issues are important in order for the research to accurately represent the residents in your region. Let us emphasize, however, that your participation in the research is completely voluntary and that neither you nor your son or daughter will be affected in any way for completing the enclosed survey or not. You indicate your voluntary agreement to participate by completing and returning this survey. Should you complete the survey, you are assured complete confidentiality. Your name will never be recorded (this is why your son or daughter has addressed the envelope for this mailing). The survey has an identification number so that we may coordinate student and parent responses, and make students available for contest drawings offering valuable gift certificates to local bookstores. Only students whose parents return completed surveys will be eligible for these prizes.

To make your valuable opinions count and your son or daughter eligible for the contest drawings, please complete the survey to the best of your ability. Pretests have shown that the survey can be completed in about 15 minutes. Any adult in your household may complete the survey -- whether he or she recycles or not. The opinions of recyclers and non-recyclers are equally important in the research. Instructions for returning the survey appear on the last page. The survey itself has the return address and is postage-paid.

A summary of the research results will be made available to government representatives at all levels, as well as any interested citizens. We would be pleased to provide a summary of results or answer any questions you might have regarding the purpose of the research or instructions for completing the survey. You may contact us by phone at (517) 353-6381 or e-mail at goldsbty@pilot.msu.edu. Thank you very much for your assistance.

Sincerely,

David J. Closs
Professor of Marketing and Logistics

Thomas J. Goldsby
Doctoral Candidate

#

With questions and concerns please contact:

Thomas J. Goldsby, Doctoral Candidate
Department of Marketing and Supply Chain Management
Eli Broad Graduate School of Management
Michigan State University
East Lansing, Michigan 48824-1122
Phone: (517)353-6381 E-mail: goldsbjt@pilot.msu.edu

Consumer Recycling Research

Pretests have shown that the survey can be completed in about 15 minutes. Once you have completed the survey, fold it in half, staple or tape the open edge shut (so that the return mailing address can be read), and drop the survey in a mailbox (no postage is necessary).

**Your voluntary participation in this important research is
very much appreciated!**

Part One: Current Recycling Activity and Background

The following questions ask about your current level of product consumption and recycling. Please respond to all questions. If you do not purchase or recycle a product, please fill in the blank with a "0".

1. How many units of the following items do you consume/use in a typical week?

Soda/pop beverages: _____ cans and bottles (all sizes and types)

Beer or wine coolers: _____ cans and bottles (all sizes and types)

Juice, water & teas: _____ cartons and bottles (all sizes and types)

Milk: _____ containers (all sizes and types)

Newspapers: _____ newspapers

2. What percentage of these items do you recycle in the typical week (0-100%)?

Soda/pop containers: _____ % Milk containers: _____ %

Beer or wine cooler containers: _____ % Newspapers: _____ %

Juice, water & tea containers: _____ %

3. Which recycling alternatives do you use for each of the materials below? Respond by entering an "X" in the box for a location that you use to recycle a given material and enter "O" for a location that is available to you for a given material though you do not use it.

	Curbside *	Dropoff **	Grocery
	(Enter an "X" if you use and "O" if you do not)		
Soft drink containers:			
Beer/wine cooler containers:			
Juice, water & tea containers:			
Milk containers:			
Newspapers:			

* "Curbside" refers to any service that collects materials at your residence.

** "Dropoff" refers to any collection point outside of your residence (aside from grocery locations).

4. Do you recycle other materials? ☐ Yes ☐ No

If so, please list the additional materials that you recycle?

5. How much responsibility for recycling do you assume in your household?

☐ primary responsible ☐ share responsibility ☐ not responsible

6. Is the primary recycler in your household also the household's primary grocery shopper?

☐ Yes ☐ No

7. Would you say that you live in a rural, metropolitan or suburban area?

☐ Rural ☐ Metropolitan ☐ Suburban

8. If your community offers a recycling program, how is it funded? (Check all that apply)

☐ Property taxes ☐ Periodic fees ☐ Usage fees ☐ Don't Know

9. Do you live in a state where deposits are collected on the beverages?

☐ Yes ☐ No

If so, what is the amount of these deposits? cents per container

Part Two: Beverage Container Recycling

The following questions ask for your opinions toward beverage container recycling, environmental issues and government action. "Beverage containers" refer to any glass, plastic or aluminum containers that are used for soft drinks or alcoholic beverages. Please indicate your level of agreement on the following statements where: 1 = Strongly Disagree, 2 = Disagree, 3 = Somewhat Disagree, 4 = Neutral (Neither Agree nor Disagree), 5 = Somewhat Agree, 6 = Agree, 7 = Strongly Agree.

