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Consumer Satisfaction with Michigan's
Container Deposit Law--An Ecological Perspective

Working Paper No. 231

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Consumer Satisfaction with Michigan's
Container Deposit Law--An Ecological Perspective

It is widely recognized that our society needs to come to grips with its solid waste problem. Heavy use of one-way packaging coupled with inefficient methods of waste disposal are squandering valuable energy and material resources, choking the city dump, and littering the landscape (Ginter and Starling 1978). Throwaway beverage containers that are not recycled have been identified as a major contributor to this problem.

The most feasible alternatives for dealing with the beverage container problem all involve some type of "reverse channel process" (Zikmund and Stanton 1971). Three types of reverse channels for recycling solid waste from consumer sources have been identified: mechanical resource recovery centers, manufacturer-controlled recycling centers, and reverse channels using traditional middlemen (Guiltinan and Nwokoye 1975). Each of these channel types has its advantages and disadvantages (Fuller 1978). This article focuses on the reverse channel using traditional middlemen.

Twenty years ago it was quite common in the U.S. for wholesale distributors and retailers to handle the backward flow of containers. As part of their normal operations, retailers sold both beer and soft drinks in refillable containers and charged a deposit to encourage their return. However, as consumers became more interested in convenience (and willing to pay for it), this returnables system gave way to today's throwaway containers (Murphy 1974). In the 1970s, reverse channels using traditional middlemen were reinstated in several states and localities through the passage of mandatory container deposit laws. States which now have such laws include Oregon, Vermont, Iowa, Maine, South Dakota, Connecticut, and Michigan. Delaware has a mandatory deposit law, but it will not become effective until similar legislation is

passed in Maryland and Pennsylvania. Container deposits are required in all national parks, and a national deposit law has been introduced in Congress several times.

Much of what is known about the operation of these deposit systems is based on the Oregon experience. Oregon's "bottle bill"¹ was passed in 1971 and fully implemented in 1972. Since that time a number of attempts have been made to assess its impact, using a variety of methodologies. By and large, the data have supported the law on both economic and environmental grounds (Murphy 1974; Gudger and Bailes 1974; Waggoner 1975). One viewpoint that is not well represented in these evaluations is that of the consumer. Little seems to be known about the reaction of consumers to their role as recyclers. Likewise, little seems to be known about the consumer-retailer interface, which is a crucial link in the reverse channel. The present study provides some factual evidence about the functioning of a deposit system as seen from the consumer's perspective.

The Question of Consumer Response

It has been asserted in several studies that Oregon consumers responded positively to their deposit system. One investigator based this conclusion on the fact that beer and soft drink sales were not adversely affected by the law (Murphy 1974). Another investigator suggested that Oregon's high redemption rates indicated that consumers found it convenient to return the containers (Gudger and Bailes 1974). While these conclusions may be accurate, they are inferential and are not based on an actual sampling of consumer opinion.

Somewhat more direct evidence regarding consumer response comes from a 1979 election in Maine where voters had the opportunity to repeal their two-year-old deposit law. Despite the fact that industry spent over \$200,000 in

advertising to defeat the law in the last ten days of the campaign, 84 percent voted to keep the deposit system.

Despite these favorable indications, there may be some danger in using the Oregon or Maine experiences to generalize about consumer response to deposit laws in particular, and recycling in general. An argument can be made that the "conservation ethic" is unusually strong in those states (Leigh and Warshaw 1977). This may be an important limitation pointing to the need for consumer research with a more representative population.

The Question of Retailer Response

A review of past events would suggest that the beverage industry is vehemently opposed to these bottle bills. On the basis of the large amounts of money spent for advertising by the industry in attempting to defeat deposit law referenda (e.g., \$1.3 million in Michigan alone), this is a reasonable conclusion. Less clear, however, is the nature of industry response after a law of this type is enacted. Of particular interest are the activities of retailers which impinge directly on consumers and which may affect consumer satisfaction with the deposit system. These activities might occur anywhere on a continuum ranging from wholehearted support, to reluctant compliance, to legal opposition, to circumvention and outright sabotage.² It should be possible to obtain from a sampling of consumer opinion some indication of retailer cooperation, especially as it relates to the level of customer service being provided.

The Michigan Experience

The data reported in this study deal with the reaction of Michigan consumers to their container law. The law passed by a 64-to-35-percent margin in November, 1976, and was implemented in December, 1978. The law requires that

a deposit be charged on all soft drink, beer, and carbonated water containers smaller than one gallon. A three-tier system is used to determine the deposit amount. A 5¢ deposit is charged on "certified containers" which can be re-used by more than one company 10¢ is charged on all other containers except quarts and liters, for which the charge is 20¢. Retailers must refund the deposit on a container if they sell the same brand as the empties. Violation of the law by a retailer, distributor, or manufacturer is a misdemeanor that carries a fine of \$100 to \$1,000 per day.

Michigan's experience with a deposit law is considered by many to be a "test case" that will have a major influence on the adoption of similar laws in other states and some influence on whether a national deposit law ever passes Congress. This is primarily because Michigan is the only large, densely populated, and industrialized state to have such a law.

The Research Objectives

The objectives of this study can be summarized as follows: (A) to describe the level of consumer satisfaction with Michigan's container law on the basis of a representative sampling of consumer opinion, (B) to determine what consumers like and dislike about the system and how this affects their satisfaction/dissatisfaction, and (C) to determine how retailer activities affect consumer satisfaction/dissatisfaction with the container law. Specific hypotheses were formulated in each of these areas and tested against the results of a statewide consumer survey. The conceptual framework underlying these hypotheses is described below.

