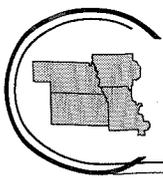
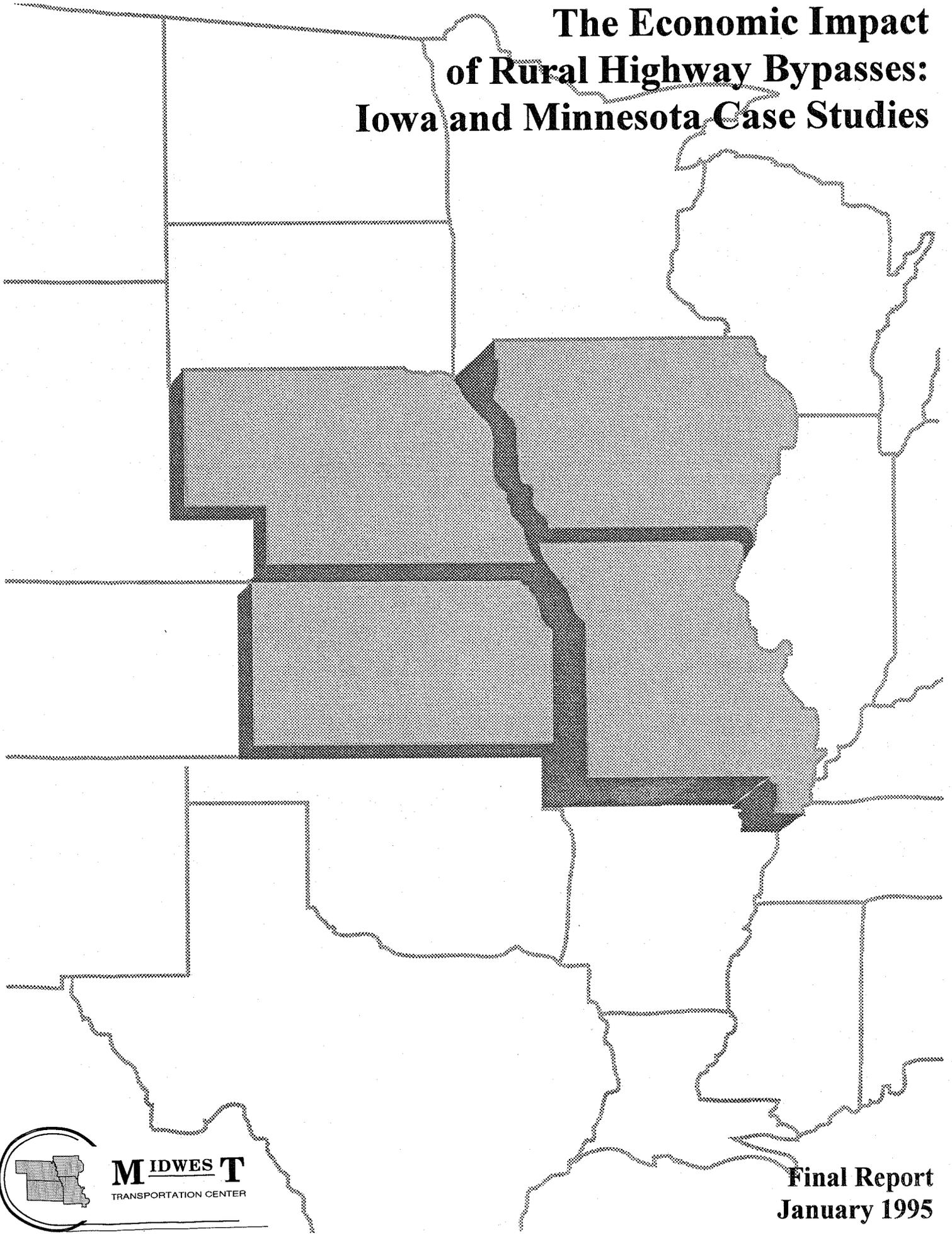


The Economic Impact of Rural Highway Bypasses: Iowa and Minnesota Case Studies



M IDWES **T**
TRANSPORTATION CENTER

Final Report
January 1995

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Funded by
Iowa Department of Transportation
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THE ECONOMIC IMPACT OF RURAL HIGHWAY BYPASSES: IOWA AND MINNESOTA CASE STUDIES

Highway bypasses around rural communities in heavily traveled transportation corridors are viewed as a highly cost effective method of improving traffic flow along non-interstate transportation routes. However the bypassing of a central business district raises concerns among merchants and residents over possible adverse impacts to their businesses. After providing a historical perspective to the role of rural bypasses, this paper uses several approaches to assess the impacts of rural highway bypasses. First, the effect on overall retail sales in bypassed communities will be examined by comparing to cities without bypasses for comparable periods. Next, the total sales are decomposed into categories or classes of retail sales to analyze the impacts upon different types of businesses that may be attributed to the bypass. Finally, the effects of the bypass on individual merchants will be examined through a personal survey of business operators in these bypass communities assessing their attitude to the bypass impacts.

History of the Bypass

The history of the rural highway bypass begins with the interstate highway system. The Federal-Aid Highway Act of 1956 was the beginning of the interstate highway system in the United States. This system connects all major cities in the United States with controlled access freeways constructed to approved modern design standards. The interstate highway system provides high levels of service for drivers using the system; e.g., controlled access and uninterrupted travel flows (Wright and Ashford 1989).

The rural highway bypass provides similar safety and conveniences. Bypasses improve the movement of goods from factories to consumers by removing many of the delay-causing impediments (Iowa Department of Transportation 1991). Although construction standards on rural highway bypasses do not meet those of the interstate highway, they do have limited access and offer many of the same safety advantages and benefits. Safety features include:

- continuous wide shoulders
- wide medians, at least two wide lanes in each direction and limited access to other streets, roads or highways.

Impediments removed by a bypass include:

- traffic lights
- pedestrian crossings
- curb-side parking
- cross-traffic and driveways.

Whether a rural highway bypass is two or four lanes, it improves the farm-to-market transportation system."Road investment in highway bypass construction normally produces benefits for road users in the form of reduced journey times, in vehicle operating costs, and an improvement in safety" (Anderson et al. 1993, 1). The Iowa Highway Commission found the highway bypass brought safety improvements, especially in the central business districts. Parking and traffic patterns improved as through traffic moved to the bypass (Iowa Highway Commission 1964, 1996).

Investment in safer and more efficient roadways also has a direct and indirect impact on local and regional economies. A transportation investment can provide consumers and merchants with economic ties to the outside world. The investment will benefit firms, households, and local and state governments. Firms that experience economic growth may take profits away from other businesses, who experience decline (Huddleston and Pangotra 1990).

Transportation investment is not always a positive experience for all firms and households as indicated from previous studies by the Iowa Highway Commission. During the 1960s, the Iowa Highway Commission conducted several studies of the economic impact of the highway bypass on rural communities. In these reports, the bypass was generally a two lane roadway that moved from "downtown" to the city limits. Some had controlled access.

The Traffic and Highway Planning Department of the Iowa Highway Commission used raw taxable retail sales data to measure the economic impact of the bypass. The data were collected four years "before" construction of the bypass and two years "after." The six years included the construction period. One of the impact studies conducted by the Iowa Highway Commission involved Chariton, Iowa. This community was bypassed by U.S. Highway 34. The highway opened to traffic on October 17, 1961. Retail sales data was collected for six years beginning in July of 1957. The "before" data includes the time from July, 1957 to the opening date. The "after" data begins with the opening of the bypass to July 1963.

The highway bypass construction period in the above studies was two to three years. When comparing the experimental data to that of the control group, those years of construction added bias to the statistics used to measure the data. One problem with this data, for example, is that it will have an overestimated sample mean. This mean would not represent an approximation of the population mean. The goal of these studies was to measure the economic impact of the highway bypass. The data indicate that bypass effects might be directly connected to the construction years. Effects noted in the Stuart, Iowa project were especially apparent in the cafe and service station businesses. There were sharp increases in retail sales of gasoline and prepared food midway through the construction period (Iowa Highway Commission 1964, 9).

Eleven communities, bypassed in the late 1950s and early 1960s, were selected for the impact studies. Each study was carried out over a six year period that included the construction year. Planners at the Iowa Highway Commission conducted the analysis using retail sales data. Their general conclusions were that the retail base of bypassed communities are not necessarily dependent on the traveling public and that existing restaurants, service stations, and motels experienced the most negative impacts. Each of these impact studies made comparisons between retail sales categories in one town and an appropriate control group. The control groups were generally economic areas, other cities or counties. The studies involved several communities,

however, there were no comparisons made between communities (Iowa Highway Commission 1962, 1963, 1964, 1965, 1966).

Most of the early bypass studies of the interstate system analyze the effects upon the retail sector of communities. Special surveys also were used to study the locational and individual business impacts. A 1972 study conducted by the Texas State Department of Highways used a written survey to find a business's preferred location near a planned freeway corridor in Houston. 175 out of 1,710 manufacturers, wholesalers, retailers and service establishments stated they would prefer to be along the freeway or within two or three blocks of it. Merchants who would be on the planned freeway corridor overwhelmingly supported freeway construction.

Location is usually an important factor in the profit and viability of a business. The Anderson bypass study looked at the location of a business relative to the bypass. Some experienced losses because of their location; others were relatively unaffected by the relocation of the old highway.

Measuring Rural Bypass Impacts in Iowa and Minnesota

The sample of cities for this evaluation of bypass impacts is drawn from 11 communities in Iowa and 10 in Minnesota that had bypasses opened since the late 1970's . This time frame was chosen in order to use retail sales data which is available in a detailed format of sales categories since 1969. Maps 1 and 2 show the location and Table 1 lists population and date of bypass opening in these communities. Each bypass city was then matched against three "control cities" chosen for having populations, traffic volume and distance from metropolitan areas comparable to the bypass cities. In another comparison, bypass city performance is contrasted against all other cities of a comparable population range in the state.

