The Work-Based Retail Activity Model: A Tool for Downtown Development Planning

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ABSTRACT

The major findings of research on the work-based shopping behavior of central business district (CBD) employees are described. Using survey data collected in Boston, Massachusetts, a system of econometric models was developed to test hypotheses about work-based shopping behavior and to provide a tool for evaluating the retail impacts of new downtown development. The research demonstrates the importance of employee shopping trips to the downtown economy; the average employee expenditure in 1982 dollars was $1,540, and the total employee contribution in downtown Boston was roughly $546 million per year. The model system provides a useful tool for forecasting the CBD retail sales that will be generated by employees in proposed new developments. Model estimation has also revealed that shopping behavior is sensitive to the number and location of shopping and lunch opportunities available and the models have been used to forecast the effect on retail sales of proposed new retail development. Characteristics of the employee, sex, income, and occupation can also explain differences in trip rates and expenditure amounts. This is of particular importance because of changes that are occurring in the composition of the CBD work force. The applicability of the model system for analysis of development impacts is demonstrated by example applications. The paper concludes with a discussion of the strengths, weaknesses, and general capabilities of the model system in the context of planning and policy analysis.

The decade of the 1960s saw an unprecedented deterioration of the retail economy in the nation's central business districts (CBDs). Urban highway development, suburbanization of metropolitan areas, and the development of regional shopping centers left the stores and restaurants in the CBD at a competitive disadvantage, resulting in a decline in sales (in constant dollars) in almost every major city.

A resurgence in the 1970s and 1980s of the CBD as a major center for new office development has brought new hope to downtown retailers. An annual growth rate of CBD office employment of 3 to 5 percent is not uncommon in the larger U.S. cities (1). Although this growth has generally been viewed favorably by retailers, the actual impact on sales has not been clearly understood.

In this paper a comprehensive profile of employee shopping activity in Boston, Massachusetts, is presented and a model system that was developed to predict the sales impact of future downtown development is described. The profile and the model system are based on more than 10,000 surveys of downtown workers conducted in 1978 and 1980 (2). The research was conducted for the Boston Redevelopment Authority and is documented in greater detail in the report "Downtown Crossing: An Economic Strategy Plan" (3).

The primary motivation for the development of the work-based retail activity model (WRAM) was the need to assess the potential retail sales volume that might be generated in downtown Boston, by new employees in proposed development projects in the CBD. The development and application of the WRAM system was only one part of a larger economic analysis of the impact of new developments and the potential for increasing retail sales in the Boston CBD conducted for the Boston Redevelopment Authority. The specific focus of this element was on the daytime shopping activities of employees who work sufficiently close to the CBD to either shop or eat a meal there on a work-based trip.

One of the main objectives of the analysis was to provide a clear and comprehensive profile of the daytime shopping activities of CBD employees. This profile was produced using a combination of simple tabulation of survey results and model simulation. The purpose of the model was to represent the decision making of downtown employees in a way that would allow the analyst to approximate the choice of downtown employees in the presence of retail opportunities different from those faced by the employees included in the survey or as defined by alternative policy scenarios.

A summary of the characteristics and capabilities of the WRAM system is presented in this paper. The model structure and specification are described and, through example applications, an indication of the model sensitivity is provided. Also provided is a profile of employee shopping behavior produced by the model system. The paper concludes with a discussion of model system capabilities and limitations.

THE WORK-BASED RETAIL ACTIVITY MODEL (WRAM)

Model Structure

The WRAM system represents decisions about four types of trips:

1. Midday trips for lunch,
2. Midday trips to shop,

3. Evening trips for dinner, and
4. Evening trips to shop.

Within each of the four trip types, four decisions are represented in the modeling system:

1. Whether to make a trip,
2. Where to make the trip,
3. Whether to purchase something, and
4. How much to spend.

An illustration of the structure of the modeling system is provided in Figure 1.

Models of the first type are referred to as trip generation models. In the case of the WRAM system, the models predict the probability that an employee will make a trip of the type designated. The aggregate number of trips in a forecast is found by summing the probabilities of individual employees.