The Level of Consumer Satisfaction

A review of the past literature suggests that ecologically concerned consumers constitute only a small portion of the total U.S. population and

that the ecological movement is confined largely to the white, upper middle class (Harry et al. 1969; Anderson and Cunningham 1972; McEvoy 1972; Stipak 1973; Kinnear, Taylor, and Ahmed 1974; Webster 1975; Murphy, Kangun, and Locander 1978; Murphy 1978). This conclusion is certainly consistent with the low level of market demand for returnables in Michigan prior to the 1976 election (15 to 25 percent) but not with the high level of support for the bottle ban (64 percent in favor). Research that focused on this apparent contradiction was undertaken at the time of the 1976 election. Those survey results indicated that Michigan consumers exhibited "normal" levels of ecological concern, that ecological concern was related to support for the law but was not a prerequisite for support, that supporters of the law were more likely than opponents to vote in the election, and that 59 percent of the law's supporters were customary users of throwaway beverage containers (Crosby, Taylor, and Kinnear 1978; 1980).

These findings raised some question about the acceptability of the deposit law once it was finally implemented in 1978. On the one hand, as many as half of the consumers whose behavior would be affected by the law were initially opposed to it. At the same time, supporters of the law seemed to have little experience with recycling and may not have been well informed about the nature of the proposed system. Because many of the supporters lacked a significant commitment to environmental protection, it seemed likely that their support would turn to dissatisfaction when they were faced with some of the negative realities of the deposit system. These considerations suggested that the deposit law would create substantial dissatisfaction after being implemented. This point of view is reflected in the first hypothesis:

H1: As the result of their experiences, more Michigan consumers are dissatisfied than satisfied with their container deposit law.

Sources of Satisfaction/Dissatisfaction

At the heart of most models of consumer satisfaction is the concept of reinforcement (Olson and Dover 1976; Madden, Little, and Dolich 1978; La Tour and Peat 1979). This concept is well articulated in Thibaut and Kelley's (1959) comparison level theory, which has been applied to marketing by La Tour and Peat. This theory posits that an individual assesses the rewards and costs of a social interaction by judging it against a comparison level, and that this assessment determines his satisfaction with the outcome of that interaction. This basic notion would seem to be applicable to consumer satisfaction with the Michigan container law, for which the comparison level is clearly the gratifications enjoyed under the previous throwaway systems. Unfortunately, identifying the rewards and costs associated with the returnables system is more problematic, since satisfaction with the law is affected not by a single interaction but by a complex network of interactions. This complexity, coupled with the general subject matter of the study, led to the adoption of an "ecological perspective" for identifying the sources of satisfaction/dissatisfaction.

The Ecological Model of Behavior

Beginning with Barker's (1965; 1968) initial work in ecological psychology, the ecological model of behavior has been successfully applied to the fields of community psychology (Kessler and Albee 1975; Holahan and Wilcox 1977) and school psychology (Carrol 1974; Thurman 1977; Thomas and Marshall 1977; Parker and Patterson 1979). According to this model, all behavior is viewed as occurring within an environmental context (ecosystem). The various habitats that compose the ecosystem are assumed to be connected both with the person and with each other. Consequently, a disturbance in one portion of the

ecosystem may set off a complex chain of events leading to consequences often unforeseen. The term "ecology" refers to the study of the interactions between individuals and their environments. These interactions involve reciprocal association, that is, the individual's actions affect his environment and vice versa. Another important concept is adaptation, the process by which a person copes with his environment. Effective coping results in a balance between the person and his physical and social environments.

An attempt to "map" the ecosystem is a useful first step in applying the ecological model. Figure 1 shows a map of the portion of the ecosystem thought to be affected by the imposition of the container return system. This figure depicts the natural environment as encompassing both the individual and the various social systems. The "marketing system" refers to the brewers, bottlers, distributors, and retailers, who are all members of both the forward and the reverse channels of distribution under this system. The interactions thought to affect consumer satisfaction with the container law are those that connect consumers to the other environmental entities in this map. Because of the interrelatedness of the ecosystem, the interactions between the other environmental entities (e.g., return system ↔ marketing system) can have secondary effects on consumer satisfaction.

Insert Figure 1 About Here

Consumer satisfaction under the deposit law is assumed to depend on the degree of congruence or balance between the individual and his behavioral ecology. Presumably, it was a lack of congruence under the throwaway system that led many consumers to favor the deposit law in 1976.³ In order to assess the degree of congruence or balance, all relevant interactions between the person and his environment must be considered simultaneously.

Consumer ↔ Natural Environment

The basic objectives of the deposit law all reflect an attempt to change the relationship between consumers and their natural environment. As noted previously, the law was aimed at: 1) reducing litter, 2) reducing solid waste tonnage, and 3) reducing resource consumption. While each of these objectives is important, they are not of equal salience to consumers when they assess the quality of their interactions with the environment. One would expect that the more immediate, proximal, and visible outcomes would have greater influence on satisfaction. This implies that the perceived effectiveness of the law in reducing litter is probably most relevant to consumer satisfaction, a conclusion which is supported by previous research indicating that "concern about litter as a source of pollution" was the most important reason why voters supported the law in 1976 (Crosby, Gill, and Taylor 1980).

Within a few months of its implementation, it was evident that the Michigan law was effective in reducing litter. A study comparing 1979 litter levels with those for 1978 showed that roadside container litter decreased by 82 percent and that roadside litter from all sources decreased by 41 percent (Ann Arbor News Oct. 14, 1979). Considering the magnitude of this effect, the relative visibility of this outcome, and consumers' apparent concern about litter, the following hypotheses were formulated:

- H2(a): The Michigan container law is perceived by most consumers as having been effective in reducing litter.
- H2(b): Satisfaction with the container law is positively associated with the perceived effectiveness of the law in reducing litter.

Consumer ↔ Return System

As noted by Thurman (1977), every environmental setting defines for the individual a functional set of behaviors that lead to the completion of a task

or job within that setting. The lack of a behavioral repertoire necessary to perform these setting-specific tasks places the individual in a noncongruent and presumably dissatisfying situation.

Viewed as a portion of the environment, the container return system defines for the consumer a set of functional behaviors consisting of reverse channel tasks. These include: sorting out containers from the household solid waste, accumulating homogeneous stocks of these containers, and transporting the containers to collection points (beverage stores) where larger stocks are accumulated. These tasks of sorting out and accumulating are inherent to any distribution process (Alderson 1957).