Total Sales

Data on per capita total sales for the bypass cities are plotted against the average for the control cities in Figures 1 for Iowa and in Figure 2 for Minnesota. No distinct pattern of retail sales in the bypass community versus the control cities is evident in either Minnesota or Iowa. A test for difference between the mean scores for the bypass and control cities also was not significant. In a separate paper, retail sales differential was tested in a model regressing total retail sales against a variety of community characteristics:

- population
- income
- size of shopping malls
- freeway accessibility
- county seat towns
- presence of a bypass around the community

This regression approach also found no significant difference in total retail sales for communities with a new bypass versus cities without bypasses (Otto 1992).

Retail sales per capita adjusted for income and city size is another measure of retail sales performance used for comparison. This measure, referred to as pull factors, is calculated as actual per capita retail sales for the sample city divided by the expected per capita retail sales for control cities according to the following formula:

$$PF = \frac{PSC}{PSS}$$

Where: PF = Pull factor
PSC = Per capita sales for city
PSS = Per capita sales for comparable cities in state

The score indicates the percentage rank of retail sales performance relative to other cities of comparable size. For example, a score of 1.5 indicates a city's retail sales are 50% higher than the retail performance of other cities in the same population range.

The advantage of the pull factor approach is that it compares cities of comparable size rather than all cities in the state. The pull factor approach for analyzing retail trade data has been used extensively for community trade area analysis in Iowa by Ken Stone. A recent illustration using this methodology is the analysis of the impact of Wal-Marts on rural Iowa communities (Stone 1989).

This pull factor analysis for the bypass communities compared to their paired communities for both the Iowa and Minnesota cases also indicated no apparent or significant difference in patterns (Figures 3 and 4). Two types of control cities are used in this study. In the first set, each bypass city is paired with three other non-bypass cities with comparable population, traffic count and location relative to nearby metro regions. The second set of control cities is based on all other Iowa cities within the same population range as the bypass city. Since rural retailing has been affected by a major set of structural changes including the growth of regional shopping malls, discount marketing, and stresses on rural income, it is important to develop relative measures of performance for a comparable period rather than only before and after indicators.

The average pull factor score for the bypass city compared to the control city (adjusted for years since the bypass opening) is used as our main measure of impact. Developing a performance measure over time provides a test for whether shopping patterns adjust at some point after the new bypass opens. Figure 3 presents estimates of total sales pull factors for the 11 bypass cities in Iowa compared to the group of control cities for the initial year and four subsequent years after opening. The same plot for the Minnesota bypass communities compared to the paired group of cities yielded similar results suggesting that a bypass did not result in a significant change in the overall retailing performance of a community (Figure 4). For both states, these results from the pull factor analysis and per capita sales plots indicate no significant difference in total sales between bypass cities and a sample of comparable cities.

Classes of Retail Sales

While overall sales do not appear to be significantly affected by the bypass, individual retail businesses such as gas stations or restaurants may be more affected because they rely more on through traffic. A pull factor analysis for each category of retail sales in the bypass and

control cities was used to investigate impacts of the bypass on different types of businesses within a community. Plots of the pull factor scores for bypass cities and control cities in Iowa are presented in Figures 5-16. A similar set of plots are presented for the Minnesota bypass cities compared to their control groups are presented in Figures 17-24. A T-test to analyze the difference in means between the bypass and control group of cities did not find a statistically significant difference between the two groups. Using a four year period to observe relative retail sales performance indicate this sample of bypass cities losing ground to the non-bypass cities in the categories of auto sales, furniture sales, miscellaneous sales, and wholesale trade. The bypass cities appeared to have relative improvement in their pull factor scores for apparel, building supplies and general merchandise. While these were apparent patterns, none of the differences were statistically significant. There appeared to be offsetting or no relative change in the other categories of retail sales for the Iowa group of cities.

The sample of Minnesota cities had a somewhat different pattern. Bypass cities had an apparent improvement in retail sales performance in general merchandise and apparel sales and declines in lumber and auto sales. Other businesses had no apparent change in relative positions. Again, differences between groups of cities were not significant at the .10 level.

A second version of pull factor analysis compares pull factor scores for various categories of retailing in bypass cities to the scores for all cities within the comparable population range. These results are presented in Figures 25-37. While this process requires a larger sample of control cities, the results are similar to the analysis using a paired city approach. Differences in sales patterns existed, but the differences were not statistically significant. Bypass cities in Iowa did appear to be losing ground in auto sales, eating and drinking establishments, general services, wholesaling, and miscellaneous sales compared to cities of comparable size. Relative gains were observed in apparel and general merchandise sales in the bypass cities. While the differences were present, none of them were significant. In the remaining categories, retail patterns in bypass and control cities moved in similar directions in response to changing economic conditions.

Attitude of Community Businesses Toward Bypass

Bypass Survey

After relying solely on secondary data to evaluate bypass effects on retail sales in some detail, a survey was conducted to investigate the perspectives of individual business owners on how bypasses affected them. A survey instrument was mailed to all retail and service businesses in the 11 bypass communities in Iowa, soliciting their reaction to a variety of bypass related issues. They were asked about the effect of the bypass on such things as: traffic noise and volume, accident rates, parking problems, the shopping environment, the number of customers and overall quality of life. This section describes the instrument used and the results of the survey. A copy of the survey instrument is in Appendix 1. The results of this survey are interesting because they allow us to get a very detailed sense of how individual businesses have been affected as opposed to whole classes of businesses.

Description of Business Categories

Iowa Taxable Retail Sales records divide Iowa businesses into 11 business groups based on the two and three digit Standard Industrial Codes:

General merchandise covers a very wide range of durable and nondurable consumer goods. This category includes: clothing and shoe stores, variety and department stores, pharmacies, farm machinery, hardware, books, sporting goods and household appliances. The largest number of surveys were to/from the general merchandisers.

The **service category** includes automobile service, refrigeration and air conditioning service, painting, wallpaper hanging, car washes, lawn care, flowers, movie theaters, photography and undertaking. This group contains many retail merchants as well and the response in this category also was large.

Building materials includes merchants who sell goods used to build a house, barn, pole building, or metal bin. Persons in the construction business are included in the building materials category because they provide a building service to customers.e.g.,electrical and plumbing contractors, home builders, cabinet makers, etc.

Owners or managers in the **food** group sell food products; i.e., grocery stores, meat lockers, bakeries, dairies, candy stores and vegetable markets. The merchants at a farmer's market selling edible items are also included.

The **apparel** group includes stores that sell only clothing for men, women and/or children.It includes individual firms selling clothing only and excludes department or discount stores that also sell apparel.

The **home furnishing** group includes furniture stores, carpet and drapery shops, and interior decorators.

The **motor vehicle** group includes automobile dealers, auto parts and tire stores, as well as brake and muffler shops.

The **eating and drinking** group is a combination of two retail sales categories. The eating group includes cafes, restaurants, lunch rooms and snack bars. The drinking group consists of taverns, over-the-counter liquor stores, beverage stores and tobacco stores.

Service stations and **motels** are a subset of the service category. Restaurants, taverns, service stations, motels and hotels are service groups but they are also considered highway oriented businesses. They are examined as subcategories because this study is interested in how these particular merchants feel about the impact of the bypass since it affects them more directly.

Miscellaneous includes almost anything that does not fit in another category. For example, this group has utility companies, auction barns, hatcheries and grain elevators.

Survey questionnaires were mailed to 1,438 merchants in the eleven bypassed communities. There was a 29 percent return rate after the first mailing; the post card reminder brought another 7 percent response. Approximately 1 percent of the surveys were discarded because they were incomplete. Table 2 describes the survey response distribution by community.

Survey Results

The perceptions of business owners and managers regarding the impact of a rural highway bypass varies with (1) the type of business, (2) location, and (3) other factors related to their community and personal situation. This thesis will focus only on the first two using data gathered via a questionnaire sent to merchants in each bypassed community.

Frequency and Cross-Tabulation Results

The merchants were asked to respond to thirteen questions concerning the overall quality of life in their community since the opening of the bypass. They overwhelmingly believed that quality of life is better or had not changed since construction of the bypass.

The highway bypass removed through traffic from many downtown areas to the newer highway. For this reason, the shopping environment in these communities is safer and quieter with less traffic on the city streets. The business people agree, by a two to one margin, that there has been a reduction in highway noise on city streets since the bypass opened. They also believed, by a ratio of five to one, that there had been a significant reduction in the volume of truck traffic along the old highway with a subsequent reduction in highway noise.

Traffic Congestion Reduction

The town of McGregor typifies the problems a bypass attempts to resolve. The town experienced traffic-related problems such as excessive noise and heavy truck traffic, until the community was bypassed by U.S. Highway 18. The old highway, which is the main street of McGregor was also the major thoroughfare to the bridge over the Mississippi River at Marquette. McGregor has a large grain operation that loads corn and soybeans on barges and rail cars for movement south. Travelers attracted by the fall colors and harvest time bring so many extra cars and trucks to town that traffic is often slowed to a crawl. In summer, McGregor is busy with tourists. Although the town is generally opposed to the bypass, the removal of the excess traffic has reduced traffic noise and congestion.

Shopping Environment

Reduced downtown traffic after the bypass led most business people to believe there is a general improvement in the shopping environment in their communities. This pleasant environment improved ease of access for customers visiting their retail merchants. The city of DeWitt offers a good example of the positive effects that can occur when heavy traffic is moved to a highway bypass. In this case, the town has been bypassed by two highways, U.S. 61 and 30 making the central business district a cleaner and quieter place to shop.

Traffic Volume

A reduction in downtown traffic volume reduces noise levels. According to the survey responses of the eleven communities, 60 percent of the merchants reported a decrease in traffic volume. This improves the shopping environment because it is easier for shoppers to drive around town. For example, Independence had problems with the volume of cars and trucks on U.S. Highway 20 and Iowa Highway 150 running through its central business district. The Highway 20 bypass has reduced some of the traffic volume but Highway 150 presents the community with problems of its own. This is a busy north-south highway with a very tight 90 degree turn in the middle of the central business district that is difficult for large trucks to navigate. Several respondents suggested a bypass for Highway 150 as well as Highway 20.