- | | Disagree | Agree |
|---|---------------|-------|
| 1. My family thinks that I should recycle beverage containers. | 1 2 3 4 5 6 7 | |
| 2. I feel that I have the knowledge to recycle beverage containers effectively. | 1 2 3 4 5 6 7 | |

		Disagree	Agree
3.	My neighbors think that I should recycle beverage containers.	1	2 3 4 5 6 7
4.	Whether or not I recycle beverage containers is entirely up to me.	1	2 3 4 5 6 7
5.	I have convenient access to a beverage container collection point.	1	2 3 4 5 6 7
6.	I have complete control over the amount of beverage container recycling that I do.	1	2 3 4 5 6 7
7.	My friends think that I should recycle beverage containers.	1	2 3 4 5 6 7
8.	I feel that I have the physical ability to recycle beverage containers effectively.	1	2 3 4 5 6 7
9.	I feel that I have the resources I need to recycle beverage containers effectively.	1	2 3 4 5 6 7
10.	It is financially rewarding to recycle beverage containers.	1	2 3 4 5 6 7
11.	I pay too much for the beverage container recycling service I currently receive (Circle 4 if you do not pay/not served).	1	2 3 4 5 6 7
12.	I expect to be monetarily compensated for recycling my beverage containers.	1	2 3 4 5 6 7
13.	Government should fine individuals who throw away beverage containers that could be recycled.	1	2 3 4 5 6 7
14.	Providing better instructions would help me to recycle beverage containers more effectively.	1	2 3 4 5 6 7
15.	It is important that I make money by recycling beverage containers.	1	2 3 4 5 6 7
16.	I would recycle more beverage containers if I were fined for throwing them away.	1	2 3 4 5 6 7
17.	I would be willing to pay more to receive better beverage container recycling service.	1	2 3 4 5 6 7
18.	I cannot figure out which beverage containers are to be recycled.	1	2 3 4 5 6 7
19.	Moving recyclable beverage containers to their collection point is inconvenient.	1	2 3 4 5 6 7
20.	Sorting out different kinds of beverage containers from one another is too much trouble.	1	2 3 4 5 6 7
21.	I have difficulty providing beverage containers to the collector at the appropriate time.	1	2 3 4 5 6 7

	Disagree	Agree
22. I intend to recycle beverage containers at every opportunity over the next two weeks.	1 2 3 4 5 6 7	
23. I find handling and storing empty beverage containers to be very messy.	1 2 3 4 5 6 7	
24. Storing empty beverage containers until they can be given to the collector is too much trouble.	1 2 3 4 5 6 7	
25. I would be willing to pay more for the beverage container recycling service I currently receive. (Circle 4 if you do not pay/not served).	1 2 3 4 5 6 7	
26. My residential facilities for storing empty beverage containers are adequate.	1 2 3 4 5 6 7	
27. For <u>curbside</u> collection only: I find it difficult to remember when the beverage containers are to be collected.	1 2 3 4 5 6 7	
28. For <u>curbside</u> collection only: I would recycle more beverage containers if they could be collected more often.	1 2 3 4 5 6 7	
29. For <u>dropoff and retail</u> collection only: I would recycle beverage containers more if the collection facility was open more often.	1 2 3 4 5 6 7	

For the next five questions, complete each statement on the scale of 1 to 7. The extreme points (1 and 7) are labeled. A rating of "4" means that you feel neutral about that statement.

30. I feel that recycling beverage containers is	Harmful	Beneficial
	1 2 3 4 5 6 7	
31. I feel that recycling beverage containers is	Bad	Good
	1 2 3 4 5 6 7	
32. I feel that recycling beverage containers is	Wise	Foolish
	1 2 3 4 5 6 7	
33. I feel that recycling beverage containers is	Worthless	Valuable
	1 2 3 4 5 6 7	
34. I feel that recycling beverage containers is	Wrong	Right
	1 2 3 4 5 6 7	

For the next question, complete the statement on the scale of 1 to 7. The extreme points (1 and 7) are labeled. A rating of "4" on the scale means that you plan to recycle occasionally.

- | | At every
opportunity | Never |
|--|-------------------------|-------|
| 35. Over the next two weeks, I plan to recycle beverage containers | 1 2 3 4 5 6 7 | |

Part Three: General Environmental and Legislative Opinions

The following questions ask for your general opinions toward the environment and legislative action. Please indicate your level of agreement on the following statements where: 1 = Strongly Disagree, 2 = Disagree, 3 = Somewhat Disagree, 4 = Neutral (Neither Agree nor Disagree), 5 = Somewhat Agree, 6 = Agree, 7 = Strongly Agree.

- | | Disagree | Agree |
|---|---------------|-------|
| 1. There is not much that any one individual can do about the environment. | 1 2 3 4 5 6 7 | |
| 2. My community's current recycling practices are very effective in reducing litter and solid waste. | 1 2 3 4 5 6 7 | |
| 3. Environmental problems are <u>not</u> affecting my life personally. | 1 2 3 4 5 6 7 | |
| 4. Recycling advertisements try to make me feel guilty for not recycling. | 1 2 3 4 5 6 7 | |
| 5. Recycling will <u>not</u> make much difference in the quality of the environment. | 1 2 3 4 5 6 7 | |
| 6. I am extremely worried about the state of the world's environment and what it will mean for my future. | 1 2 3 4 5 6 7 | |
| 7. Recycling conserves natural resources. | 1 2 3 4 5 6 7 | |
| 8. Compared to other things in my life, environmental problems are not that important to me. | 1 2 3 4 5 6 7 | |

For the following questions, indicate your level of agreement with the statements regarding recycling advertisements on television and radio. If you have not seen/heard recycling advertisements on either television or radio, circle the "not applicable" (NA) choice for that statement.

		Television							Radio								
		Disagree			Agree				Disagree			Agree					
9.	I find recycling advertisements on to be very believable.	NA	1	2	3	4	5	6	7	NA	1	2	3	4	5	6	7
10.	I find recycling advertisements on to be very persuasive.	NA	1	2	3	4	5	6	7	NA	1	2	3	4	5	6	7
11.	I find recycling advertisements on to be very informative.	NA	1	2	3	4	5	6	7	NA	1	2	3	4	5	6	7

For the following questions, indicate your level of agreement with the statements regarding recycling advertisements in newspapers and magazines. If you have not seen recycling advertisements in either newspapers or magazines, circle the "not applicable" (NA) choice for that statement.