Two factors suggest that performing these channel tasks would be perceived by consumers as dissatisfying. One is that many consumers have had little or no experience participating in recycling. Therefore, they will lack an appropriate behavioral repertoire for performing the tasks and must undertake the process of developing one. This will tend to lengthen the adjustment process. Second, consumers have previously indicated a willingness to pay money (in the form of higher prices for throwaways) in order to avoid these tasks. This implies that the time and effort required to perform them is of value to consumers. These tasks should result in a perception of the returnables system as inconvenient relative to the throwaway system, which supports the following hypotheses:

- H3(a): Most consumers find it inconvenient to perform the reverse channel tasks required of them under the Michigan container law.
- H3(b): Satisfaction with the container law is positively associated with the perceived convenience of performing these tasks.

Consumers ↔ Marketing System ↔ Return System

As mentioned before, changes in one part of the ecosystem may lead to changes in other parts because of its interrelatedness. These changes might be termed secondary effects. The imposition of the container return system seems to have produced several secondary effects.

Consumers were not the only environmental entity whose behavior was affected by the law. Members of the marketing system were also required to adapt their behaviors to the changed environmental conditions. Their responses to the reverse channel tasks imposed on them by the return system also affected their forward channel activities and associated interactions with consumers. This was a natural consequence of using the same middlemen in both channels.

The most obvious of these interactions concerns the impact of reverse channel costs on product prices. Prior to the 1976 election, environmentalists who supported the deposit law argued that beer and soft drink prices would most likely decline because of the law. The argument of the environmentalists notwithstanding, beer and soft drink prices rose dramatically in Michigan in the first half-year of the law's implementation. Soft drink prices showed a 15 to 20 percent increase (Detroit Free Press Feb. 7, 1979). Beer prices increased by nearly 50 percent (Detroit Free Press March 26, 1979). While a certain amount of the increase was attributable to inflation, Michigan prices were well above those in Wisconsin, Indiana, and Ohio, which are neighboring states without deposit laws. Industry sources attributed much of this increase to the \$130 million in new capital investment needed to implement the law (Ann Arbor News July 22, 1979).

This negative secondary effect of the return system on the marketing system and ultimately on consumer prices is predicted to have a negative impact on satisfaction. Previous research indicates that concern about the

effects of the deposit law on prices was the reason given most frequently for being opposed to the law in 1976 (Crosby and Gill 1980). The following hypotheses address this concern:

- H4(a): Most consumers perceive that the deposit law has resulted in a significant increase in the prices of soft drinks and beer.
- H4(b): Satisfaction with the container law is negatively associated with the amount of perceived price increase.

Another secondary effect felt to have negative consequences for consumer satisfaction is also a consequence of using retailers as middlemen in both channels. In a very real sense, the forward and reverse channels vie for space in the retailer's back room. The retailer must use valuable storage space for processing the returnables. Unless storage space is expanded, the filled containers must be stored on display shelves. In order to keep the amount of shelf space devoted to beverages from exploding, the retailer must reduce this assortment of brands and container types (Tanner 1979). Presumably, the proliferation in beverage lines that has historically occurred reflects an attempt by marketers to better serve the needs of consumers and has contributed to their satisfaction; therefore, loss of this variety should result in dissatisfaction relative to the previous system.

- H5(a): Most consumers perceive that the deposit law has made it more difficult to find their preferred brands and container types.
- H5(b): Satisfaction with the container law is positively associated with the perceived ease of finding the preferred brands and container types.

Consumers ↔ Marketing System

A final set of interactions believed to be important to satisfaction also involves the consumers and the marketing system. Although technically these interactions also have their origin with the imposition of the container law, they are not considered here to be secondary effects. The difference between

these effects and the previous set (prices, assortment) is the degree to which the environment (i.e., the return system) dictates to the marketing system a particular set of responses. In the case of beverage prices and the beverage assortment, environmental control was almost complete.⁴ Other responses, however, involve a high degree of decision freedom on the part of retailers and are largely strategic in nature. These responses refer to the level of customer service provided in the reverse channel by retailers, which should affect consumers' perceptions of the convenience of the system and thereby their satisfaction with it. There are at least two key interactions between consumers and the marketing system in the reverse channel: how easy or difficult it is to return containers at the point of return (POR) and how easy or difficult it is for consumers to obtain a refund of the deposit.

In deciding on a customer service level strategy, the retailer faces a bit of a dilemma. Individual retailers (or their organizations) who oppose the law may decide to do everything in the power to turn consumer sentiment against the law. This might involve providing little or no customer service. The problem with this strategy is that it may backfire, having more of a negative impact on the retailer's business than on consumer attitudes about the law. If there are other retailers who choose to cooperate with the law and are providing a high level of customer service, consumers may elect to take their business to them.

It is predicted that many individual retailers and grocer organizations will be inclined to take the risk of losing some customers and will offer a low level of customer service in the reverse channel, in the hopes of turning consumer sentiment against the law. This prediction is based on the assumption that many retailers find themselves in a desperate situation, caught between

the high costs of coping with the return system and the low margins of the beverage business.

H6(a): Most consumers find it inconvenient to return their containers at the store and difficult to obtain the deposit refund.

H6(b): Satisfaction with the container law is positively related to the perceived convenience of the reverse channel.

Procedure

The Data

The data utilized in this study were obtained from a telephone survey of 302 Michigan consumers, eighteen years old and over. The interviews were conducted in the summer of 1979, by which time the deposit system had been fully operative for six to eight months. The survey represented the second wave of an attitude tracking study. About half of the subjects had been previously interviewed in 1976, just prior to the general election when the law was passed.

A two-stage random digit dialing method was used in both waves of the tracking study. This provided a probability sample of all the telephone numbers in the state, listed and unlisted, while minimizing the number of unproductive dialings. In households having more than one eligible adult, the respondent was randomly selected. For quality control purposes, all calls were made from a central location.