Merchants in bypassed communities thought the dust and noise problem had been reduced with the decrease in traffic volume. Even with reduced traffic volumes, they believed the number of customers visiting their places of business had not changed with the opening of the bypass. Most merchants (43 percent) believed it took less time for customers to get from the bypass to their business. These factors led to the merchants' perception of an improved shopping environment in their communities.

Attitude Toward Bypass

One of the survey questions asked retail merchants "Based on your experience with the bypass, would you still favor the bypass?" The number of people who favored the bypass was three times greater than the number opposed. According to some of the written comments, several merchants in Elkader, Manchester and Independence were enthusiastic about the bypass and the changes it had made to their downtown areas. In fact, they commented that they would like to see the construction of a bypass for the other major highway in their communities. For example, a few Elkader business people wanted Iowa Highway 56 to bypass their town. Some Manchester merchants want Iowa Highway 13 moved to the edge of town as well as the Independence merchants who wanted Iowa Highway 150 moved out of the downtown.

Impact on Business

Another question asked retail merchants to describe the impact on their businesses since the bypass opened. Most (53 percent) of the merchants responding to the question thought the bypass had no significant impact. According to the written comments, many merchants believed most of the business decrease they experienced was a result of an economic downturn. One merchant wrote that it was necessary to change the business to fit the new economic situation.

In general, the majority of merchants agreed that the quality of life in their towns had improved since the highway bypass opened. Traffic noise, traffic volume and truck traffic had decreased in the downtown areas. This led to a more pleasant shopping environment for merchants and customers. Most believed the impact of the bypass had no effect on the success or failure of their businesses. This led the business people to conclude that quality of life had not changed or was better than before. In general, merchants thought that locating the bypass

on the edges of their communities was an improvement to the business environment in other parts of town.

Location

This question gave the responder four choices of location:

- In the central business district (CBD)
- On the old highway but not in the CBD
- Near the bypass
- At another location.

The majority of businesses (41 percent) were located in the CBD, 20 percent along the old highway but not in the CBD, 15 percent near the highway bypass and 24 percent at other locations around town. The cross-tabulations in Table 6 compare the four locations with the three responses available to merchants in the quality of life variables in part one of the survey instrument.

The removal of a major highway through a town has an impact on the retail merchants, depending on where they are located. When location was compared by cross-tabulation to traffic noise and volume, merchants in all four locations thought these problems were better with the opening of the bypass. Traffic volume had decreased markedly in this area and with it came a definite reduction in traffic noise.

The majority of merchants (43 percent) in all locations thought the shopping environment was better or that there had been no changes since the bypass opened. Most business people saw no change in quality of life for their community. The one exception is the businesses in other locations where the majority of respondents thought the quality of life was better since the bypass.

The perception of bypass impacts on the number of customers varied by location. Although most merchants in the central business districts thought they had lost customers because of the bypass, nearly as many business people saw no change in the number of customers. McGregor merchants, for example, believed they have lost customers in their central business district because of the highway bypass. This town's marketing strategy is focused on attracting tourists. The bypass opening may cause their marketing strategy to focus on the advantages of shopping in a less congested city center. Merchants on the old highway were more likely to say they saw no change in their number of customers after the bypass than merchants in the central business district. Those near the bypass believed there were more customers since the bypass opened, and those in other locations overwhelmingly believed the numbers of customers had not changed.

A third major schema for cross classifying bypass issues is to examine for differences according to city. The overall distribution of responses by businesses according to city is presented in Table 3. None of the cities had the majority of businesses reporting that the overall quality of life was made worse by the bypass with many cities reporting an improvement from the bypass. A similar pattern was observed for the question of highway noise and the bypass.

A somewhat different pattern begins to emerge as the shopping related questions are examined. While most cities reported mostly no effect from the bypass, businesses in the cities of McGregor and Walker reported high levels of negative impacts on business, highly negative impacts on customers, and high negative impacts on overall shopping environment. McGregor was the only city reporting more businesses opposed to the bypass than in favor (Figure 53). The high profile of tourism in the McGregor area and the high dependency of tourism businesses on drop-in and through traffic may explain much of that city's opposition to the bypass.

The survey results analyzing the merchants' perception of the bypass impacts can be contrasted to the analysis of the categorical retail trade data of the previous section. The survey indicated that most merchants believed the number of customers shopping at their places of business had not changed since the opening of the bypass. However, merchants in the food group, eating and drinking, service stations and motels thought they had lost customers since the bypass opened. But the retail trade analysis indicated that only eating and drinking establishments had suffered losses.

Merchants in all eleven communities agreed that the opening of the bypass had no effect on the success or failure of their businesses. The majority were also in favor of the highway bypass. The merchants in McGregor, a small community that relies on summer and fall tourism, were the only exception. They thought the bypass has taken away some of the tourism traffic.

When examined by type of business, most of the merchants who responded to the survey were in favor of the bypass and believed the numbers of customers had not changed. Merchants in the food, eating and drinking, and motel and service stations believed they had experienced reduced numbers of customers.

Statistical Methods

The cross tabulations and frequency tables provide descriptive information on merchant attitudes toward bypasses. This section provides a more formal testing of the statistical relationship between business characteristics and their attitude to bypass issues. A Probit model was used to evaluate the relationship between the dependent variables measuring attitudes of businesses to bypass issues and the independent variables measuring the characteristics of the merchant and their community. Since the dependent variable are dichotomous choice (yes or no responses), Ordinary Least Squares (OLS) techniques are not appropriate for estimating the model parameters. A Probit model based on maximum likelihood techniques are used to provide efficient and consistent estimates of model parameters.

Three different dependent variables were used to represent different bypass issues to be evaluated in the Probit model format. One dependent variable was based on the merchants attitude for or against the highway bypass. The second dependent variable was the merchants' perceptions of a positive or negative impact on business activity. The third dependent variable

was the overall positive or negative impact of the bypass on the community. These are binary choice variables and the empirical approximation can be written as:

$$\begin{aligned} \text{FR}_i &= 0 \text{ if the merchant is not in favor of the bypass,} \\ \text{FR}_i &= 1 \text{ if the merchant is in favor of the bypass} \end{aligned}$$

where FR_i is the i 'th merchant's decision to favor the bypass or oppose it. They might also perceive that business activity increased or stayed the same or that it had decreased. Another perception, as in model three, says the bypass impact has an effect on the community or it does not.

The estimated coefficients do not directly indicate the increase in the probability of the event occurring, given a one unit increase in the corresponding independent variable. Rather, the coefficients reflect the effect of a change in an independent variable on $F^{-1}(P_i)$. The amount of the increase in probability depends on the original probability and thus on the initial values of all the independent variables and their coefficients (Judge et al. 1982, 522). The quantitative variables provide more usable information in the form of elasticities of the means. The categorical data are based on a nominal scale, therefore, the statements to be made about the variables are limited. See Table 4 for descriptions of the dependent and independent variables used in the above model. Table 5 lists the means and standard deviations of independent variables. The set of explanatory variables are intended to represent quality of life issues, bypass impact issues, demographic information, and categories of business and location types. The quality of life measures include indicators such as traffic noise and volume, shopping environment, number of customers and the ease of freight delivery.

The types of business categories were aggregated from eleven groups to three: general merchandise, services, and highway oriented businesses. The highway businesses included service stations, restaurants, taverns, motels and hotels. These categories were condensed to provide manageable groups with similar behaviors. The general merchandise category was the base group for this set of dummy variables.

Dummy variables were also created for the location variable. The base category was the central business district. The other dummy variables for location include: (1) on the old highway but not in the central business district, (2) near the bypass, and (3), other locations in town.

Results

The maximum-likelihood Probit estimates of three different dependent variables are discussed in this analysis. The Probit results were estimated using SHAZAM (White 1990). Three variations of a basic model were estimated for each dependent variable. The parameter estimates along with their standard errors and elasticities are presented in Table 7. The last column in Table 7 is the conditional probability of each independent, qualitative variable. The elasticities are recorded for the quantitative variables only.

As indicated by the Chow-R2 results, between 45 and 72 percent of the variation in the results are explained by the regression models. The local characteristics of the communities appear to have the least to do with explaining variation in the business owners perception of the

bypass impacts. The results related to location and type of business are more important and appear to generate a consistently significant pattern across the different sets of models. In each of the models, the effects of the three locations (near bypass, old highway outside the CBD, and other) are contrasted with the excluded category of the old highway in the CBD. Businesses located near the new bypass and in other locations in town were more likely than merchants in the old downtown to support the bypass. Businesses along the old highway away from downtown were less likely to support the bypass. A similar pattern was present in the models examining merchants' assessment of impacts on business activities and overall impact on community quality of life. Merchants near the new bypass were more likely than those at downtown locations to think business had improved or were not adversely impacted by the bypass. Merchants along the old route away from downtown and those at other locations were more likely than downtown merchants to think the bypass had adversely affected business activities and that the city was better off with the bypass. The positive response by businesses near the new bypass are understandable because they are generally newer service stations, fast food restaurants and motels built to take advantage of access to the new highway location.

Another location variable evaluated is the distance of the central business district from the bypass. In models analyzing merchants' attitude toward the bypass, the results indicate that as the distance from the bypass increases, merchants are more likely to be opposed to the bypass (Part 7A). The merchants' responses reflect concern with accessibility to the bypass. The further they were from the bypass, the more likely they were to believe the bypass had a negative impact on their business activity. The second set of models for perception of impact on business activity (Part 7B) show that as the distance increases there is a very slight increase or no change in their perception of impact on business activity. However, even with this perception of a negative impact, the results of the third set of models indicate that greater distances from the bypass was associated with a positive assessment of the bypass impact on local quality of life (Part 7C).

The variable "urban center" is defined as the distance between the bypass town and the nearest city with a population over 45,000 (Table 8). The urban center with a larger population and a greater variety of stores for shopping represents the "pull" of an urban center. The models examining approval of the bypass indicate that a greater distance between the bypass community and the urban center is associated with an increased likelihood that the merchant will oppose the bypass. This variable is significant at the .01 level. This result was counter to our original expectations that improving access to more distant trade centers would be perceived as threatening to local merchants and adversely affect their attitude toward the bypass. Indeed, community leaders in some of the bypassed towns did comment that the bypass made it easier for people to drive to larger urban centers and spend the day shopping.