The second type of decision determines the distribution of trips. The WRAM system does not distribute trips of individual employees to specific stores or restaurants, but sums the number of trips in each zone of a 40-zone system and then distributes the trips in the zone among the 40 zones.

The last two decisions are combined and are represented in WRAM by a single average purchase value per trip for each trip type. This average purchase value reflects the decision on the part of some trip makers not to make a purchase. Their trips are, in effect, averaged in with a purchase value of $0.00. The purchase values used in the model (in 1979 dollars) are:

Trip	Purchase Value ($)
Lunch	3.74
Midday shopping (when combined with a lunch trip)	10.48
Midday shopping (when no lunch trip is made)	15.72
Dinner	7.48
Evening shopping	15.72

All sales values or expenditure levels expressed in other parts of the paper is dollars other than 1979 dollars imply certain assumptions about the inflation in retail prices since 1979.

Model Formulation and Estimation

Each of the models in the package was estimated by using what is referred to as a "logit" formulation. The name is derived from the logistic curve; an S-shaped curve that represents the probability that an individual will make a particular choice over all other choices for different levels of relative utility of the choices.

The logit model is based on the assumption that a decision maker associates with each choice alternative a particular utility and will choose the alternative with the highest utility. Utilities cannot be measured directly, but if assumed to be linear functions of certain measurable attributes, the functions can be estimated by using maximum likelihood estimation.

The probability of a particular choice i is related to the utilities of each of the choices available according to the relationship:

$$p(i) = \exp(U_i) \sum_{\text{all } k} \exp(U_k)$$

where

$P(i)$ = the probability of choosing alternative i,

U_i = the utility associated with alternative i, and

U_k = the utility associated with alternative k.

Estimation of the model coefficients was performed by using a standard estimation package that selects the set of coefficients that have the maximum likelihood of producting the observed choices. For more information on maximum likelihood estimation, the reader is referred to a standard econometrics text (4) or a text on choice modeling (5).

In the case of the trip generation models, the choice is a binary one; between making a trip and not making a trip. In the case of a binary choice model, all exogeneous variables can enter into the utility formulation for one option. The coefficients or weights that are estimated by the estimation package may be either positive or negative reflecting either a positive or negative effect on the utility associated with the choice.

In the case of the trip distribution models, the utility associated with a particular zone is represented as a combination of the amount of retailing in the zone, the distance to the zone, and certain nonquantifiable characteristics. The nonquantifiable characteristics may include such attributes as safety, cleanliness, variety, or price. The effect of these nonquantifiable characteristics is captured in a constant term in the utility function for groups of zones. The utility associated with a zone could thus be written as follows:

$$U_{ij} = b_0 + b_1 \log(EMP_j) + b_2 \log(DIST_{ij}) + e_{ij}$$

where

U_{ij} = the utility that individual i associates with destination,
EMP_j = the retail employment in zone j,
$DIST_{ij}$ = the distance between individual i and zone j,
e_{ij} = an error term, and
b_0, b_1, b_2 = model estimated coefficients.

Model Specification

Trip Generation

There are three types of characteristics that could influence an employee's decision to make one of the four types of work-based trips under consideration:

1. Characteristics of the retail opportunities available to the employee,
2. Characteristics of the building in which the employee works, and
3. Characteristics of the employee.

The importance of the first type of characteristic is rather obvious. If there are no places where an employee can purchase a lunch within a reasonable travel time, the employee is not likely to decide to leave his or her building for lunch. Likewise, the greater the opportunities available for lunch or the closer the opportunities, the more likely the employee is to decide to leave the building for lunch. A similar argument could be made for the relationship between the availability of non-food retail opportunities and work-based shopping trips. The key to selecting appropriate variables to capture the essence of this availability is finding a measure that includes both the size of each opportunity and the location of each opportunity with respect to the employees's workplace.