		Newspapers							Magazines								
		Disagree			Agree				Disagree			Agree					
		NA	1	2	3	4	5	6	7	NA	1	2	3	4	5	6	7
12.	I find recycling advertisements in to be very believable.																
13.	I find recycling advertisements in to be very persuasive.																
14.	I find recycling advertisements in to be very informative.																

Part Four: Newspaper Recycling

The following questions ask for your opinions toward newspaper recycling, environmental issues and government action. Please indicate your level of agreement on the following statements: 1 = Strongly Disagree, 2 = Disagree, 3 = Somewhat Disagree, 4 = Neutral (Neither Agree nor Disagree), 5 = Somewhat Agree, 6 = Agree, 7 = Strongly Agree.

	Disagree Agree						
1. I expect to be monetarily compensated for recycling my newspapers.	1	2	3	4	5	6	7

	Disagree	Agree
2. Whether or not I recycle newspapers is entirely up to me.	1	2 3 4 5 6 7
3. My friends think that I should recycle newspapers.	1	2 3 4 5 6 7
4. My neighbors think that I should recycle newspapers.	1	2 3 4 5 6 7
5. Government should fine individuals who throw away newspapers that could be recycled.	1	2 3 4 5 6 7
6. I have complete control over the amount of newspaper recycling that I do.	1	2 3 4 5 6 7
7. I feel that I have the physical ability to recycle newspapers effectively.	1	2 3 4 5 6 7
8. I feel that I have the knowledge to recycle newspapers effectively.	1	2 3 4 5 6 7
9. I feel that I have the resources I need to recycle newspapers effectively.	1	2 3 4 5 6 7
10. My family thinks that I should recycle newspapers.	1	2 3 4 5 6 7
11. It is financially rewarding to recycle newspapers.	1	2 3 4 5 6 7
12. It is important that I make money by recycling newspapers.	1	2 3 4 5 6 7
13. I would recycle more newspapers if I were fined for throwing them away.	1	2 3 4 5 6 7
14. I cannot figure out which parts of the newspaper can be recycled.	1	2 3 4 5 6 7
15. I pay too much for the newspaper recycling service I currently receive (Circle 4 if you do not pay/not served).	1	2 3 4 5 6 7
16. I have convenient access to a newspaper collection point.	1	2 3 4 5 6 7
17. I would be willing to pay more for the newspaper recycling service I currently receive. (Circle 4 if you do not pay/not served).	1	2 3 4 5 6 7
18. Providing better instructions would help me to recycle newspapers more effectively.	1	2 3 4 5 6 7
19. Moving newspapers to their collection point is inconvenient.	1	2 3 4 5 6 7
20. I have difficulty providing newspapers to the collector at the appropriate time.	1	2 3 4 5 6 7
21. I intend to recycle newspapers at every opportunity over the next two weeks.	1	2 3 4 5 6 7
22. I would be willing to pay more to receive better newspaper recycling service.	1	2 3 4 5 6 7

- | | Disagree | Agree |
|--|---------------|-------|
| 23. Sorting out recyclable paper from non-recyclable paper is too much trouble. | 1 2 3 4 5 6 7 | |
| 24. I find handling and storing newspapers to be very messy. | 1 2 3 4 5 6 7 | |
| 25. Storing newspapers until they can be given to the collector is too much trouble. | 1 2 3 4 5 6 7 | |
| 26. My residential facilities for storing newspapers are adequate. | 1 2 3 4 5 6 7 | |
| 27. For <u>curbside</u> collection only: I find it difficult to remember when the newspapers are to be collected. | 1 2 3 4 5 6 7 | |
| 28. For <u>curbside</u> collection only: I would recycle more newspapers if they could be collected more often. | 1 2 3 4 5 6 7 | |
| 29. For <u>dropoff and retail</u> collection only: I would recycle newspapers more if the collection facility was open more often. | 1 2 3 4 5 6 7 | |

For the next five questions, complete each statement on the scale of 1 to 7. The extreme points (1 and 7) are labeled. A rating of "4" means that you feel neutral about that statement.

- | | | |
|---|----------------------------|------------|
| 30. I feel that recycling newspapers is | Bad
1 2 3 4 5 6 7 | Good |
| 31. I feel that recycling newspapers is | Wise
1 2 3 4 5 6 7 | Foolish |
| 32. I feel that recycling newspapers is | Harmful
1 2 3 4 5 6 7 | Beneficial |
| 33. I feel that recycling newspapers is | Wrong
1 2 3 4 5 6 7 | Right |
| 34. I feel that recycling newspapers is | Worthless
1 2 3 4 5 6 7 | Valuable |

For the next question, complete the statement on the scale of 1 to 7. The extreme points (1 and 7) are labeled. A rating of "4" on the scale means that you plan to recycle occasionally.