The results for another locational characteristic indicate that merchants in a county seat city are more likely to be in favor of the bypass. They also believe business activity has not changed or has increased since the bypass opened. The county seat variable is significant at the .01 level in models of Part 7A and at the .05 level in models of Part 7B. This variable ranks second in magnitude among conditional probabilities. Since county seat towns draw customers from a wider region, including more rural areas, the bypass contributes to an improved downtown environment for these customers.

Type of Business

A second major concern of this study is understanding how the effects of the bypass will vary by type of business. While the frequency patterns indicated a pattern by type of business, the Probit regression, with other factors held constant, will test the consistency of the pattern. Three types of businesses were described as dummy variables in the three models: highway oriented businesses, service businesses, and the control category of general merchandise. When compared to the general merchandise category, merchants in the service category were less likely to be supportive of the bypass (significant at the .05 level). Merchants in the service businesses thought their business activities had not changed or had improved since the opening of the bypass, relative to the general merchandise category. These service businesses also believed the bypass had not adversely affected the overall quality of life in the community relative to the responses by the general merchandise merchants. The service merchants tend to be more oriented toward supplying local trade center functions and not drop-in traffic. Local trade center businesses need to pay more attention to customer satisfaction in order to generate and retain repeat customers in their region. With a local clientele base, these service firms may not be as concerned if a bypass takes through-traffic away from their downtown site.

The merchants in highway oriented businesses tended to favor the bypass when compared to those in the central business district. They also believed their business activities had increased or remained unchanged. The set of models assessing the bypass's impact on overall quality of life (Part 7C) indicated that these same merchants thought the bypass had a positive impact on their community. The variable in two models was significant at the .10 level. The highway oriented businesses along the old highways, when compared to the general merchandise businesses, believed they had not experienced negative effects from the bypass, even after controlling for location. Service stations, restaurants and motels often depend on motorists for their business. When the highway bypass is opened, new highway businesses are established along the roadway, often forcing existing travel related businesses to move in order to compete.

In general, the impact from the bypass has been positive. The merchants' perceptions did vary depending on the types of businesses they operated. The merchants in highway oriented businesses tended to be the most positive about the bypass and those in the central business districts tended to be more negative.

Quality of Life Factors

A number of quality of life variables are significant and have important ranks in conditional probabilities. Traffic volume is ranked number one in magnitude among the conditional probabilities in the regression models of the for/against and the perception variables and is significant at the .01 level in four of the nine models.

Merchants strongly believed traffic volume had decreased since the opening of the bypass. The results of the models of the for/against variable (Part 7A) and the perception variable (Part 7B) show strong support for the bypass among merchants who thought traffic problems had improved. Merchants who thought there was a reduction in traffic also thought there was no change or that there was an increase in their business's activity. Merchants who thought there

was a reduction in traffic volume after the opening of the bypass also thought the bypass was very important to the quality of life in their communities.

Merchants tended to favor the bypass as the number of perceived customers increased. They believed that their business activity had increased or at least did not change. Merchants who believed there had been an improvement in their shopping environments also favored the bypass and thought their business activity had improved or had not changed since the bypass. This variable is significant at the .10 level in models of the perception variable in Part 7B. In models assessing the overall bypass impact (Part 7C), the merchants thought the bypass had a positive effect on their communities. In general, merchants thought there had been an improvement in the shopping environment since the bypass opened.

Accident Rate

The official accident rates were taken from traffic records at the Iowa Department of Transportation. The information was collected for an eight year period, encompassing four years before and after the bypass opened. The Iowa Department of Transportation does traffic counts and the accident rates on primary highways in even years, and highways and streets in communities in the odd years. However, they do not always count every highway and street in these two years. As a consequence, this variable has missing data.

Merchants believe the number of accidents have decreased since the opening of the bypass. However, the official accident rate indicates a slight increase in the number of accidents over an eight year period. The difference between perceived accident rates and official rates may be due to several factors. Merchants' perceptions of fewer accidents may stem from their strong opinions about reductions in traffic volume. There may be more accidents but fewer personal injuries and less damage so the accidents are not as noticeable. More frequent accidents may be occurring at new locations.

Other Variables

The survey asked merchants when their business began operation. The variable that describes the year a business began operation is significant at the .01 and .05 level in the set of models asking about approval of bypass (Part 7A). The results indicate that the longer a business has been in operation, the more likely the merchant will favor the bypass. Their perception of impacts on levels of business activity was similar. The longer merchants have been in operation, the more they believe their business activity has increased or has not changed since the bypass opening. Similarly, the set of models assessing the overall community impacts of bypasses (Part 7C) show merchants do not blame the bypass for any downturn in business. This pattern of results suggest that over time merchants adapt to the presence of a bypass and adjust their marketing strategy to a new situation. The perceptions of the merchants also vary with the length of time they have been in business. Firms that have been in business longer appear to be able to adjust to the bypass impact more easily.

Communities appear to be adjusting differently to the impact of the bypass. In Webster City, merchants were delighted to see the excess traffic moved to the highway bypass, but opposition to the bypass developed after its opening. In response, downtown improvement efforts

were begun. Kay Hagen, the executive director for the Chamber of Commerce in Webster City, said the town has a Main Street Project that has been in effect since 1990. The project has made progress in developing a unique central business district and hopes to attract customers who usually shop in larger urban centers.

Information Signs

The data from the cross tabulations indicated a strong dissatisfaction with current signage provisions along the bypass. The merchants' attitude toward the signage was tested against their attitude toward the bypass, the impact on business activity, and overall quality of life in the Probit regression models. The results of this section indicate that merchants who disliked the sign situation were still supportive of the bypass and for how it contributes to the community. The probit regression results tended to indicate a negative and significant relationship between merchants' attitude toward signs and the various indicators of bypass outcomes for communities.

Of all written comments on the survey instrument, the sign issue was the most controversial and most frequently discussed. A few merchants were upset because there was not a sign on the bypass to even direct people to their town. Towns that had signs reported using considerable effort to persuade the Iowa Department of Transportation to install signs along the bypass. Some wanted signs to direct people to downtown areas that were difficult to find. Several merchants wanted signs to direct people to historic or noteworthy places. Some of these requests came from Dyersville merchants wanting to draw tourists to their "Field of Dreams" and their National Farm Toy Museum.

A merchant from Manchester suggested signs for highway oriented businesses that were "cut-off from highway traffic" when the bypass opened. Many wanted advertising signs placed along the bypass. However, the regulations for road signs along Iowa's highways are very specific. Chapter 306C of the Code of Iowa, 1987 says:

No advertising device shall be erected or maintained within any adjacent area as defined in section 306C.10, or on the right of way of any primary highway (Iowa Congress 1987, 2285). An adjacent area means an area which is contiguous to and within six hundred sixty feet of the nearest edge of the right of way of any interstate, freeway primary, or primary highway. (Iowa Congress 1987, 2284).

There are some exceptions to the above code. Three of these exceptions will be discussed using the Department of Transportation Administrative Code. Chapter 118 describes the rules and regulations for logo signing:

"This chapter pertains to official signs that are located within the right-of-way of interstate and freeway primary highways and that give specific information of interest to the traveling public. The department shall control the erection and maintenance of these signs in accord with this chapter." (Iowa Department of Transportation 1987, 1).

These signs are for private company logos that advertise gas, food, lodging or camping. Merchants near the bypass would be most interested in this type of advertising. There is a charge for making the sign plus a yearly cost of maintaining it.

The second exception is a Tourist Oriented Directional Sign which the Iowa Department of Transportation describes:

Tourist-oriented directional signing is official signing that is located within the right-of-way of a primary highway and that gives specific information regarding activities or sites of significant interest to the traveling public (Iowa Department of Transportation 1989, 1).

These signs direct tourists to something of significant interest. All signs in this category must be approved by the Iowa Tourism Signing Commission.

The final exception is the Private Directional Signing which the Iowa Department of describes:

Signs containing directional information about public places owned or operated by federal, state or local governments or their agencies; publicly or privately owned natural phenomena or historical, cultural, scientific, educational or religious sites; or publicly or privately owned areas of natural scenic beauty or naturally suited for outdoor recreation. This definition includes sites set aside as refuges for the preservation of species on the federal or state endangered species list. Private directional signs pertain only to signs erected on private property (Iowa Department of Transportation 1987, 1).

The only road signs available to most merchants is the logo signing mentioned above. Also, a logo sign may be installed for advertising purposes along primary highways. These are often used by rural businesses and are paid for by the merchants. Communities may have their town name on a sign along a highway bypass.

The concerns by merchants about signs reflect their underlying fear that customers might not be able to locate their town or their places of business. Some merchants thought there were not enough signs, and others were upset because there were no signs. Being able to have a properly placed sign was important to these businesses and represents an ongoing concern for these merchants.

SUMMARY AND CONCLUSION

This study has examined the economic impact of rural highway bypasses based on performance of retail sectors in the affected communities and from the perceptions of individual business owners in the communities. This report focused on recently constructed bypasses completed in Iowa and Minnesota since the late 1970's. The results from analyzing the secondary data indicate that the overall levels of retail sales in a community are not significantly affected by the presence of a bypass. Breaking retail sales into component categories indicated some

minor re-distributional effects where bypass cities experienced lower sales shares (pull factors) for furniture, auto and wholesale trade sales, while sales shares (pull factors) improved in building supplies and miscellaneous sales. The report found strong similarities in the responses of rural communities to bypasses in both Iowa and Minnesota. Geographical, economic, and cultural similarities in these two states may explain similar responses in communities with new bypasses.

The benefits of an improved flow of traffic from bypasses around rural communities along a transportation corridor usually exceed losses of retail sales in the aggregate. Several classes of businesses oriented to highway customers indicated levels of improved retail sales. Businesses serving the local trade area and those dependent on repeat customers are actually likely to benefit from an improved downtown shopping environment. A transfer among individual business owners appears to be occurring in communities where certain businesses along the old highway close and others open along the new bypass. Over time, the majority of merchants appear to be adjusting to the new situation and report being in favor of the bypass.