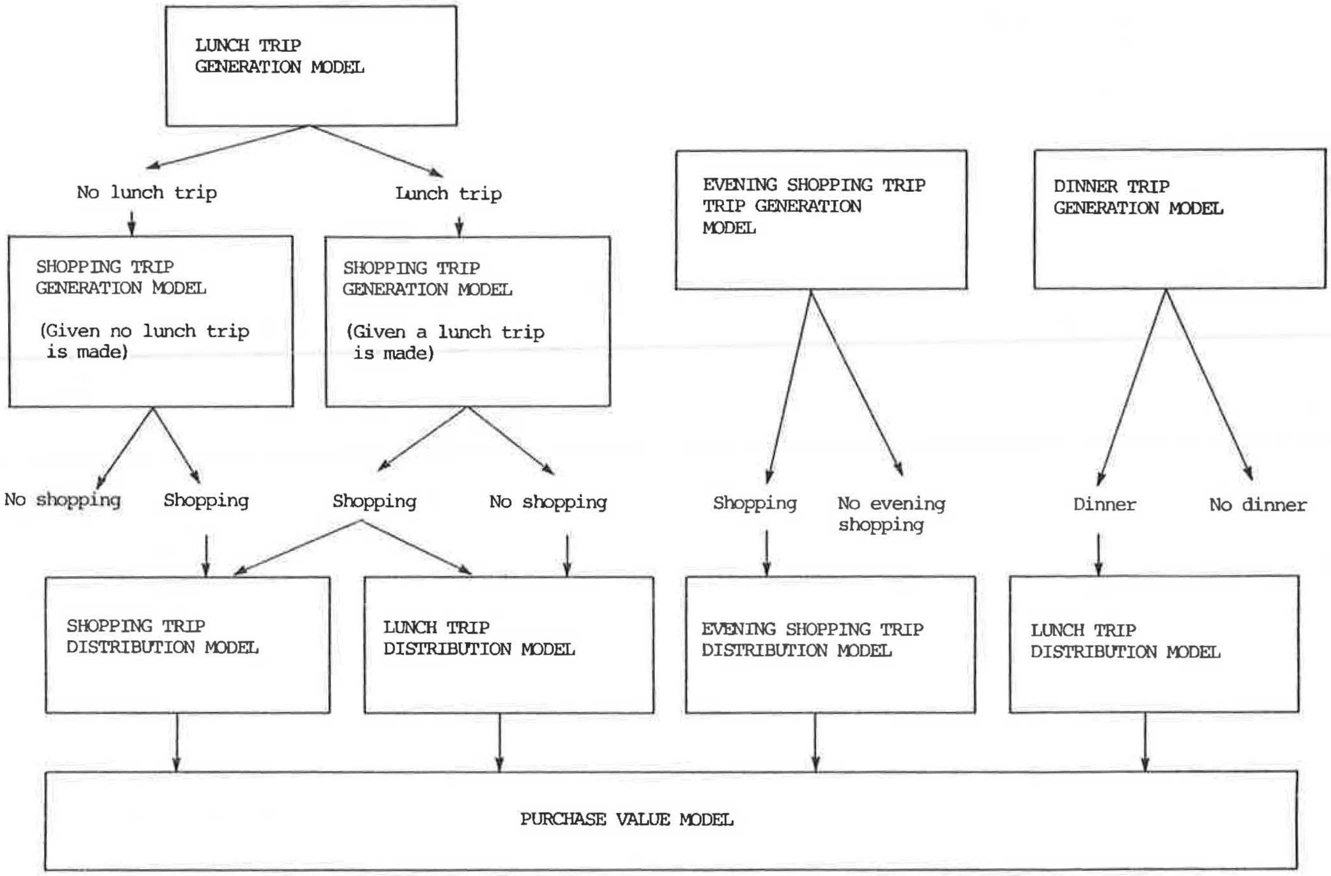

FIGURE 1 Structure of model system.

Two alternative functional forms were tested by calculating the measures

$$A_j = \sum_{\text{all } i} s_i/d_{ij} \text{ and } A_j = \sum_{\text{all } i} s_i/(d_{ij})^2$$

where s_i is the retail employment in block i and d_{ij} is the distance between employment location j and block i.