The demographic profile of the sample was very similar to the population profile of the state, especially in terms of occupation, age, sex, and marital status. The sample had slightly higher incomes and was somewhat better educated than the population as a whole, but the differences were minor in nature. The attitude item responses of those contacted in both waves of the tracking study were compared to the responses of those contacted only in the second wave. No important differences were detected.

The Measures

The measures obtained in this study are summarized in Table 1. Each measure related to a specific hypothesis previously developed. It should be noted that two different approaches to measuring satisfaction have been employed in the study. One measure, "Overall Satisfaction," was intended to tap the absolute level of consumer satisfaction with the deposit law. The other measure, "Voting Preference," was intended to tap the relative level of consumer satisfaction. In the latter case, the choice was between voting to maintain the law and voting to repeal it and return to a throwaway system. It was assumed that respondents would choose the more satisfying alternative, although either could be satisfying or dissatisfying in an absolute sense.

Insert Table 1 About Here

Results

Univariate Analysis

A univariate percentage distribution for each of the question items is reported in Table 2. The percentages are based on the number of respondents who held an opinion on the question. These data can be applied to testing the "evaluative-perceptual" hypotheses: H1, H2(a), H3(a), H4(a), H5(a), and H6(a).

Insert Table 2 About Here

Contrary to H1, substantially more consumers were found to be satisfied than dissatisfied with the deposit law. Two-thirds (64 percent) said they were either "very satisfied" or "somewhat satisfied." Only 26 percent of this sample expressed some degree of dissatisfaction. Similar results (not shown in Table 2) were obtained on the voting preference question. Three-fourths

(75 percent) of the respondents indicated they would vote to retain the return system rather than go back to the previous throwaway system. This high level of support for the deposit law on both questions clearly contradicts H1.

Responses to the two efficacy questions indicate that most consumers perceived the deposit law to be effective in reducing litter. A full 70 percent of the sample said that the law "almost entirely eliminated" or produced "a major reduction" in container litter. Likewise, 54 percent said the law reduced litter from all sources by that amount. On both questions only a negligible percentage indicated that the law had no effect. These data provide strong support for H2(a).

The sample opinion was about evenly split on whether it was convenient to perform the reverse channel tasks imposed by the deposit law. Half of the respondents (49 percent) said it was convenient to keep track of and store the containers and half (52 percent) said it was convenient to transport them to the store. Despite the variability in response, a much larger portion of consumers than was predicted by H3(a) find these tasks convenient.

The respondents were unified in their evaluation that the deposit law had increased soft drink and beer prices. Excluding the deposit amount, 42 percent claimed they paid "a lot more" because of the law and 38 percent said they paid "a little more." Only 1 percent of the sample claimed that prices had gone down. These data provide support for H4(a).

There was little evidence that the deposit law has adversely affected the availability of brands and container types, as predicted by H5(a). Consumers' responses to the two availability questions resembled compressed bell-shaped curves, with over 70 percent selecting the neutral category in both instances.

Retailers appeared to be providing a much higher level of customer service in the reverse channel than was predicted by H6(a). The majority of consumers

(70 percent) felt it was convenient to return containers once they were inside the store. Consumers also gave retailers high marks on the ease of getting their deposit back. Two-thirds of the sample (65 percent) said it was "very easy" to obtain a refund and 93 percent said it was "very" or "fairly easy."

Correlation Analysis

Product-moment correlations were computed between all of the measures and are reported in Table 3. Although strictly ordinal in nature, each of the question items was treated as though it was intervally scaled. Codes were assigned, giving higher numerical values to "more" of each attribute (e.g., 4 = very convenient, 1 = very inconvenient). These data were then used to test the "relational" hypotheses: H2(b), H3(b), H4(b), H5(b), and H6(b).

Insert Table 3 About Here

The bottom two rows of Table 3 show the correlation between each of the perceptions and the satisfaction-related measures (Overall Satisfaction and Voting Preference). At the 95 percent confidence level, all of the "relational" hypotheses were supported. There were, however, considerable differences among the perceptions with respect to the strength of their association with the satisfaction measures. Also, the relationships between the perceptions and Voting Preference tended to be stronger than those between perceptions and Overall Satisfaction.

In general, the perceptions can be divided into three groups according to the strength of their association with satisfaction: strong, moderate, and weak. Relatively strong associations existed for the two efficacy perceptions (Reduction of Container Litter and Reduction of All Litter) and the two perceptions relating to the consumer's responsibilities in the reverse channel

(Convenience at Home and Convenience in Transit). Moderate levels of association existed for one reverse channel perception (Convenience in Store) and one forward channel perception (Price Effect). Relatively weak associations were found for the two availability perceptions (Brands and Containers) and the ease of obtaining the deposit refund (Refund Ease).

Summarized below are the results obtained from testing each of the hypotheses:

	<u>(a) Direction of Perception</u>	<u>(b) Relationship to Satisfaction</u>
H1: Consumer Satisfaction	Not Supported (Better)	--
H2: Effectiveness	Supported	Supported (Strong)
H3: Task Convenience	Not Supported (Better)	Supported (Strong)
H4: Price Effect	Supported	Supported (Moderate)
H5: Availability	Not Supported (No Effect)	Supported (Weak)
H6: Customer Service	Not Support (Better)	Supported (Moderate/Weak)

Multivariate Analysis

The bivariate correlations provide some indication of the value of each perception in explaining differences in satisfaction, subject to certain limitations. One limitation is that correlations exist between the perceptual items themselves, as indicated in Table 3. This suggests that several of the questions are tapping the same underlying sentiments to some degree. Another limitation is that the correlations are based on an overly simplistic model. The perceptions do not influence satisfaction in isolation from each other but rather combine simultaneously to affect satisfaction. The simple correlations provide no indication of the joint predictive power of all the perceptions combined, although that information is needed to evaluate the usefulness of the theoretical framework that has been employed. Factor analysis seemed to

be an appropriate method for dealing with the first of these limitations and multiple regression analysis an appropriate method for dealing with the second.