- | | | |
|---|--|-------|
| 35. Over the next two weeks, I plan to recycle newspapers | At every
opportunity
1 2 3 4 5 6 7 | Never |
|---|--|-------|

Part Five: Demographic Information

1. Gender (Check one): ☐ Female ☐ Male
2. Marital status: ☐ Single ☐ Married ☐ Widowed
3. Age: ☐ 17 - 22 years ☐ 30 - 39 ☐ 51 - 60 ☐ Above 70
 ☐ 23 - 29 ☐ 40 - 50 ☐ 61 - 70
4. In what state do you live? _____ 5. What is your zip code? _____
6. What is the highest level of education you have attained?
- ☐ High school diploma ☐ Bachelor's Degree ☐ Other
 ☐ Some college ☐ Master's Degree
 ☐ Associate's degree ☐ Doctorate, M.D. or J.D.
7. What type of residence do you live in?
- _____ House _____ Apartment/Condominium _____ Mobile Home _____ Other
8. How many people live in your household? _____ people
9. What is your race?
- ☐ African American ☐ Caucasian ☐ Native American
 ☐ Asian ☐ Hispanic ☐ Other
10. What is your household family income? (optional)
- ☐ less than \$20,000 ☐ \$60,001 - \$90,000
 ☐ \$20,000 - \$40,000 ☐ \$90,001 - \$125,000
 ☐ \$40,001 - \$60,000 ☐ more than \$125,000

Part Six: Your Voice (Optional)

This is your opportunity to voice your opinion regarding the topics of this research. Please use the space provided to briefly address these questions (optional).

1. What could your community do to encourage you to recycle more than you currently do?
2. Do you have any final thoughts you would like to share regarding recycling, environmental issues or government action?

Thank you again for completing this survey!

Instructions for returning this survey:

1) fold along this line, 2) staple or tape the open end shut, and 3) drop in a mailbox.

Michigan State University
Department of Marketing and Supply Chain Management
N370 North Business Complex
East Lansing, Michigan 48824-1122

No postage
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in the United States

BUSINESS REPLY MAIL

FIRST CLASS MAIL PERMIT NO. **** EAST LANSING, MI

POSTAGE WILL BE PAID BY ADDRESSEE:

**Michigan State University
MSU Mail Center
East Lansing, Michigan 48824**

APPENDIX C

MEASUREMENT VALIDATION ACROSS SAMPLES

Table C.1 Descriptive Statistics, Full Sample (Beverage Containers)

Item	Mean	Std. Dev.	Min.	Max.	Skewness	Kurtosis
BI1	5.28	1.91	1	7	-0.910	-0.291
BI2	5.65	1.65	1	7	-1.291	1.024
A1	6.69	0.78	1	7	-3.376	14.393
A2	6.62	0.90	1	7	-2.959	9.608
A3	6.68	0.78	1	7	-3.242	13.348
A4	6.67	0.77	1	7	-2.828	9.157
A5	6.54	0.92	1	7	-2.558	7.974
SN1	5.81	1.64	1	7	-1.258	0.626
SN2	4.88	1.59	1	7	-0.356	-0.194
SN3	4.50	1.59	1	7	-0.075	-.051
PBC1	6.42	1.08	1	7	-2.582	7.724
PBC2	6.14	1.32	1	7	-1.950	3.769
PBC3	5.97	1.55	1	7	-1.682	2.113
EI1	4.17	2.22	1	7	-0.171	-1.385
EI2	3.40	1.93	1	7	0.256	-0.978
PA1	4.40	1.14	1	7	0.166	1.032
PA2	4.14	0.96	1	7	0.251	3.363
PA3	4.32	1.00	1	7	0.440	2.239
PA4	4.24	0.98	1	7	0.416	2.653
PEC1	3.71	1.18	1	7	-0.639	1.798
PI1	4.09	1.87	1	7	0.067	-0.982
CON1	3.79	2.03	1	7	0.241	-1.157
CON2	5.00	1.72	1	7	-0.440	-0.602
CON3	4.50	1.82	1	7	-0.221	-0.938
CON4	4.67	1.88	1	7	-0.394	-0.919

Table C.2 Measurement Reliabilities, Full Sample (Beverage Containers)

Construct	Reference	Item	Scale Type	Alphas
Behavioral Intention	B11	I intend to recycle beverage containers at every opportunity over the next two weeks.	7-point Likert	0.8239
	B12	Over the next two weeks, I intend to recycle beverage containers	7-point Semantic Differential (Never/At every opportunity)	
	A1	I feel that recycling beverage containers is	7-point Semantic Differential (Bad/Good)	
Attitude toward the Act of Recycling	A2	I feel that recycling beverage containers is	7-point Semantic Differential (Wise/Foolish) ^k	0.9154
	A3	I feel that recycling beverage containers is	7-point Semantic Differential (Harmful/Beneficial)	
	A4	I feel that recycling beverage containers is	7-point Semantic Differential (Wrong/Right)	
	A5	I feel that recycling beverage containers is	7-point Semantic Differential (Worthless/Valuable)	
			7-point Likert	
Subjective Norm	SN1	My family thinks that I should recycle beverage containers.	7-point Likert	0.7977
	SN2	My friends think that I should recycle beverage containers.	7-point Likert	
	SN3	My neighbors think that I should recycle beverage containers.	7-point Likert	
Perceived Behavioral Control	PBC1	I feel that I have the physical ability to recycle beverage containers effectively.	7-point Likert	0.7634
	PBC2	I feel that I have the knowledge to recycle beverage containers effectively.	7-point Likert	
	PBC3	I feel that I have the resources I need to recycle beverage containers effectively.	7-point Likert	

^k Denotes an item that has been reverse-scaled

Table C.2 (cont'd)