The measure using d_{ij} provided more explanatory power both in a direct comparison with trip rates and in actual multivariate modeling in which other variables were included.

Characteristics of the second type, those of the building in which the employee works, were not incorporated into the model because of the difficulty of collecting this type of data for forecasting. By not including these characteristics in the models, forecasts assume that future buildings are similar to those in the estimation data set.

One characteristic that was hypothesized to be an influencing factor and that proved to be so in preliminary tests was the availability of food services in an employee's building. The availability of food services in a building should satisfy the lunch needs of some employees without a trip out of the building. This should then reduce the employee's probability of making a trip out of the building for lunch and, because of the linkage between lunch and midday shopping trips, should also reduce the probability of a midday shopping trip. Some exploratory model estimation indicated that the effect did exist, generally reducing the number of lunch trips by about 10 percent and the number of shopping trips by about 7 percent.

Employee characteristics were the third type. The importance of these characteristics is most clearly demonstrated by the difference in shopping rates for men (26 per 100) and women (36 per 100). The difference in trip rates is reflected both in the stratification by sex and in a stratification by occupation primarily because of a high correlation between sex and occupation (84.4 percent of office clerical workers are women and 64.9 percent of executive or professional office workers are men).

Income was included as a variable in the trip generation models primarily on the basis of the hypothesis that a higher income indicates a greater purchasing power and, therefore, a greater financial ability to shop. Other justifications for its inclusion are also possible, however. It might be argued that the CBD provides better opportunities for the purchase of expensive or high quality goods than alternative shopping areas. Employees with higher incomes would then be more likely to shop downtown than would be explained solely on the basis of their purchasing power.

Reasons for including occupation in the trip generation models are not as obvious, particularly when one has controlled for differences in sex and income. The main justification for its inclusion would be that certain occupation types are more restrictive than others in the amount of time allowed for midday shopping or lunch trips. It might be argued that clerical positions tend to be less flexible in work hours, which restricts the employee's ability to shop during working hours. It might be expected that a greater proportion of work-based shopping trips may be made by clerical employees after rather than during working hours.

Information on the age of an employee proved to be of little value in either a theoretical or empirical way in explaining differences in lunch or shopping trip rates. There was some indication that the lunch trip frequency was highest among the youngest (under 25) and oldest (65 or over) employees but age was not included in the models.

The results of the model estimation for trip generation are given in Table 1. Included below each coefficient estimate is the t-statistic for the coefficient. The t-statistic provides an indication of the significance of the variable in the model. A value of 1.7 or more generally indicates that the estimated coefficient provides a significant improvement in the explanatory power of the model (reflecting a 90 percent level of confidence that the coefficient is significantly different from zero).

The two accessibility variables EACC and NACC were significant and of the appropriate sign for the midday models. It should be noted, however, that the accessibility variables provide little improvement to the evening models. Early estimation of the dinner model that included the variable EACC produced a negative coefficient that is counterintuitive. Subsequently, estimations were therefore made without an accessibility variable.

Each of the socioeconomic variables added explanatory power in at least one of the models but the effect of each variable differs dramatically from model to model. Income (HINC) and occupation (OCC), for example, are far more significant in the shopping models than in the lunch model. The variable SEX, which has a value of 1 if the employee is female, is positive and highly significant in each model, indicating that female employees shop and make lunch trips more frequently than male employees, all else being equal.

Trip Distribution

The trip distribution models contain only three types of variables.

1. The retail employment in a zone (EMP),
2. The distance from the employee's workplace to the zone (DIST), and
3. A constant term for each major area to reflect nonquantified elements of attractiveness.

Both the employment and distance variables are included in the model as the natural log of the variable: log(EMP) and log(DIST). This specification was chosen primarily because it provided a better fit to the data than other alternatives. The lunch and midday shopping trip distribution models include two employment terms: one representing food-oriented employment (FDR) and one representing nonfood employment (NFR). The models include both terms because of the linkage between lunch and shopping trips and because inclusion of both terms improved the explanatory power of the model.