One model of factor analysis assumes that responses to individual question items can be decomposed into their common and unique parts (Rummel 1971). An attempt is made to find a small number of common factors that account for the intercorrelations between the question items (Schuessler 1971). It is assumed that the unique parts of the variables are uncorrelated with each other.

The factor analysis was performed on the matrix of correlations shown in Table 3 (exclusive of the satisfaction measures). Technically, the following steps were used: (1) a principal components analysis was used to determine the proper number of factors and to estimate commonalities; (2) Kaiser's Criterion was used to determine the number of factors to retain; (3) the squared multiple correlations were used as the initial commonality estimates for the iterative refactoring; and (4) an orthogonal or varimax rotation was performed on the factor matrix to find simple structure.

The final results of the factor analysis are reported in Table 4. Three orthogonal (uncorrelated) factors that accounted for the common variance (source of the intercorrelations) between the question items were extracted. Table 4 shows the rotated factor matrix and the factor loadings for each variable (the variable-factor correlations). The commonality estimates indicate the amount of common variance that each question item shared with the other question items.

Insert Table 4 About Here

The highest loading of each variable was circled in Table 4 to assist in the interpretation of the factors. Factor 1 appears to be a relatively general factor. Variables with high loadings on Factor 1 were: Reduction-All Litter, Reduction-Beer/Soft Drinks, Convenience-Home, and Convenience-Transit. Thus, Factor 1 represents both the efficacy and task-convenience measures. The variable Price Impact also had its highest loading on Factor 1, but the absolute magnitude was fairly low (.25). It appears that Price Impact is a very unique variable, since it shared only 10 percent of its variance with the other variables.

Variables with high loadings on Factor 2 were Convenience-Store and Refund Ease. Both of these variables reflect the level of customer service provided by the retailer in the reverse channel. Variables with high loadings on Factor 3 were Availability-Brands and Availability-Containers. These variables reflect the forward channel impacts of the deposit law other than price.

The results of the factor analysis served as input for the regression analysis. The purpose of the regression analysis was to find the best fitting linear equation for predicting satisfaction, on the basis of a set of independent variables. As noted earlier, however, the question items exhibited fairly high intercorrelations, which violates one of the assumptions of regression--limited multicollinearity. This is not a problem, however, if the factors are used as independent variables, since they are known to be orthogonal.

The exact procedure used involved a stepwise regression, which is a method for selecting the best regression equation (Draper and Smith 1966). Variables enter the equation in order of their ability to dispel any remaining unexplained variance in the dependent variable, provided the entry criterion is satisfied (in terms of minimum explained variance). Variables can later be deleted if they fail to satisfy an exit criterion (also in terms of minimum

explained variance). One restriction placed on the stepwise regression in this study was that Factors 1 to 3 had to enter the equation first.

A stepwise regression procedure with forced factor entry was run for each of the dependent variables: Overall Satisfaction and Voting Preference. These results appear in Table 5. The regression model provided a much better prediction of Voting Preference than of Overall Satisfaction. Fifty-one percent of the variance in Voting Preference was accounted for, compared to 29 percent of the variance in Overall Satisfaction. Factor 1 contributed the bulk of the explained variance in both models, although all the factors had significant coefficients.

Insert Table 5 About Here

According to the statistical procedure used, the individual question items could also enter the equation. Since the common parts of these items were already accounted for in the factors, this was a test to determine whether their unique parts could contribute to explaining the variance in the dependent variable. The only variable able to satisfy the entry criterion (had to be significant at $p < .10$) was Price Impact, and its entry explained about 1 percent of the variance in both models.

Interpretation

Despite their lack of experience with recycling, Michigan consumers exhibited a much higher level of acceptance of the return system than was anticipated. This would indicate that consumers perceived a positive net benefit associated with the deposit law. This "net benefit" refers to the rewards minus the costs of the return system in comparison to the previous throwaway system.

The perception of consumers that the deposit law was effective in reducing litter agrees with published reports of controlled litter counts. It might be concluded that these consumers were fairly sensitive to changes in their environmental cues. This sensitivity may have been brought about by the high level of attention given the deposit law issue from 1976 to 1979. With the passage of time, the saliency of this effect could decrease.

The fact that half of the respondents found it convenient to perform the required reverse channel tasks indicates a fairly rapid rate of behavioral adaptation on the part of these consumers. It is important to recall that few consumers were participating in recycling at the time of the law's implementation. Despite this, many seemed to have developed a convenient (i.e., efficient) behavioral repertoire in a period of about six to eight months. Presumably, the percentage finding recycling convenient will increase (albeit at a slowing rate) as additional experience is gained. These results seem to mitigate the concern of Zikmund and Stanton (1971) that the consumers' "throw-away lifestyle" is the greatest barrier to the effective recycling of household solid waste.

The inflationary effect of the deposit law on beverage prices is a fact of life that was clearly perceived by most consumers. The consensual nature of this opinion may explain why the (negative) association between Price Effect and satisfaction was only moderately strong. The magnitude of the correlation coefficient is affected by the variability in responses, and this variability was relatively low for the Price Effect question. Therefore, it would probably be a mistake to discount the importance of this perception. It may be that a perceived price increase was a source of some dissatisfaction for the majority of respondents.

The effect of the deposit law on the availability of brands and container types appeared to be a "non-issue" for most of the respondents. This does not necessarily refute the argument that retailers were forced to reduce their assortments because of the law, but it is only logical that these reductions would primarily involve the marginal brands (i.e., those representing a low market share) and would not be perceived by the cadre of consumers who are loyal buyers of the dominant brands. It is probably safe to conclude, however, that the availability of the dominant brands and most popular container types was largely unaffected.

The results indicate that retailers are providing a much higher level of customer service in the reverse channel than was predicted. As was the case for the Price Effect, a lack of variability in the customer service items may have contributed to a relatively weak association with satisfaction. Likewise, it would be a mistake to totally discount the importance of the customer service factors. The high level of customer service being provided may indicate that retailers place great emphasis on maintaining a loyal customer base and would do little to jeopardize this franchise, even in a tight financial situation. A second explanation is that many retail managers are also motivated by a sense of social responsibility and a desire to "make the deposit law work." Both of these explanations may be true to some extent.