The analysis of the survey data collected from individual business owners in the bypass communities indicate that an overall majority of respondents favored the bypass. Regardless of location, a majority of merchants agreed that traffic volume and noise had decreased since the bypass. They thought the shopping environment and accessibility of suppliers and delivery trucks to their places of businesses had improved or not changed since the opening of the bypass. However the location of a business in relation to the new bypass did affect the owners perception of impact on business activities. New businesses along the bypass were most positive about the bypass and its impact on sales while business along the old route and away from the downtown CBD were least positive and reported that business activities were adversely affected.

Types of business being operated was another important factor affecting merchants' perception of the bypass. Service industries and highway oriented businesses were more positive than general merchandisers and reported business activities improved or unchanged since the bypass opening. In addition to the influence of bypasses, merchants also listed regional shopping malls and general declines in rural retailing as factors affecting their level of business activity.

Several other characteristics appeared to be important in affecting receptiveness of businesses to the bypass. Merchants who have been in business for longer periods of time are more likely favor a bypass. Merchants in county seat towns were more likely to favor a bypass than those that are not. Also, the greater the distance from the bypass to the CBD, the more likely the merchants are opposed to the bypass.

The outcome of this research suggests several areas for further study. One interesting research topic would be examining how bypasses are altering the central place hierarchy of how far residents are willing to travel for different types of goods. By facilitating the flow of travel, the bypass may be extending the reach of central places into rural areas. Another study might explore why the merchants' perceptions of accident rates varied from the official rates.

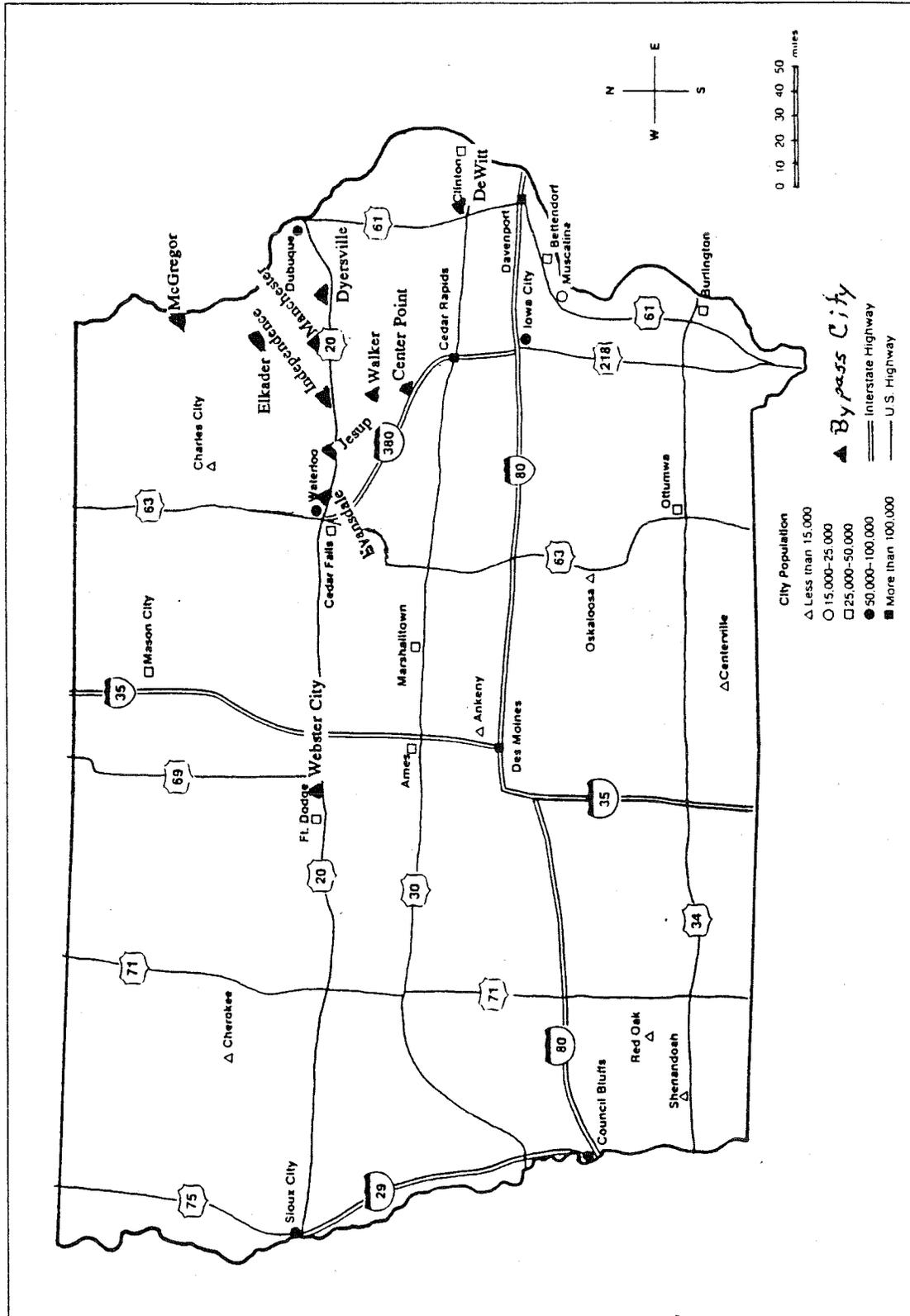
A change to a community such as the introduction of a bypass can be an opportunity to encourage merchants to make necessary adjustments in their way of doing business. They could begin planning activities to offset challenges and problem areas introduced by their changed

circumstances. The area near the bypass could be zoned commercial and the central business district could be promoted as a retailing center. These activities could help stabilize the community retailing base and help unify merchants toward a common community goal.

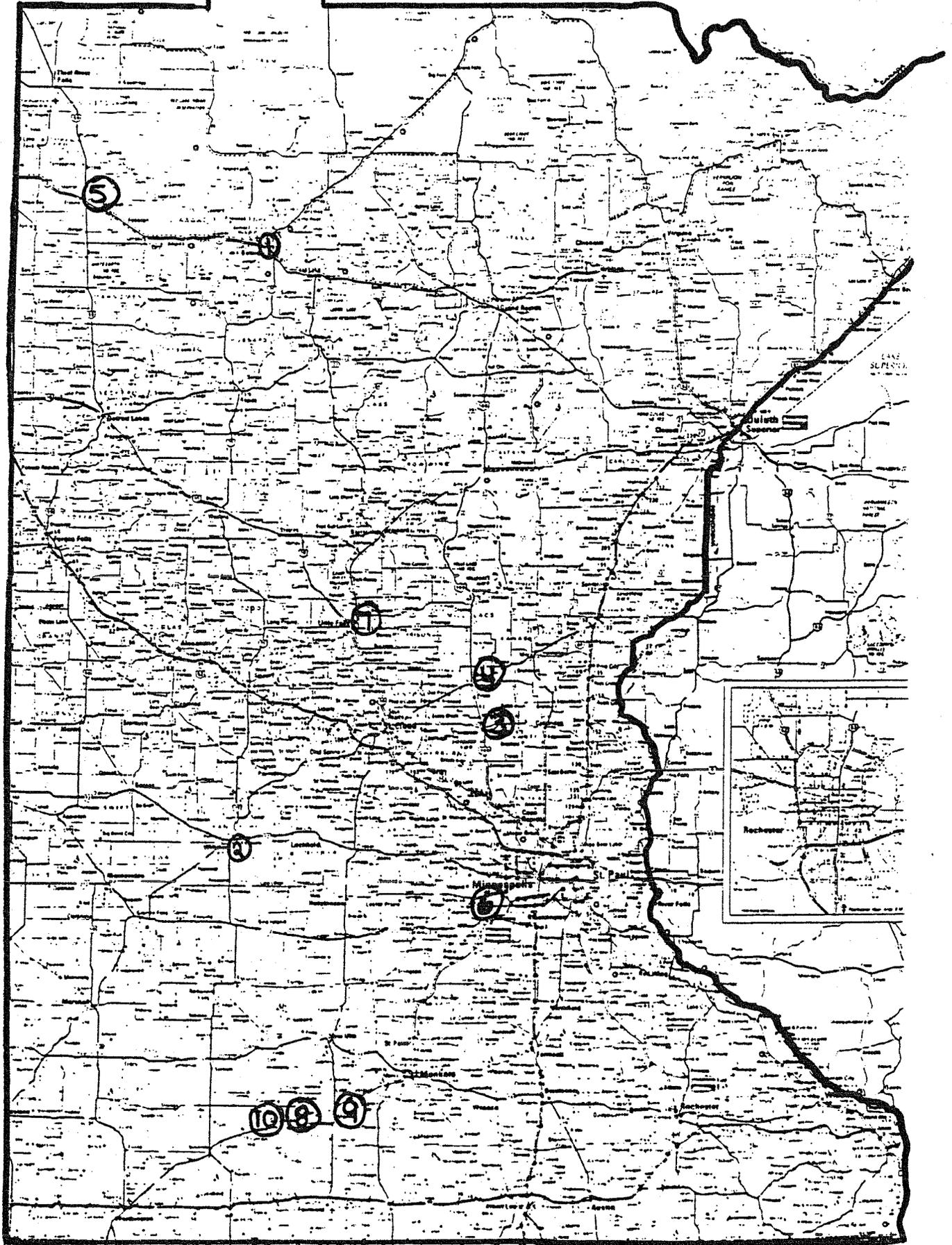
Other studies have indicated that merchants may have an a priori negative attitude toward bypasses that become more positive with the passage of time. Merchants anticipate a proposed bypass may have a very negative impact on the business community. With time and the necessary adjustments, as this study indicates, most merchants believe the bypass is a benefit to them and to their communities. Overtime, the business community appears to be able to make adjustments that eventually evolves into support for the bypass.