The evening shopping trip model yielded the best result when a single employment term for all retail employment (TLR) was included rather than either a nonfood employment term alone or both the food and nonfood employment terms included separately. Evening dinner trip distribution could not be modeled directly because of an insufficient number of observations. To compensate, the dinner trip distribution has been represented by a distribution model estimated on the basis of trips for lunch only. In the model, only a food-oriented employment variable (FDR) was included. Because of differences in the types of food-oriented establishments in the various zones, a somewhat different distribution of lunch and dinner trips might be expected. Unfortunately, sufficient data were not available to produce a better distribution.

Eleven area-specific constant terms were estimated: three representing the main department stores and eight representing the main districts in downtown Boston. One additional area-specific constant, DTC(2), was included to represent attraction to the Downtown Crossing, the heart of the shopping district, for employees more than 20 min away. Because the Boston Employee Survey underrepresented employees in the areas more than 20 min from the Downtown Crossing, this variable is designed to reduce any bias in the model by controlling for it directly.

The results of the model estimation for trip distribution are given in Table 2. The t-statistics indicate that size and distance are important variables in the models but a significant amount of the variation is also explained by the area-specific constants.

Sensitivity Analysis

The sensitivity of expenditures for lunch and shopping trip purposes to changes in characteristics of the retail opportunities available and to changes in the composition of the employment can be illustrated by applying the model system for a hypothetical building in the downtown area. The building in the example has an employment of 1,000, all of whom are nongovernmental office employees. The sensitivity of shopping activity is illustrated by examining the effects of seven sample changes.

1. Addition of 50,000 ft^2 of new food-oriented retail floor space at a distance of 1,000 ft from the building.

TABLE 1 Estimated Trip Generation Model Coefficients

Trip Type	Constant Term	EACC	NACC	SEX	HINC	OCC
Lunch	−0.57	0.17×10^{0}	NA	0.58×10^{-1}	0.48×10^{-1}	-0.52×10^{-1}
Coefficient (t-statistic)	2.7	5.5		8.3	0.7	0.7
Midday shopping						
With lunch	−0.70	NA	0.33×10^{-1}	0.61	0.92×10^{-1}	0.14
Coefficient (t-statistic)	3.8		1.7	7.1	1.1	1.6
Without lunch	−1.62	NA	0.45×10^{-1}	0.48	0.23	0.29
Coefficient (t-statistic)	6.4		1.7	3.9	2.0	2.3
Dinner	−3.04	—[a]	NA	0.13	0.19	−0.45
Coefficient (t-statistic)	2.1			0.8	1.2	2.6
Evening shopping	−2.50	NA	0.11×10^{-1}	0.86	−0.46	−0.17
Coefficient (t-statistic)	10.4		0.4	7.2	4.2	1.6

Note: Variable definitions: EAC = Σ(food-oriented employment)$_i$/d_{ij}; NACC = Σ(nonfood employment)$_i$/d_{ij}; SEX = 1 if employee is female, 0 otherwise; HINC = 1 if household income is $30,000 or more, 0 otherwise; OCC = 1 if employee's occupation is clerical, 0 otherwise. NA = not applicable.

[a] Efforts to estimate a coefficient for this variable did not produce satisfactory results.