There appears to have been some value in using an ecological approach to study satisfaction with the deposit law. Although some person-environment interactions were undoubtedly overlooked, many of the important ones seem to have been identified. This was most evident in the case of Voting Preference, where the regression model accounted for over half of the variance in this dependent variable.

The relative nature of the Voting Preference variable may explain why a higher R^2 was obtained for that variable than for the absolute measure of Overall Satisfaction. Note that many of the perceptual questions were measured on a relative basis involving a comparison to the situation that existed under the previous throwaway system. This comparison is explicit for the Price Effect and Availability questions and implicit for the rest (it can be assumed that the throwaway system provided "maximum" convenience). It should perhaps be expected that a better prediction would be obtained if both the independent and the dependent variables were expressed in relative terms.

The high loadings of two dissimilar sets of variables on Factor 1 (the effectiveness and task-convenience measures) may reflect the influence of individual difference factors not included in this analysis. A different method for applying the ecological model involves measuring the characteristics of the individual and the environment separately, and then testing for statistical interactions. Here, a more direct approach was used, in which respondents provided self-reports about these person-environment interactions. Characteristics of the individuals and their predispositions probably account for the response patterns represented by Factor 1 (high effectiveness and high convenience, low effectiveness and low convenience). Simply put, consumers differed in their motivation to adapt to the return system. The influence of these background variables is the subject of research currently under way.

This ecological approach to behavioral analysis may ultimately prove useful to the study of consumer satisfaction with products and services. Instead of focusing, as in the present study, on the product or service itself, the entire ecosystem surrounding the purchase and use of the product/service would be examined. This would include not only the interaction of consumers

with the product but also their interactions with salespeople, the media, reference groups, competitors, and so forth.

Conclusion

It would appear that Michigan's container deposit system is considered a success from the consumers' viewpoint. This is no small achievement in a state that is heavily urbanized and contains a large working class. Provided that consumers have experienced most of the "costs" of the system already, it appears unlikely that the deposit law will be repealed in the near future. This is not to say that consumers would prefer the deposit system over every possible alternative, especially if that alternative offered the same benefits with fewer costs.

The results also provide some encouragement for the extension of the bottle ban idea to other states. This concept has run into trouble in other states, such as Ohio where there was great fear about the effects of the law on prices. This may be partly attributable to the amount of press coverage the price effect received. If it were possible to better publicize the benefits to the environment as well as the satisfaction of Michigan consumers, voter sentiment in other states might be swayed more in favor of this idea.

Finally, the results provide some encouragement for the recycling concept in general. Much has been made about the public's resistance to recycling and the lack of ecological concern needed to sustain a recycling system. The findings of this study suggest a contrary view. Given an incentive that induces trial of the concept, consumers can adapt to recycling quite readily. Perhaps this reflects an old adage from psychology, that "sometimes it is easier to act yourself into a new way of thinking than to think yourself into a new way of acting."

Footnotes

¹The term "bottle bill" is actually a misnomer, since the bill also applies to cans.

²Press accounts from Oregon, Vermont, Maine, and Michigan have reported instances involving each of these behaviors.

³Under the throwaway system the interaction of consumers with the marketing system was positive (convenient), while their interaction with the natural environment was negative (perception of a littered landscape).

⁴Some have argued that retailers set beverage prices artificially high to negatively influence consumer attitudes about the law. Authorities have been unable to prove that this is a widespread phenomenon.

Table 1

The Measures

Label	Description
H1. Overall Satisfaction:	Satisfaction with the system used to implement the deposit law.
H1. Voting Preference:	How the respondent would vote on a hypothetical referendum to repeal the law.
H2. Reduction-All Litter:	Degree to which the system is perceived as having reduced the total amount of litter in the state.
H2. Reduction-Beer/Soft Drinks:	Degree to which the system is perceived as having reduced litter from beer and soft drink containers.
H3. Convenience-Home:	How convenient it is to keep track of and store containers in the home.
H3. Convenience-Transit:	How convenient it is to transport the containers to the store.
H4. Price Impact:	Perceived effect of the system on the cost of soft drinks and beer, exclusive of the deposit.
H5. Availability-Brands:	Perceived effect of the system on the availability of favorite brands of soft drinks and beer.
H5. Availability-Containers:	Perceived effect of the system on the availability of favorite types and sizes of containers.
H6. Convenience-Store:	How convenient it is to return the containers once inside the store.
H6. Refund Ease:	How easy it is to get the deposit back.

Table 2

Consumer Evaluation of Michigan's Container Return System

<u>H1. Overall Satisfaction</u>		<u>H4. Price Impact</u>	
5 = Very Satisfied	27%	5 = A Lot More	42%
4 = Somewhat Satisfied	37	4 = A Little More	38
3 = Neither Satisfied/Dissatisfied	10	3 = About Same	19
2 = Somewhat Dissatisfied	17	2 = A Little Less	1
1 = Very Dissatisfied	9	1 = A Lot Less	—
Total	<u>100%</u>	Total	<u>100%</u>
Base	(299)	Base	(281)
<u>H2. Reduction-Beer/Soft Drinks</u>		<u>H5. Availability-Brands</u>	
4 = Almost Entirely	16%	5 = Much Easier to Find	2%
3 = Major	54	4 = Easier to Find	11
2 = Minor	24	3 = Neither Easier/More Difficult	76
1 = No Effect	6	2 = More Difficult to Find	8
Total	<u>100%</u>	1 = Much More Difficult to Find	3
Base	(296)	Total	<u>100%</u>
		Base	(290)
<u>H2. Reduction-All Litter</u>		<u>H5. Availability-Containers</u>	
4 = Almost Entirely	5%	5 = Much Easier To Find	3%
3 = Major	49	4 = Easier To Find	10
2 = Minor	37	3 = Neither Easier/More Difficult	71
1 = No Effect	9	2 = More Difficult To Find	14
Total	<u>100%</u>	1 = Much More Difficult to Find	2
Base	(290)	Total	<u>100%</u>
		Base	(289)
<u>H3. Convenience-Home</u>		<u>H6. Convenience-Store</u>	
4 = Very Convenient	17%	4 = Very Convenient	37%
3 = Fairly Convenient	32	3 = Fairly Convenient	33
2 = Fairly Inconvenient	30	2 = Fairly Inconvenient	15
1 = Very Inconvenient	21	1 = Very Inconvenient	15
Total	<u>100%</u>	Total	<u>100%</u>
Base	(287)	Base	(278)
<u>H3. Convenience-Transit</u>		<u>H6. Refund Ease</u>	
4 = Very Convenient	15%	4 = Very Easy	65%
3 = Fairly Convenient	37	3 = Fairly Easy	28
2 = Fairly Inconvenient	28	2 = Fairly Difficult	4
1 = Very Inconvenient	20	1 = Very Difficult	3
Total	<u>100%</u>	Total	<u>100%</u>
Base	(287)	Base	(287)