The survey also shed some light on residents' discontent with the process of planning and implementing highway bypasses. The merchants who completed the survey instruments were often very anxious to express their views. They were very concerned about information signs and advertising access to their community. However, they did not seem to realize that there was little they could do to erect their preferred types of advertising signs. Involving merchants earlier in the bypass process would increase their level of understanding of the process and could provide input on important routing and interchange location decisions. The experiences of this sample of bypassed communities suggest that a new bypass is not a catastrophic event for their retailing sector. As with most change, there are opportunities as well as threats. With an awareness of the process as well as possible impacts, communities in rural transportation corridors can work to adjust and take advantage of bypass situations.

MAPS



MAP-1 Eleven bypassed communities shown on a map of the State of Iowa.



1-Bemidji
2-Willmar
3-Princeton

4-Milaca
5-Crookston
6-Cologne

7-Little Falls
8-St. James
9-Madelia

10-Butterfield

TABLES

Table 1. Population Data for the 11 Bypassed Communities

Town	County	City Population	County Population
Center Point	Linn	1,693	168,767
DeWitt	Clinton	4,514	51,040
Dyersville	Dubuque	3,703	86,403
Elkader	Clayton	1,510	19,054
Evansdale	Black Hawk	4,638	123,798
Independence	Buchanan	5,972	20,844
Jesup	Buchanan	2,121	20,844
Manchester	Delaware	5,137	18,035
McGregor	Clayton	797	19,054
Walker	Linn	673	168,767
Webster City	Hamilton	7,894	16,071

Source: Willis Goudy and Sandra Charvat Burke

Iowa Counties: Selected Population Trends, Vital Statistics, and Socioeconomic Data. 1992 Edition, October 1992, p 6-7.

Table 2. Survey Distribution by City

City	Response to Survey			
	Number Sent	Number Returned	Percent Returned	Percent of Sample
Center Point	150	17	11	3.4
DeWitt	166	61	37	12.2
Dyersville	153	55	36	11.0
Elkader	100	47	47	9.4
Evansdale	102	31	30	6.2
Independence	176	78	44	15.6
Jesup	70	21	30	4.2
Manchester	177	57	32	11.4
McGregor	59	29	49	5.8
Walker	29	14	48	2.8
Webster City	256	90	35	18.0
Total	1,438	500		100.0

Table 3. Categories Used in Type of Business

Original List	Final List
1. Cafe/Restaurant	General Merchandise
2. Tavern/Beverage/Tobacco	Construction/Materials
3. Truck Stop	Food
4. Service Station	Apparel
5. Construction/Materials	Home Furnishings
6. Manufacturing	Eat and Drink
7. Transportation	Services
8. Wholesale Trade	Motor Vehicles
9. Retail Trade	Service Stations
10. Finance/Insurance	Motel/Hotel
11. Services	Miscellaneous

Table 4. Definition of Variables

Independent Variables	Definition
Noise	Categorical data for traffic noise where -1 = Worse, 0 = No Change, 1 = Better
Traffic Volume	Categorical data for traffic volume, description same as noise
Accident Rate	Categorical data for accident rate, description same as noise
Shopping Environment	Categorical data for shopping environment, description same as noise
Customers	Categorical data for number of customers, description same as noise
Freight Delivery	Categorical data for ease of delivery of freight, description same as noise
Quality of Life	Categorical data to measure quality of life, description same as noise
Merchant's Perception	Categorical data to measure perception where -1 = Significant Decrease, 0 = No Change, 1 = Significant Increase in Business
County Seat	0 = No, not county seat, 1 = Yes, county seat
Income	County income figures from 1990 Census
Bypass Year	Year city was bypassed by highway
Accident Rate	Official state accident rates in % change
Distance	Distance from center of town to bypass highway
Urban Distance	Distance from bypass town to nearest town of over 40,000 population
Sign Issue	Adequacy of signs on bypass
Bypass Impact	Categorical data with 0 = Bypass caused increase or decrease in business, 1 = Bypass did not cause this
Began Management	Year present management took control of the business
Began Business	Year business began
Highway Businesses	Dummy variable equal to 1 if business is highway oriented
Services	Dummy variable equal to 1 if business is service oriented
Old Highway, Not CBD	Dummy variable equal to 1 if business is located on the Old highway but not in the CBD
Near Bypass	Dummy variable equal to 1 if business is located near the Bypass
Other Location	Dummy variable equal to 1 if business is located at another place in town

Table 5. Means and Standard Deviations of Independent Variables

Variable	Mean	Standard Deviation
Noise	.602	.538
Traffic Volume	.452	.759
Perceived Accident Rate	.398	.549
Shopping Environment	-.030	.674
Customers	-.157	.660
Freight Delivery	.259	.466
Quality of Life	.361	.634
County Seat	.536	.500
Income	16434.000	1485.700
Bypass Year	85.133	3.393
Official Accident Rate	28.178	30.558
Distance	1.307	.295
Urban Distance	30.807	13.925
Sign Issue	.596	.824
Bypass Impact	.235	.425
Began Management	77.380	11.693
Began Business	70.904	18.778
Highway Businesses	.170	.376
Service Businesses	.314	.465
Old Highway, Not CBD	.200	.400
Near Bypass	.154	.361
Other Location	.239	.427

Table 6. Chi-Square Values of Location Variables

Cross-tabulation	Chi Square Critical) ^a	Chi Square (Calculated)
Location by Noise	12.6	16.504
Location by Traffic Volume	12.6	21.103
Location by Shopping Envir.	12.6	24.432
Location by Quality of Life	12.6	15.540
Location by Customers	12.6	55.622

^a Chi-square with 6 degrees of freedom and .05 significance level

Table 7. Coefficients, Elasticities and Conditional Probabilities for Three Dependent Variables

Dependent Variable: Part 7A For/Against Bypass				
Variable	Model 1	Model 2	Model 3	Conditional Probability
Noise	.202 (.510)			.567
Traffic Volume	1.206*** (.302)	1.103*** (.273)		.958
Perceived Accident Rate	-.299 (.600)	-.138 (.515)		.394
Shopping Environment	.276 (.378)	.180 (.354)		.480
Customers	.761* (.507)	.757 (.405)		.378
Freight Delivery	.394 (.635)			.536
Quality of Life	-.038 (.403)	.019 (.348)		.484
For/Against Bypass				
Business Perception				
County Seat	1.654*** (.775)	1.407*** (.590)	.617** (.365)	.858
Bypass Year	.068 (.099)	.034 (.072)	-.035 (.046)	
Official Accident Rate	[.276] .005 (.013) [.006]	[.188]	[-.654]	
Distance to Bypass	-.844 (.981)	-.875 (.795)	-.890** (.490)	
Urban Distance	[-.053] -.055*** (.205)	[-.747] -.049*** (.018)	[-.258] -.023** (.011)	
Sign Issue	[-.081] -.495*** (.203)	[-.985] -.416*** (.185)	[-.156] .063	
Bypass Impact	-1.518*** (.572)	-1.332*** (.500)	.242	
Began Management	-.039** (.024) [.000]			
Began Business	.032*** (.013) [.000]	.020** (.010) [.094]	.012** (.007) [.192]	
Highway Business	.038 (.547)	-.161 (.504)	-.171 (.334)	.476
Service Business	-.828* (.567)	-.700 (.509)	-.238 (.315)	.298
Old Highway, Not CBD	-.503 (.549)	-.278 (.500)	-.131 (.311)	.397
Near Bypass	.617 (.748)	.766 (.722)	.677** (.445)	.520
Other Location	.056 (.716)	.138 (.678)	1.013** (.498)	.476
Constant	-.801 (10.900)	-.104 (6.450)	4.603 (4.170)	
Loglikelihood Ratio Test	98.696	94.725	34.200	
Chi-Square	32.671	27.587	18.307	
	{21 df}	{17 df}	{10 df}	
Chow R ²	.659	.623	.225	

Note: Standard errors and elasticities corresponding to the estimated coefficients are reported in parenthesis and brackets, respectively. *, **, *** indicates significant at .1, .05, and .01, respectively.

Part 7B. Perception on Business Activity

Variable	Model 1	Model 2	Model 3	Conditional Probability
Noise	-.804 (.761)			.005
Traffic Volume	1.332*** (.548)	1.070*** (.401)		.201
Perceived Accident Rate	-.949 (1.10)	-.564 (.752)		.011
Shopping Environment	.893* (.680)	.542* (.472)		.024
Customers	1.507** (.754)	1.458*** (.572)		.012
Freight Delivery	.571 (1.24)			.034
Quality of Life	.840* (.641)	.713* (.462)		.071
For/Against Bypass				
Business Perception				
County Seat	2.234** (1.22)	1.835*** (.812)	.663** (.372)	.169
Bypass Year	.334** (.166)	.244*** (.101)	.054 (.048)	
Official Accident Rate	[.024]	[.130]	[1.07]	
Distance to Bypass	.004 (.017) [.000]			
Urban Distance	.580 (.999) [.000]	.753 (.868) [.006]	-.237 (.441) [.072]	
Sign Issue	-.017 (.031) [-.001]	-.150 (.024) [-.003]	-.007 (.010) [-.049]	
Bypass Impact	.396 (.713)	.223 (.584)		.054
Began Management	-2.614*** (.805)	-2.214*** (.687)		.003
Began Business	.039 (.038) [.003]			
Highway Business	.021 (.019) [.001]	.028** (.016) [.012]	.012** (.006) [.199]	
Service Business	.046 (.811)	.396 (.641)	-.035 (.321)	.027
Old Highway, Not CBD	2.628** (1.34)	1.819** (.929)	.670** (.337)	.092
Near Bypass	-.449 (.847)	-.567 (.709)	.031 (.318)	.020
Other Location	3.097** (1.802)	2.602** (1.438)	1.100** (.510)	.047
Constant	-1.196* (.924)	-.834 (.778)	.480* (.378)	.012
Loglikelihood Ratio Test	34.492 (17.770)	-22.094 (8.980)	-4.665 (4.403)	
Chi-Square	114.566	111.423	25.536	
Chow R ²	{21 df} .764	{17 df} .741	{10 df} .149	

Note: Standard errors and elasticities corresponding to the estimated coefficients are reported in parenthesis and brackets, respectively. *, **, *** indicates significant at .1, .05, and .01, respectively.