TABLE 2 Estimated Trip Distribution Model Coefficients

Trip Type	Store 1	Store 2	Store 3	Back Bay	Prudential Center	Quincy Market	Tremont Street	Downtown Crossing	Government Center	Park Square	DTC (2)	Log (FDR)	Log (NFR)	Log (TLR)	Log (DST)
Lunch	1.06	1.74	0.73	−0.20	0.68	2.41	1.40	0.32	0.98	−3.32	−1.12	0.09	0.21	NA	−1.22
	7.0	12.2	5.2	8.8	3.1	19.9	11.1	4.3	7.8	3.3	3.1	5.5	7.7		23.6
Midday shopping	1.40	1.88	1.00	2.77	1.00	2.16	1.54	0.69	0.98	−2.55	−1.08	0.06	0.21	NA	−1.31
	8.8	12.4	6.8	1.0	3.7	13.7	9.6	7.7	5.6	2.5	2.8	3.0	6.8		20.0
Evening dinner	0.95	1.78	0.36	0.43	1.19	2.64	1.42	0.17	0.91	−2.82	−0.99	0.19	NA	NA	−1.16
	3.4	8.1	1.3	1.4	4.3	16.5	8.1	1.7	5.4	2.8	1.7	8.0			16.4
Evening shopping	1.35	1.70	1.56	1.30	1.21	2.35	1.15	−0.07	1.52	0.38	NA	NA	NA	0.49	−0.55
	3.7	5.3	3.9	0.3	3.1	7.8	2.3	0.3	3.8	0.6				5.2	4.2

Note: NA = not applicable.

2. Addition of 50,000 ft^2 of new food-oriented retail floor space at a distance of 500 ft.
3. Addition of 100,000 ft^2 of nonfood retail floor space at a distance of 1,000 ft.
4. Addition of 100,000 ft^2 of nonfood retail floor space at a distance of 500 ft.
5. A 10 percent increase in the proportion of female employees in the building.
6. A 10 percent increase in the proportion of clerical employment in the building.
7. A 10 percent increase in the proportion of employees in the building with household incomes of $30,000 or more (1980 dollars).

The base distribution of employees by person type is assumed to be the same as the overall average for the Boston CBD office employment.

	%
Female	57.3
Clerical	43.1
Upper income	40.4

The results of the analysis are given in Table 3. Two important points emerge from the analysis. First, lunch trips are more sensitive to changes in accessibility to food-oriented floor space than shopping trips are to nonfood floor space. Second, among the characteristics of the employees, the sales volumes are most sensitive to the proportion of female employees. This result is significant in light of nationwide employment statistics that indicate that by 1990 the proportion of females among CBD employees may increase by 5 percentage points. According to the WRAM forecasts this change would produce an increase in downtown sales in Boston of 2 to 3 percent or about $10 million to $15 million per year (in 1982 dollars).

TABLE 3 Sensitivity Analysis: Change in Retail Sales

	Changes in Annual Expenditure (1982 dollars)	
Policy or Change	Lunch	Daytime Shopping
Add 50,000 ft^2 of food retail at 500 ft	164,000	20,000
Add 50,000 ft^2 of food retail at 1,000 ft	82,000	10,000
Add 50,000 ft^2 of nonfood retail at 500 ft	0	36,000
Add 50,000 ft^2 of nonfood retail at 1,000 ft	0	18,000
Increase in the proportion of female employees of 10 percent	2,000	36,000
Increase in the proportion of clerical employees of 10 percent	−2,000	10,000
Increase in the proportion of high income employees of 10 percent	2,000	8,000

Note: Changes are for a hypothetical office building with an employment of 1,000.

In the analysis for the Boston Redevelopment Authority, the WRAM was used to provide sales forecasts for 1985 and for a number of 1990 development scenarios for downtown Boston. The 1985 forecasts indicated that the added employment from development in progress would add $131 million (in 1982 dollars) over the 1982 level of sales--a 24 percent increase. Roughly 30 percent of that increase will be in food sales and 70 percent in nonfood sales.

In the examination of future development scenarios, eight possible combinations of office and retail development were examined in the CBD. The alternatives represented different locations for development and different levels of development (low, medium, and high) for both the retail and office components. The analysis indicated that the volume of sales generated (from employees) per square foot of new retail added varied significantly from a low of $188 per square foot for the "high office-high retail" alternative to a high of $815 per square foot for the "high office-low retail" option. The analysis clearly demonstrated the importance of the employee market to the success of new retail floor space added.