Table 3

Correlation Matrix^a

	Reduction Beer/Soft Drinks (H2)	Reduction All Litter (H2)	Convenience At Home (H3)	Convenience In Transit (H3)	Price Impact (H4)	Availability Brands (H5)	Availability Containers (H5)	Convenience In Store (H6)	Refund Ease (H6)
Reduction Beer/Soft Drinks	1.00	.62	.37	.34	-.23	.20	.13	.26	.12
Reduction All Litter		1.00	.50	.39	-.14	.20	.18	.31	.10 ^b
Convenience At Home			1.00	.76	-.26	.22	.26	.45	.22
Convenience In Transit				1.00	-.25	.22	.31	.43	.20
Price Impact					1.00	-.08 ^c	-.11 ^b	-.18	-.13
Availability of Brands						1.00	.42	.18	.09 ^c
Availability of Containers							1.00	.29	.17
Convenience In Store								1.00	.53
Refund Ease									1.00
Overall Satisfaction	.36	.39	.45	.38	-.29	.18	.20	.32	.16
Voting Preference	.52	.53	.60	.56	-.34	.21	.22	.42	.20

^aUnless indicated otherwise, all r's are significant at the 95% confidence level.

^bSignificant at the 90% but not the 95% confidence level.

^cNot significant at the 90% confidence level.

Table 4

Factor Analysis of Perceptual Variables with Varimax Rotation

	Rotated Factor Matrix (Loadings)			Commonality Estimates	
	Factor 1	Factor 2	Factor 3	Input	Output
Reduction-Beer/Soft Drinks	.66	.05	.09	.45	.45
Reduction-All Litter	.74	.05	.12	.56	.56
Convenience-Home	.67	.37	.21	.64	.62
Convenience-Transit	.59	.37	.26	.60	.55
Price Impact	-.25	-.17	-.06	.10	.10
Availability-Brands	.16	.03	.59	.37	.37
Availability-Containers	.10	.20	.65	.46	.47
Convenience-Store	.28	.72	.18	.61	.62
Refund Ease	.05	.62	.07	.39	.39
% Total Variance	22%	14%	11%		
% Common Variance	47%	30%	23%		

Table 5

Stepwise Regression Analysis of Overall Satisfaction

Independent Variables	F-Value	Significance Level	Adjusted R ²	Standard Coefficient (Final Stage)
Factor 1*	98.962	.000	.253	.435
Factor 2*	9.452	.002	.274	.126
Factor 3*	2.745	.090	.278	.079
Price Impact	6.107	.010	.291	-.130

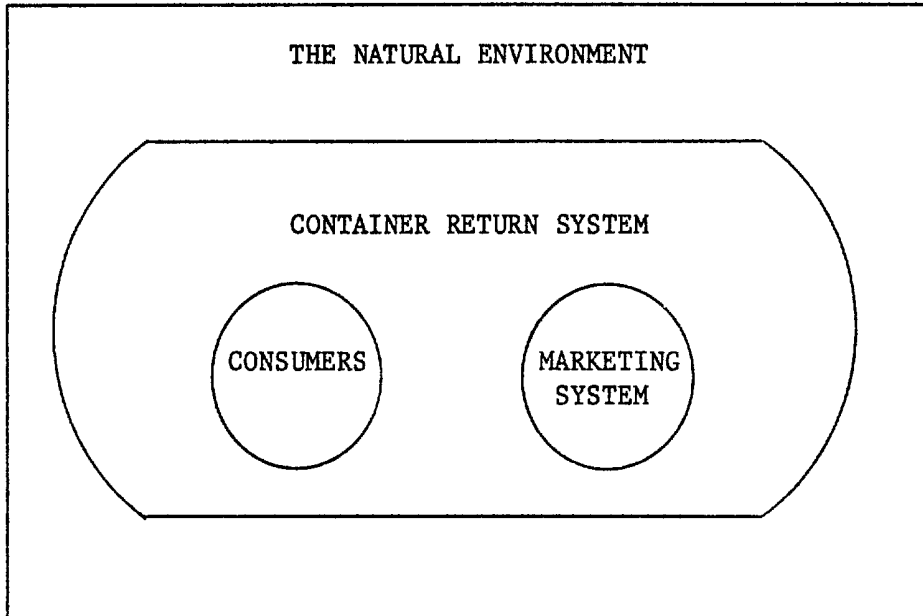
Stepwise Regression Analysis of Voting Preference

Independent Variables	F-Value	Significance Level	Adjusted R ²	Standard Coefficient (Final Stage)
Factor 1*	235.315	.000	.447	.585
Factor 2*	27.520	.005	.494	.196
Factor 3*	4.784	.030	.500	.089
Price Impact	6.756	.010	.510	-.114

*Forced to enter before individual question items were allowed to enter.

Figure 1

Map of the portion of the ecosystem affected by the law.