Part 7C. Overall Bypass Impact on Community

Variable	Model 1	Model 2	Model 3	Conditional Probability
Noise	.073 (.302)			.221
Traffic Volume	.088 (.245)	.081 (.231)		.227
Perceived Accident Rate	-.730*** (.324)	-.451** (.282)		.035
Shopping Environment	.206 (.264)	.169 (.244)		.174
Customers	-.407* (.295)	-.193 (.270)		.242
Freight Delivery	.901*** (.376)			.855
Quality of Life	.243 (.257)	.300* (.239)		.284
For/Against Bypass	-1.625*** (.506)	-1.423*** (.466)		.000
Business Perception	-.523** (.308)	-.497* (.305)		.203
County Seat	.657 (.557)	.436 (.400)	-.081 (.323)	.390
Bypass Year	.072 (.074)	.054 (.056)	.039 (.045)	
Official Accident Rate	[9.769] .004 (.007) [.195]	[7.077]	[4.657]	
Distance to Bypass	1.212** (.633) [2.538]	1.118** (.555) [2.243]	1.066*** (.457) [1.950]	
Urban Distance	-.018* (.015) [-.887]	-.016 (.014) [.000]	.002 (.010) [.089]	
Sign Issue	-.695* (.351)	-.607** (.327)		.054
Bypass Impact				
Bypass Management	.003 (.016) [.213]			
Began Business	-.004 (.010) [-.494]	-.005 (.008) [.000]	-.013** (.006) [-1.267]	
Highway Business	.563* (.388)	.445* (.346)	.191 (.287)	.251
Service Business	-.371 (.405)	-.505* (.375)	-.363* (.293)	.115
Old Highway, Not CBD	-.027 (.425)	-.075 (.400)	.113 (.304)	.169
Near Bypass	1.182*** (.442)	1.157*** (.408)	.488* (.323)	.302
Other Location	.102 (.457)	.172 (.440)	-.448 (.378)	.203
Constant	-5.117 (8.420)	-5.664 (5.219)	-4.612 (4.110)	
Loglikelihood Ratio Test	14.566	111.423	25.536	
Chi-Square	32.671	27.587	18.307	
Chow R ²	{21 df} .764	{17 df} .741	{10 df} .149	

Note: Standard errors and elasticities corresponding to the estimated coefficients are reported in parenthesis and brackets, respectively. *, **, *** indicates significant at .1, .05, and .01, respectively.

Table 8. Urban Centers

Bypass City	Urban Center	Distance (miles)
Center Point	Cedar Rapids	10
DeWitt	Davenport	15
Dyersville	Dubuque	25
Elkader	Dubuque	56
Evansdale	Waterloo	6
Independence	Waterloo	24
Jesup	Waterloo	15
McGregor	Dubuque	49
Manchester	Waterloo	42
Walker	Cedar Rapids	16
Webster City	Ames	43