PROFILE OF EMPLOYEE RETAIL ACTIVITY

Average Annual Trip Rates

The Boston Employee Survey and the WRAM system output have revealed a suprisingly high frequency of trip making. The analysis indicated that on an average day, 43 percent of CBD employees make a trip out of the building for lunch. Shopping trips are made by 31 percent, and in all 53 percent leave the building for either lunch or shopping or both. Furthermore, an additional 6 percent leave the building for purposes other than lunch or shopping. Rates are provided for a number of stratifications of the survey sample as illustrated by the data in Table 4.

Purchase Type and Expenditures

There are considerable differences in expenditures between groups when the survey sample is stratified according to the employee characteristics included in the model. Table 4 gives the average expenditure per trip (including some trips for which no purchase is made) for different subsamples segmented according to occupation, sex, income, and employment location.

An analysis using the WRAM system suggests that in 1982, employees in downtown Boston contributed $546 million in retail sales. As illustrated by the data in Table 5, the average annual expenditure per employee was $1,540. Of this amount, roughly 27 percent was for food or drink and 73 percent was for nonfood goods. The difference that retail accessi-

TABLE 4 Trip Frequency and Expenditure Profile (Office and Government Employees)

	Trips per 100 Employees[a]		Average Expenditure[b]	
Survey Sample	Shop	Lunch	Shop	Lunch
Total sample	31.3	43.1	16.40	4.90
Sex				
Male	25.6	42.7	19.40	5.10
Female	35.7	43.9	16.20	4.40
Occupation				
Clerical	34.5	43.3	14.00	4.00
Executive/Professional	29.3	43.1	19.20	5.60
Sales and other	25.7	42.7	25.30	5.60
Income				
Less than $30,000	31.9	42.8	15.90	4.30
$30,000 or more	30.7	43.4	20.20	5.60
Employment location				
Financial district	32.0	44.5	17.50	4.60
Back Bay/Prudential	26.9	34.7	13.00	5.40

[a]Trip rates may reflect mulitiple trips by an individual in a single day.
[b]The average expenditure includes trips for which no purchase is made. Such trips are entered as a value of $0.00. Expenditures are in 1982 dollars and assume an average annual inflation of 7 percent between 1979 and 1982 and an average annual increase in real income (after inflation) of 3 percent.

TABLE 5 Profile of Average Annual Employee Expenditures (1982 dollars)

Purchase Type	Financial District Employees ($)	All Boston Proper Employees ($)
Lunch	420	360
Dinner	60	60
Total food	480	420
Daytime	975	840
Evening	315	280
Total nonfood	1,290	1,120
Total	1,770	1,540

Note: Assumes 250 working days per year, an average annual inflation of 7 percent between 1979 and 1982 and an average annual increase in real income (after inflation) of 3 percent.

TABLE 6 Distribution of Employee Expenditures by Type

Purchase Type	Percentage of all Purchases[a] (%)	Average Value[b] of Purchase ($)	Percentage of Dollars Spent (%)
Meal (sit down)	26.6	5.84	15.9
Meal (take out)	18.9	3.53	6.9
Food (other than meal)	10.5	2.98	3.2
Clothing	14.0	23.63	33.9
Books/magazines	8.0	5.79	4.8
Jewelry	1.6	41.28	6.8
Shoes	1.7	26.37	4.6
Housewares	3.3	21.67	7.3
Furniture	0.2	49.24	1.0
Drugs or toiletries	7.3	2.66	2.0
Other (comparison)	7.9	16.77	13.6
Total	100.0		100.0

[a]Based on responses to both first trip and second trip purchases.
[b]Based on value of purchases on first trip only.

bility and employee characteristics can produce is illustrated in Table 5 by the expenditure profile for employees of the financial district, the employment area with the greatest access to stores and restaurants. The total average of $1,770 is almost 15 percent greater than the average for downtown Boston.

With respect to occupation, clerical workers consistently have lower average purchase value than other employees. This might well be explained on the basis of income, however, because clerical workers have a significantly lower average income than other occupations. Women also have a lower average purchase value than men, which might also be a reflection of differences in income. After accounting for differences in trip rates, however, women office employees in the sample had an average annual expenditure roughly 10 percent higher than men.