Construct	Reference	Measurement Item	Scale Type	Alphas
Economic Incentives	EI1	I expect to be monetarily compensated for recycling my beverage containers.	7-point Likert	0.7531
	EI2	It is important to make money by recycling beverage containers.	7-point Likert	
Promotions, Appeal Content	PA1	I find recycling advertisements on television to be very persuasive.	7-point Likert	0.8612
	PA2	I find recycling advertisements on radio to be very persuasive.	7-point Likert	
	PA3	I find recycling advertisements in beverage containers to be very persuasive.	7-point Likert	
	PA4	I find recycling advertisements in magazines to be very persuasive.	7-point Likert	
Perceived Economic Cost of Participation	PEC1	I pay too much for the beverage container recycling service I currently receive.	7-point Likert	--
Promotions, Informative Content	PI1	Providing better instructions would help me to recycle beverage containers more effectively.	7-point Likert ^R	--
Convenience	CON1	Moving beverage containers to their collection point is inconvenient.	7-point Likert ^R	0.7832
	CON2	I have difficulty providing beverage containers to the collector at the appropriate time.	7-point Likert ^R	
	CON3	Sorting out different kinds of beverage containers from one another is too much trouble.	7-point Likert ^R	
	CON4	Storing empty beverage containers until they can be given to the collector is too much trouble.	7-point Likert ^R	

^R Denotes an item that has been reverse-scaled

Table C.3 Confirmatory Factor Analysis, Beverage Containers**Fit Statistics**

Chi-square	638.38	p < 0.001
Normed chi-square	2.40	(df = 266)
BBNFI	0.916	
BBNNFI	0.943	
CFI	0.949	

Parameter	Standardized Estimate	t-Value^a
BI1	0.806	--- ^b
BI2	0.879	13.690
A1	0.893	--- ^b
A2	0.821	20.837
A3	0.821	20.824
A4	0.882	23.966
A5	0.751	17.821
SN1	0.667	--- ^b
SN2	0.797	12.141
SN3	0.829	12.283
PBC1	0.703	--- ^b
PBC2	0.738	11.372
PBC3	0.747	11.446
EI1	0.878	--- ^b
EI2	0.694	3.224
PA1	0.656	--- ^b
PA2	0.677	11.288
PA3	0.877	13.702
PA4	0.883	13.739
PEC1	1.000	--- ^b
PI1	1.000	--- ^b
CON1	0.680	--- ^b
CON2	0.681	10.355
CON3	0.745	10.908
CON4	0.644	9.944

^a t-values are derived from the unstandardized solution^b t-values for these parameters are not available since they were fixed for scaling purposes

Table C.4 Reliability Estimates for Sub-Samples

	Legislative Setting (Beverage Containers)			City Setting (Newspapers)		
Construct	Non-Deposit	5-Cent Deposit	10-Cent Deposit	Rural	Suburban	Metropolitan
Behavioral Intention	0.8796	0.7038	0.7954	0.8352	0.7689	0.8284
Attitude	0.9279	0.9157	0.8862	0.9239	0.9394	0.8791
Subjective Norm	0.7692	0.7604	0.7937	0.7935	0.8029	0.7919
Perceived Behavioral Control	0.7526	0.7527	0.7641	0.6734	0.8626	0.7498
Economic Incentives	0.8255	0.6726	0.7088	0.7523	0.7187	0.8062
Promotions, Appeal						
Content	0.8214	0.8749	0.8739	0.8330	0.8569	0.9019
Perceived Economic Cost of Participation ^a	---	---	---	---	---	---
Promotions, Informative Content ^a	---	---	---	---	---	---
Convenience	0.8090	0.7317	0.7809	0.7904	0.7762	0.8473

^a These are single-item scales

Table C.5 Confirmatory Factor Analysis, Non-Deposit (Beverage Containers)

Fit Statistics

Chi-square	429.65	p < 0.001
Normed chi-square	1.62	(df = 266)
BBNFI	0.876	
BBNNFI	0.942	
CFI	0.948	

Parameter	Standardized Estimate	t-Value^a
BI1	0.838	--- ^b
BI2	0.937	9.771
A1	0.930	--- ^b
A2	0.879	16.803
A3	0.906	18.223
A4	0.860	15.889
A5	0.694	10.343
SN1	0.610	--- ^b
SN2	0.759	6.936
SN3	0.902	7.020
PBC1	0.662	--- ^b
PBC2	0.807	6.836
PBC3	0.674	6.357
EI1	0.836	--- ^b
EI2	0.708	11.893
PA1	0.633	--- ^b
PA2	0.744	6.859
PA3	0.768	6.994
PA4	0.803	7.150
PEC1	1.000	--- ^b
PI1	1.000	--- ^b
CON1	0.705	--- ^b
CON2	0.702	7.094
CON3	0.770	7.568
CON4	0.698	7.064

^a t-values are derived from the unstandardized solution

^b t-values for these parameters are not available since they were fixed for scaling purposes

Table C.6 Confirmatory Factor Analysis, 5-Cent Deposit (Beverage Containers)**Fit Statistics**

Chi-square	399.06	p < 0.001
Normed chi-square	1.50	(df = 266)
BBNFI	0.830	
BBNNFI	0.927	
CFI	0.935	