References

- Alderson, Wroe (1957), Marketing Behavior and Executive Action, Homewood, Ill.: Richard D. Irwin, Inc., Chapter 7.
- Anderson, W. Thomas Jr. and Cunningham, William H. (1972); "The Socially Conscious Consumer," Journal of Marketing, 35 (July), 23-31.
- Barker, R. G. (1965), "Explorations in Ecological Psychology," American Psychologist, 20 (January), 1-14.
- _____, (1968), Ecological Psychology, Stanford, Calif.: Stanford University Press.
- Carroll, Anne W. (1974), "The Classroom as an Ecosystem," Focus on Exceptional Children, 6, 1-11.
- Crosby, Lawrence A., and Gill, James D. (1980), "A Causal Path Analysis of Ecological Behavior Relating to Marketing," in Kent Monroe, Advances in Consumer Research, Vol. VIII (forthcoming).
- _____, and Taylor, James R. (1980), "Consumer/Voter Behavior in the Passage of the Michigan Container Law," Working Paper No. XXX, Division of Research, Graduate School of Business, The University of Michigan.
- Crosby, Lawrence A.; Taylor, James R. and Kinnear, Thomas C. (1978), "Attitude and Behavior Correlates of Voting Intentions on the 1976 Michigan Non-Returnables Ban," Working Paper No. 164, Division of Research, Graduate School of Business, The University of Michigan.
- _____, (1980), "The Role of Ecological Concern in the Passage of the Michigan Container Law," American Marketing Association Combined Proceedings (forthcoming).
- Draper, N. R. and Smith, H. (1966), Applied Regression Analysis, New York: John Wiley & Sons.
- Fuller, Donald A. (1978), "Recycling Consumer Solid Waste: A Commentary on Selected Channel Alternatives," Journal of Business Research, 6 (January), 17-31.
- Ginter, Peter M. and Starling Jack M. (1978), "Reverse Distribution Channels of Recycling," California Management Review, 20 (Spring), 72-82.
- Gudger, Charles M. and Bailes, Jack C. (1974), "Distribution and Environmental Concerns: The Beverage Container Problem," International Journal of Physical Distribution, 6 (No. 1), 28-38.
- Harry, J. et al. (1969), "Conservation: An Upper-Middle-Class Social Movement," Journal of Leisure Research, 1, 246-254.

- Holahan, Charles J. and Wilcox, Brian L. (1977), "Ecological Strategies in Community Psychology," Journal of Community Psychology, 5 (No. 4), 423-33.
- Kessler, Marc and Albee, George W. (1975), "Primary Prevention," Annual Review of Psychology, 26, 557-91.
- Kinnear, Thomas C., Taylor, James R., and Ahmed, Sadrudin A. (1974), "Ecologically Concerned Consumers: Who Are They?," Journal of Marketing, 38 (April), 20-24.
- La Tour, Stephen A. and Peat, Nancy C. (1979), "Conceptual and Methodological Issues in Consumer Satisfaction Research," in William L. Wilke, ed. Advances in Consumer Research, Vol. VI, Ann Arbor: Association for Consumer Research, 431-437.
- Leigh James and Warshaw, Martin (1977), "The Michigan Bottle Bill: Will Consumers Put Their Money Where They Put Their Votes," Michigan Business Review, 29 (November), 13-18.
- Madden, Charles Stanley, Little, Eldon L., and Dolich, Ira J. (1978), "A Temporal Model of Consumer S/D Concepts as Net Expectations and Performance Evaluations," Third Annual Conference on Consumer S/D and Complaining Behavior.
- McEvoy, J. (1972), "The American Concern with the Environment," in Social Behavior, Natural Resources, and the Environment, ed. W. R. Burch, Jr., New York: Harper and Row, 214-236.
- Murphy, Patrick E. (1974), "A Cost/Benefit Analysis of the Oregon 'Bottle Bill'," American Marketing Association Combined Proceedings Series No. 36, 347-352.
- _____ (1978), "Environmentally Concerned Consumers: Demographic Dimensions," in Proceedings of the 1978 Educators' Conference, ed. Subhash C. Jain, Chicago: American Marketing Association.
- _____, Kangun, Norman, and Locander, William B. (1978), "Environmentally Concerned Consumers--Racial Variations," Journal of Marketing, 42 (October), 61-66.
- Olson, Jerry C. and Dover, Philip (1976), "Effects of Expectation Creation and Disconfirmation on Belief Elements of Cognitive Structure," in B. B. Anderson, ed. Advances in Consumer Research, Vol. III, Chicago: Association for Consumer Research, 168-75.
- Parker, J. and Patterson, J. L. (1979), "Toward an Ecological Evaluation Model," Educational Forum, 43, 351-362.
- Rummel, R. J. (1971), Applied Factor Analysis, Evanston, Ill.: Northwestern University Press.

- Schuessler, Karl (1971), Analyzing Social Data, Boston: Houghton and Mifflin.
- Stipak, B. (1973), "An Analysis of the 1968 Rapid Transit Vote in Los Angeles," Transportation, 2, 71-86.
- Tanner, Ronald (1979), "As Forced Deposits Hit Michigan Retailers Try to Return That Law," Progressive Grocer, 58 (February), 73-75.
- Thibaut, J. W. and Kelly, H. H. (1959), The Social Psychology of Groups, New York: Wiley.
- Thomas, Ellidee D. and Marshall, Melody J. (1977), "Clinical Evaluation and Coordination of Services: An Ecological Model, Exceptional Children, 11 (September), 17-22.
- Thurman, S. Kenneth (1977), "Congruence of Behavioral Ecologies: A Model of Special Education Programming," Journal of Special Education, 11 (No. 3), 329-33.
- Waggoner, Don (1975), "Oregons Bottle Bill Two Years Later," unpublished research report, Columbia Group Press.
- Webster, Frederick E., Jr. (1975), "Determining the Characteristics of the Socially Conscious Consumer," Journal of Consumer Research, 2 (December), 188-196.
- Zikmund, William G. and Stanton, William J. (1971), "Recycling Solid Wastes: A-Channels-of-Distribution Problem," Journal of Marketing, 35 (July), 34-39.