As has been implied in the previous paragraphs, the largest difference in expenditure arises when the sample is divided according to income. Although there is a slightly higher overall trip rate among those with incomes under $30,000, the differences in purchase value (which are significant) result in a much higher annual expenditure from those with incomes of $30,000 or more. The result is roughly a 25 percent higher contribution from the higher income group.

Purchase Type

The data in Table 6 illustrate the distribution of purchases and the distribution of sales for a detailed enumeration of goods. Several interesting facts are apparent from the table. First, although food constitutes 56 percent of all purchases, it represents only 26 percent of total sales volume. In contrast, comparison goods (which excludes food, drugs, and toiletries) constitute 37 percent of all purchases but 72 percent of all sales volume. What makes this particularly interesting is that the major growth in sales in the Boston CBD over the past 20 years has been in the areas of food and convenience goods.

SUMMARY CAPABILITIES AND LIMITATIONS

The WRAM system provides a powerful tool for analyzing the retail impacts of many types of CBD development policies. There are, however, particular strengths and weaknesses that should be discussed and caveats given with the model's use. The model system is designed for analysis of three main types of changes:

1. Changes in the amount or location of office floor space;
2. Changes in the amount, location, or type (food or nonfood) of retail floor space; and
3. Changes in the characteristics of downtown employment (sex, occupation, income).

The model system is not designed to test physical changes in the shopping environment (such as automobile-free zones, or sidewalk bricking) or management policies (such as increased maintenance, added security, or increased marketing). The modeling system is also not designed to differentiate between types of floor space on the basis of qualitative differences. Floor space devoted to the sale of high quality merchandise is represented in the same manner as floor space devoted to the sale of discount merchandise except to the extent that difference can be represented by different employees-to-floor space ratios.

Within the limits of analyses for which the models are intended, the WRAM system has the following distinct attributes:

1. It provides the only mechanism for incorporating the effects of both size and distance from employment when evaluating the trip-generating effect of retail floor space. In addition, all retail opportunities are considered simultaneously, not each opportunity in isolation.

2. It allows for analysis of projects that are located outside of the original Boston Employee Survey area. The relationships developed on the basis of the survey responses can be extrapolated to test the impact of projects in outlying areas.

3. It requires little new data for the evaluation of a proposed project, and the model inputs are easily prepared.

4. The results are summarized at a level of detail that is useful for general policy analysis.

The advantages make the WRAM system an appropriate planning tool in a variety of settings.

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Implementation of Downtown Automobile-Use Management Projects

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ABSTRACT

Most capital improvement studies deal with feasibility analysis or evaluation of successfully completed projects. Relatively little is known about the many cases in which projects have been attempted but have not been successfully completed. Reported in this paper are the findings of a study that investigated the implementation process of downtown automobile-use management projects. This implementation process was compared with the process encountered in alternative central business district (CBD) revitalization efforts. Information was solicited through mail surveys of city planners in 67 cities about approximately 200 CBD revitalization projects, including 38 automobile-restricted zones that have been considered, initiated, or completed during the past 8 years. Implementation problems were perceived to be related to certain project attributes and the stage that the project had reached. The latter poses interesting questions about the identification and measurement of implementation problems in future research. The study reconfirmed an emerging role for city planners that emphasizes managing, negotiating, and coordinating projects that require public-private partnerships.

Cities are expanding their role of strictly providing services or regulating business. They have shifted away from the expensive urban renewal practices of the 1960s, which involved clearance or capital improvement projects without a firm commitment from the private sector. Their new orientation is toward policies that include ways to influence their economies through the creation of jobs, the coordination of private sector roles, and the facilitation of private development (1).

Central business district (CBD) revitalization has been the dominant strategy for urban economic development. Transportation improvements and automobile-use management projects have been used as means of improving the economic vitality of urban centers. Automobile-use management is the new term used to describe broader transportation policies that manage vehicle use in a large geographic area. Automobile restriction is such a form of management that goes beyond the scope of traditional linear pedestrian