Parameter	Standardized Estimate	t-Value^a
BI1	0.713	--- ^b
BI2	0.787	5.641
A1	0.855	--- ^b
A2	0.854	12.044
A3	0.678	8.435
A4	0.905	13.330
A5	0.857	12.116
SN1	0.631	--- ^b
SN2	0.725	5.975
SN3	0.825	6.114
PBC1	0.795	--- ^b
PBC2	0.648	6.312
PBC3	0.754	6.989
EI1	0.743	--- ^b
EI2	0.689	2.417
PA1	0.658	--- ^b
PA2	0.673	6.567
PA3	0.899	8.247
PA4	0.918	8.306
PEC1	1.000	--- ^b
PI1	1.000	--- ^b
CON1	0.639	--- ^b
CON2	0.618	4.965
CON3	0.702	5.286
CON4	0.560	4.646

^a t-values are derived from the unstandardized solution

^b t-values for these parameters are not available since they were fixed for scaling purposes

Table C.7 Confirmatory Factor Analysis, 10-Cent Deposit (Beverage Containers)

Fit Statistics

Chi-square	378.21	p < 0.001
Normed chi-square	1.42	(df = 266)
BBNFI	0.872	
BBNNFI	0.952	
CFI	0.958	

Parameter	Standardized Estimate	t-Value^a
BI1	0.763	--- ^b
BI2	0.891	8.041
A1	0.914	--- ^b
A2	0.651	9.595
A3	0.860	15.705
A4	0.902	17.402
A5	0.706	10.941
SN1	0.665	--- ^b
SN2	0.854	8.064
SN3	0.761	7.784
PBC1	0.693	--- ^b
PBC2	0.700	7.183
PBC3	0.787	7.609
EI1	0.803	--- ^b
EI2	0.689	2.969
PA1	0.654	--- ^b
PA2	0.628	7.078
PA3	0.917	9.520
PA4	0.920	9.527
PEC1	1.000	--- ^b
PI1	1.000	--- ^b
CON1	0.688	--- ^b
CON2	0.677	6.782
CON3	0.732	7.104
CON4	0.646	6.554

^a t-values are derived from the unstandardized solution

^b t-values for these parameters are not available since they were fixed for scaling purposes

Table C.8 Confirmatory Factor Analysis, Rural Setting (Newspapers)

Fit Statistics

Chi-square	460.09	p < 0.001
Normed chi-square	1.73	(df = 266)
BBNFI	0.884	
BBNNFI	0.941	
CFI	0.947	

Parameter	Standardized Estimate	t-Value^a
BI1	0.959	--- ^b
BI2	0.849	10.764
A1	0.879	--- ^b
A2	0.736	11.259
A3	0.959	19.294
A4	0.964	19.547
A5	0.825	13.753
SN1	0.594	--- ^b
SN2	0.877	7.428
SN3	0.856	7.417
PBC1	0.706	--- ^b
PBC2	0.819	8.252
PBC3	0.785	8.116
EI1	0.824	--- ^b
EI2	0.716	3.125
PA1	0.567	--- ^b
PA2	0.628	5.971
PA3	0.861	7.137
PA4	0.887	7.169
PEC1	1.000	--- ^b
PI1	1.000	--- ^b
CON1	0.622	--- ^b
CON2	0.584	5.773
CON3	0.816	7.108
CON4	0.723	6.729

^a t-values are derived from the unstandardized solution

^b t-values for these parameters are not available since they were fixed for scaling purposes

Table C.9 Confirmatory Factor Analysis, Suburban Setting (Newspapers)

Fit Statistics

Chi-square	349.99	p < 0.001
Normed chi-square	1.32	(df = 266)
BBNFI	0.875	
BBNNFI	0.962	
CFI	0.967	

Parameter	Standardized Estimate	t-Value^a
BI1	0.881	--- ^b
BI2	0.909	9.884
A1	0.963	--- ^b
A2	0.796	12.840
A3	0.932	21.412
A4	0.954	24.035
A5	0.741	10.969
SN1	0.624	--- ^b
SN2	0.958	7.092
SN3	0.813	7.067
PBC1	0.627	--- ^b
PBC2	0.735	6.036
PBC3	0.858	6.284
EI1	0.928	--- ^b
EI2	0.769	6.197
PA1	0.760	--- ^b
PA2	0.711	7.806
PA3	0.909	10.373
PA4	0.934	10.593
PEC1	1.000	--- ^b
PI1	1.000	--- ^b
CON1	0.776	--- ^b
CON2	0.848	8.755
CON3	0.656	6.802
CON4	0.757	7.937

^a t-values are derived from the unstandardized solution

^b t-values for these parameters are not available since they were fixed for scaling purposes

Table C.10 Confirmatory Factor Analysis, Metropolitan Setting (Newspapers)

Fit Statistics

Chi-square	423.83	p < 0.001
Normed chi-square	1.59	(df = 266)
BBNFI	0.905	
BBNNFI	0.957	
CFI	0.962	

Parameter	Standardized Estimate	t-Value^a
BI1	0.782	--- ^b
BI2	0.942	15.576
A1	0.927	--- ^b
A2	0.679	10.640
A3	0.983	26.851
A4	0.948	23.239
A5	0.787	13.920
SN1	0.642	--- ^b
SN2	0.926	9.352
SN3	0.947	9.329
PBC1	0.765	--- ^b
PBC2	0.849	9.796
PBC3	0.742	8.852
EI1	0.841	--- ^b
EI2	0.656	4.646
PA1	0.686	--- ^b
PA2	0.714	7.856
PA3	0.856	9.017
PA4	0.834	8.890
PEC1	1.000	--- ^b
PI1	1.000	--- ^b
CON1	0.698	--- ^b
CON2	0.684	6.889
CON3	0.615	6.348
CON4	0.680	6.861

^a t-values are derived from the unstandardized solution

^b t-values for these parameters are not available since they were fixed for scaling purposes

APPENDIX D

FULL MODEL RESULTS FOR SUB-SAMPLES

Table D.1 Full Model Analysis, Non-Deposit Setting (Beverage Containers)**Fit Statistics**

Chi-square	473.52	p < 0.001
Normed chi-square	1.77	(df = 267)
BBNFI	0.863	
BBNNFI	0.926	
CFI	0.935	

Measurement Model			Structural Model		
Parameter	Standardized Estimate	t-Value ^a	Parameter	Standardized Estimate	t-Value ^a
BI1	0.831	--- ^b	A-BI	0.262	3.147
BI2	0.908	7.918	SN-BI	0.309	3.280
A1	0.929	--- ^b	PBC-BI	0.425	4.015
A2	0.879	16.699	EI-A	-0.196	-1.869
A3	0.905	18.129	PA-A	0.070	0.754
A4	0.870	15.817	PA-SN	0.229	2.218
A5	0.694	10.317	PEC-A	-0.009	-0.102
SN1	0.577	--- ^b	PEC-PBC	-0.113	-1.336
SN2	0.746	6.662	PI-PBC	0.179	2.096
SN3	0.937	6.421	CON-PBC	0.586	4.747
PBC1	0.663	--- ^b			
PBC2	0.678	6.254			
PBC3	0.766	6.619			
EI1	0.871	--- ^b			
EI2	0.813	2.492			
PA1	0.656	--- ^b			
PA2	0.743	7.084			
PA3	0.770	7.247			
PA4	0.785	7.329			
PEC1	1.000	--- ^b			
PI1	1.000	--- ^b			
CON1	0.695	--- ^b			
CON2	0.718	7.179			
CON3	0.758	7.466			
CON4	0.714	7.146			

^a t-values are derived from the unstandardized solution^b t-values for these parameters are not available since they were fixed for scaling purposes

Table D.2 Full Model Analysis, 5-Cent Deposit (Beverage Containers)**Fit Statistics**

Chi-square	423.84	p < 0.001
Normed chi-square	1.59	(df = 267)
BBNFI	0.819	
BBNNFI	0.914	
CFI	0.923	

Measurement Model			Structural Model		
Parameter	Standardized Estimate	t-Value ^a	Parameter	Standardized Estimate	t-Value ^a
BI1	0.679	--- ^b	A-BI	0.341	3.024
BI2	0.765	4.464	SN-BI	0.308	2.515
A1	0.858	--- ^b	PBC-BI	0.389	3.079
A2	0.855	12.135	EI-A	0.158	1.424
A3	0.673	8.369	PA-A	0.325	3.231
A4	0.902	13.308	PA-SN	0.083	0.784
A5	0.858	12.210	PEC-A	-0.071	-0.797
SN1	0.595	--- ^b	PEC-PBC	0.018	0.182
SN2	0.713	5.707	PI-PBC	0.180	1.831
SN3	0.867	5.507	CON-PBC	0.348	2.752
PBC1	0.789	--- ^b			
PBC2	0.604	5.834			
PBC3	0.786	6.710			
EI1	0.625	--- ^b			
EI2	0.819	1.225			
PA1	0.662	--- ^b			
PA2	0.674	6.615			
PA3	0.900	8.324			
PA4	0.914	8.375			
PEC1	1.000	--- ^b			
PI1	1.000	--- ^b			
CON1	0.603	--- ^b			
CON2	0.635	4.847			
CON3	0.703	5.058			
CON4	0.621	4.786			

^a t-values are derived from the unstandardized solution^b t-values for these parameters are not available since they were fixed for scaling purposes

Table D.3 Full Model Analysis, 10-Cent Deposit (Beverage Containers)**Fit Statistics**

Chi-square	466.52	p < 0.001
Normed chi-square	1.75	(df = 267)
BBNFI	0.842	
BBNNFI	0.916	
CFI	0.925	

Measurement Model			Structural Model		
Parameter	Standardized Estimate	t-Value ^a	Parameter	Standardized Estimate	t-Value ^a
BI1	0.736	--- ^b	A-BI	0.196	2.411
BI2	0.881	6.721	SN-BI	0.353	3.585
A1	0.914	--- ^b	PBC-BI	0.473	4.291
A2	0.651	9.601	EI-A	-0.216	-2.058
A3	0.857	15.601	PA-A	0.154	1.787
A4	0.902	17.417	PA-SN	0.349	3.506
A5	0.708	10.931	PEC-A	-0.069	-0.843
SN1	0.621	--- ^b	PEC-PBC	0.031	0.372
SN2	0.867	7.415	PI-PBC	-0.085	-1.017
SN3	0.782	7.386	CON-PBC	0.463	4.058
PBC1	0.659	--- ^b			
PBC2	0.699	6.893			
PBC3	0.815	7.241			
EI1	0.397	--- ^b			
EI2	0.582	-2.624			
PA1	0.656	--- ^b			
PA2	0.628	7.088			
PA3	0.918	9.562			
PA4	0.919	9.565			
PEC1	1.000	--- ^b			
PI1	1.000	--- ^b			
CON1	0.675	--- ^b			
CON2	0.694	6.827			
CON3	0.713	6.936			
CON4	0.670	6.662			

^a t-values are derived from the unstandardized solution^b t-values for these parameters are not available since they were fixed for scaling purposes

Table D.4 Full Model Analysis, Rural Setting (Newspapers)**Fit Statistics**

Chi-square	498.31	p < 0.001
Normed chi-square	1.87	(df = 267)
BBNFI	0.875	
BBNNFI	0.929	
CFI	0.937	

Measurement Model			Structural Model		
Parameter	Standardized Estimate	t-Value ^a	Parameter	Standardized Estimate	t-Value ^a
BI1	0.948	--- ^b	A-BI	0.174	2.349
BI2	0.832	9.068	SN-BI	0.321	3.687
A1	0.877	--- ^b	PBC-BI	0.464	4.961
A2	0.734	11.175	EI-A	-0.241	-2.161
A3	0.958	19.081	PA-A	0.273	3.045
A4	0.964	19.392	PA-SN	0.284	2.773
A5	0.822	13.609	PEC-A	-0.149	-1.916
SN1	0.582	--- ^b	PEC-PBC	-0.049	-0.614
SN2	0.867	7.181	PI-PBC	0.140	1.745
SN3	0.870	7.178	CON-PBC	0.574	4.721
PBC1	0.651	--- ^b			
PBC2	0.766	7.316			
PBC3	0.819	7.504			
EI1	0.841	--- ^b			
EI2	0.702	2.526			
PA1	0.574	--- ^b			
PA2	0.633	6.069			
PA3	0.860	7.251			
PA4	0.882	7.289			
PEC1	1.000	--- ^b			
PI1	1.000	--- ^b			
CON1	0.644	--- ^b			
CON2	0.593	5.952			
CON3	0.780	7.186			
CON4	0.762	7.106			

^a t-values are derived from the unstandardized solution^b t-values for these parameters are not available since they were fixed for scaling purposes

Table D.5 Full Model Analysis, Suburban Setting (Newspapers)**Fit Statistics**

Chi-square	380.41	p < 0.001
Normed chi-square	1.42	(df = 267)
BBNFI	0.865	
BBNNFI	0.949	
CFI	0.955	

Measurement Model			Structural Model		
Parameter	Standardized Estimate	t-Value ^a	Parameter	Standardized Estimate	t-Value ^a
BI1	0.865	--- ^b	A-BI	0.220	2.619
BI2	0.902	8.830	SN-BI	0.273	2.971
A1	0.962	--- ^b	PBC-BI	0.568	4.653
A2	0.795	12.768	EI-A	-0.273	-2.505
A3	0.933	21.365	PA-A	0.174	1.825
A4	0.954	23.908	PA-SN	0.324	2.997
A5	0.740	10.945	PEC-A	-0.025	-0.279
SN1	0.615	--- ^b	PEC-PBC	0.038	0.401
SN2	0.970	6.892	PI-PBC	0.023	0.242
SN3	0.860	6.977	CON-PBC	0.510	4.021
PBC1	0.617	--- ^b			
PBC2	0.730	5.901			
PBC3	0.847	6.207			
EI1	0.842	--- ^b			
EI2	0.847	3.230			
PA1	0.764	--- ^b			
PA2	0.711	7.834			
PA3	0.912	10.482			
PA4	0.930	10.648			
PEC1	1.000	--- ^b			
PI1	1.000	--- ^b			
CON1	0.783	--- ^b			
CON2	0.832	8.695			
CON3	0.661	6.889			
CON4	0.775	8.173			

^a t-values are derived from the unstandardized solution^b t-values for these parameters are not available since they were fixed for scaling purposes

Table D.6 Full Model Analysis, Metropolitan Setting (Newspapers)**Fit Statistics**

Chi-square	467.19	p < 0.001
Normed chi-square	1.75	(df = 267)
BBNFI	0.896	
BBNNFI	0.946	
CFI	0.952	

Measurement Model			Structural Model		
Parameter	Standardized Estimate	t-Value ^a	Parameter	Standardized Estimate	t-Value ^a
BI1	0.754	--- ^b	A-BI	0.329	4.904
BI2	0.865	14.240	SN-BI	0.113	1.750
A1	0.925	--- ^b	PBC-BI	0.593	6.575
A2	0.676	10.524	EI-A	-0.330	-2.645
A3	0.982	26.430	PA-A	0.187	2.264
A4	0.947	22.925	PA-SN	0.258	2.774
A5	0.785	13.770	PEC-A	-0.139	-1.832
SN1	0.638	--- ^b	PEC-PBC	-0.036	-0.490
SN2	0.939	9.249	PI-PBC	0.053	0.711
SN3	0.935	9.254	CON-PBC	0.650	5.736
PBC1	0.748	--- ^b			
PBC2	0.850	9.642			
PBC3	0.724	8.490			
EI1	0.906	--- ^b			
EI2	0.609	3.009			
PA1	0.691	--- ^b			
PA2	0.711	7.894			
PA3	0.857	9.131			
PA4	0.830	8.970			
PEC1	1.000	--- ^b			
PI1	1.000	--- ^b			
CON1	0.692	--- ^b			
CON2	0.766	7.542			
CON3	0.588	6.195			
CON4	0.678	6.947			

^a t-values are derived from the unstandardized solution^b t-values for these parameters are not available since they were fixed for scaling purposes

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