FIGURES

Figure 1

AVERAGE TOTAL PER CAPITA SALES-IOWA

Bypass vs. Paired vs. Controlled cities

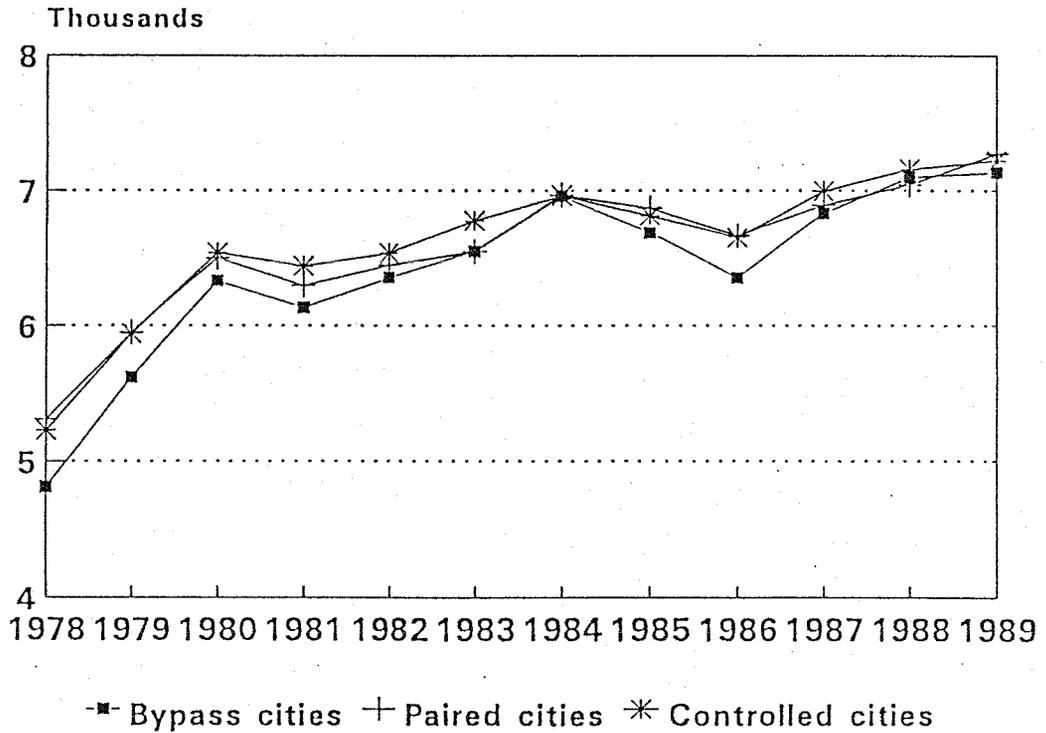


Figure 2

AVERAGE TOTAL PER CAPITA SALES-MINNESOTA

Bypass cities vs. Paired cities

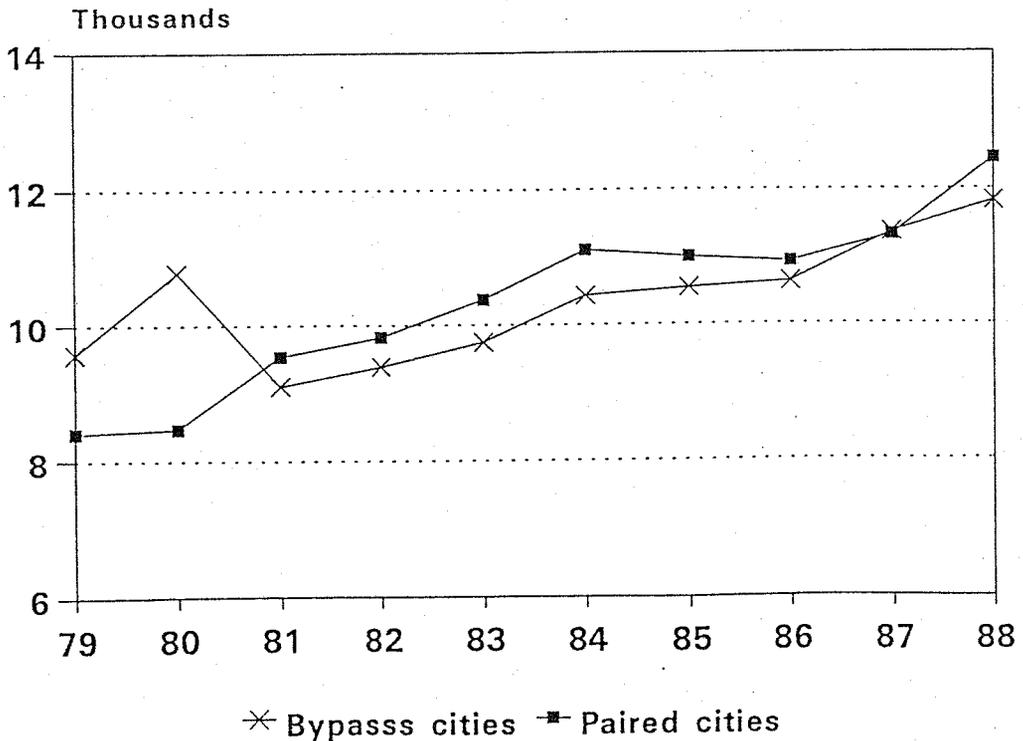


Figure 3

Total Sales Pull Factors-Iowa Bypass vs. Paired Cities

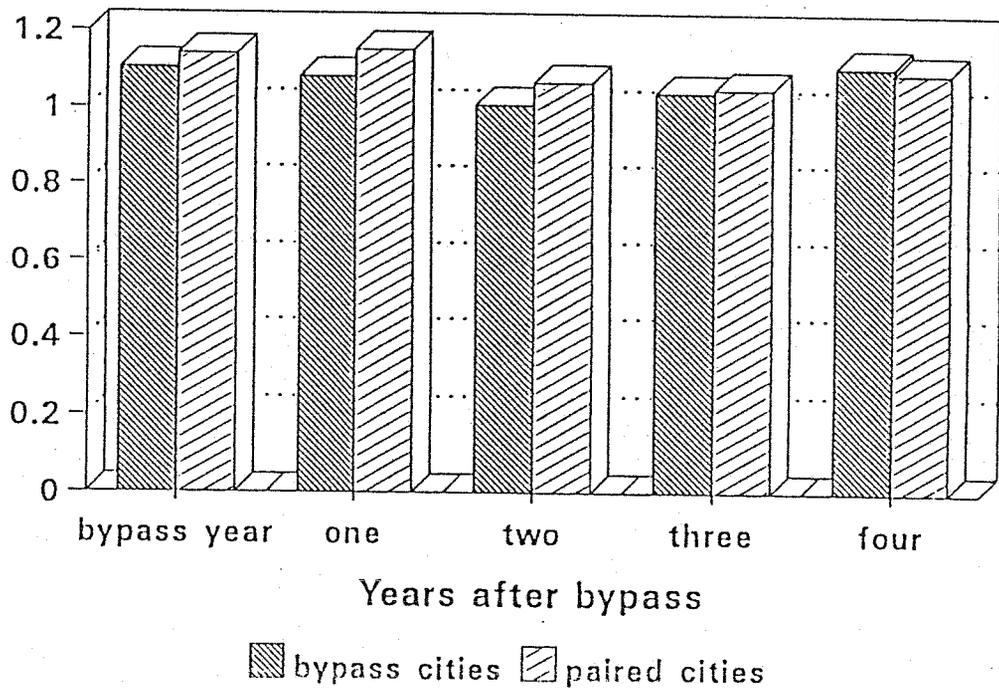


Figure 4

Total Sales Pull Factors-Minnesota Bypass cities vs. Paired cities

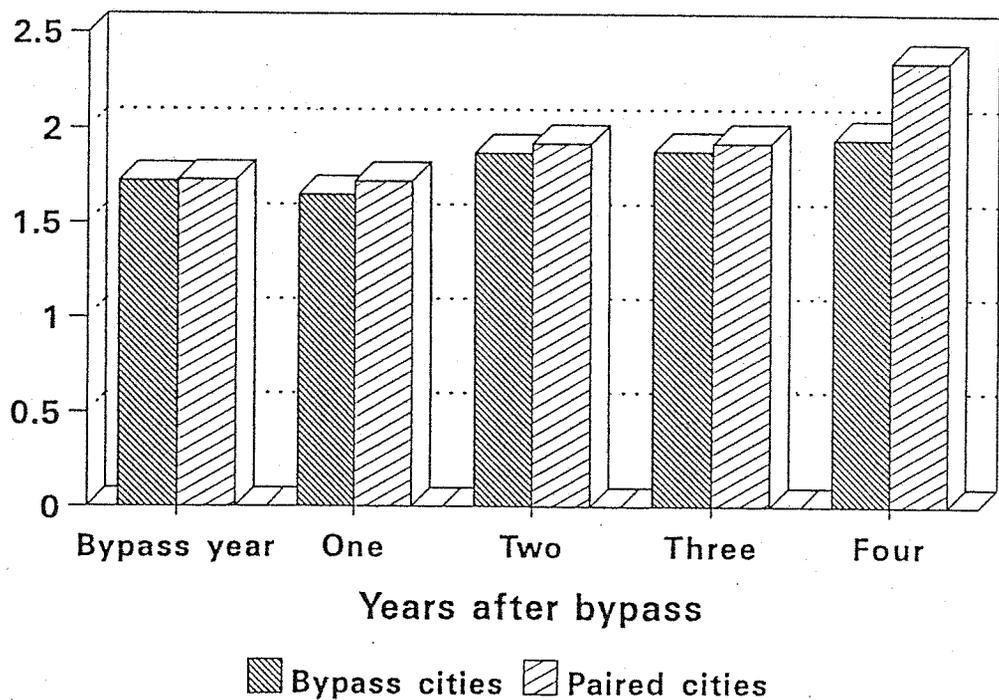


Figure 5

Apparel Sales Pull Factors-Iowa Bypass vs. Paired Cities

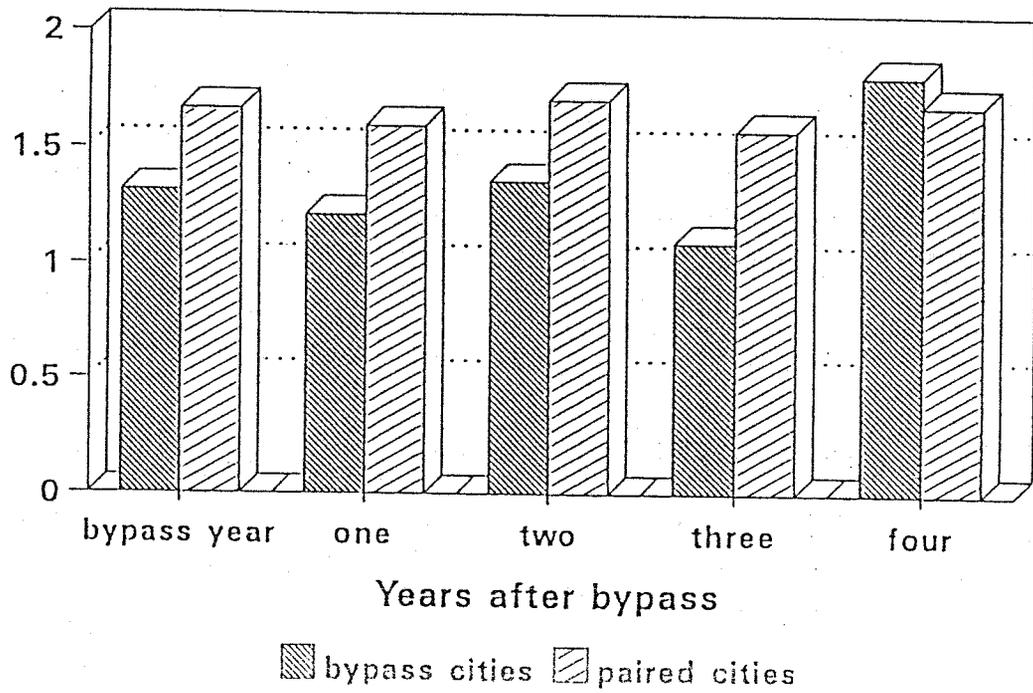


Figure 6

Building Sales Pull Factors-Iowa Bypass vs. Paired Cities

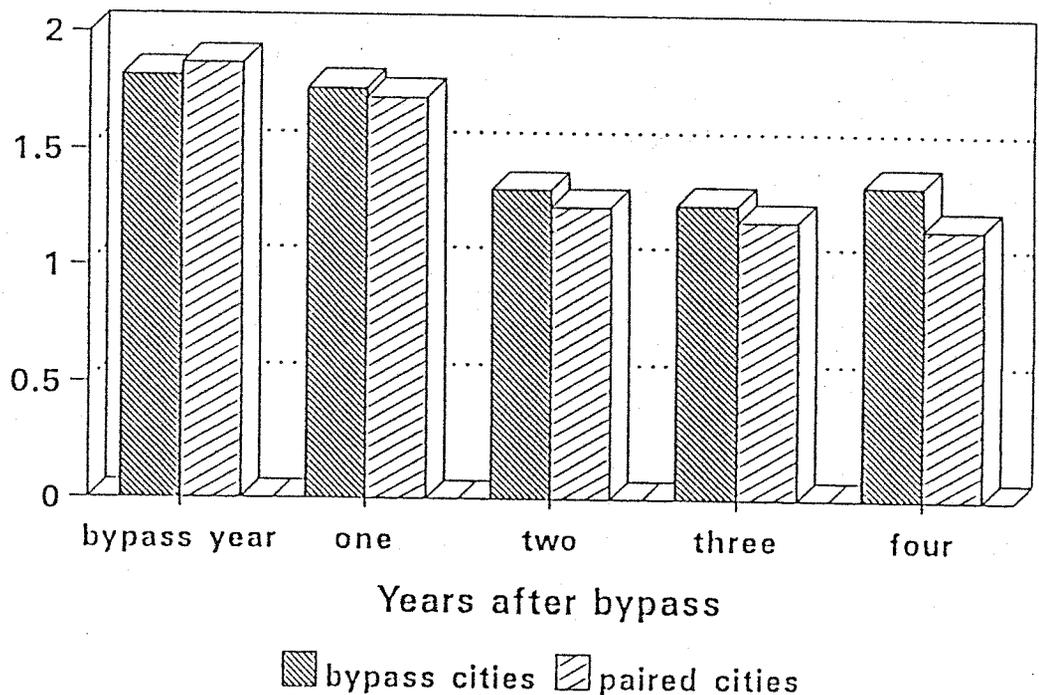


Figure 7

Auto Sales Pull Factors-Iowa Bypass vs. Paired Cities

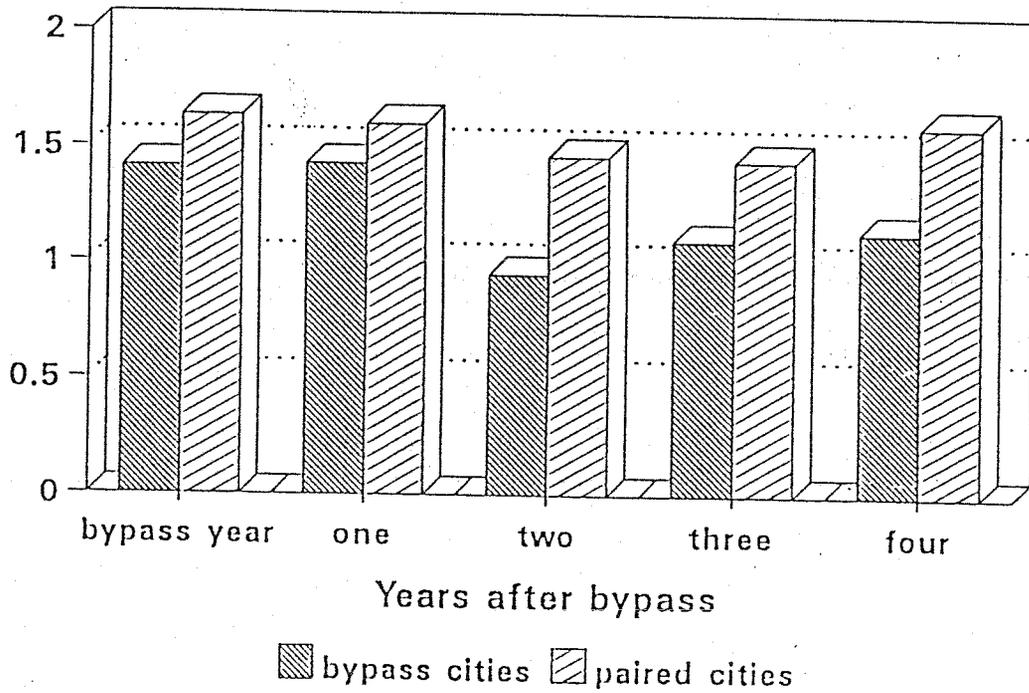


Figure 8

Eat & Drink Sales Pull Factors-Iowa Bypass vs. Paired Cities

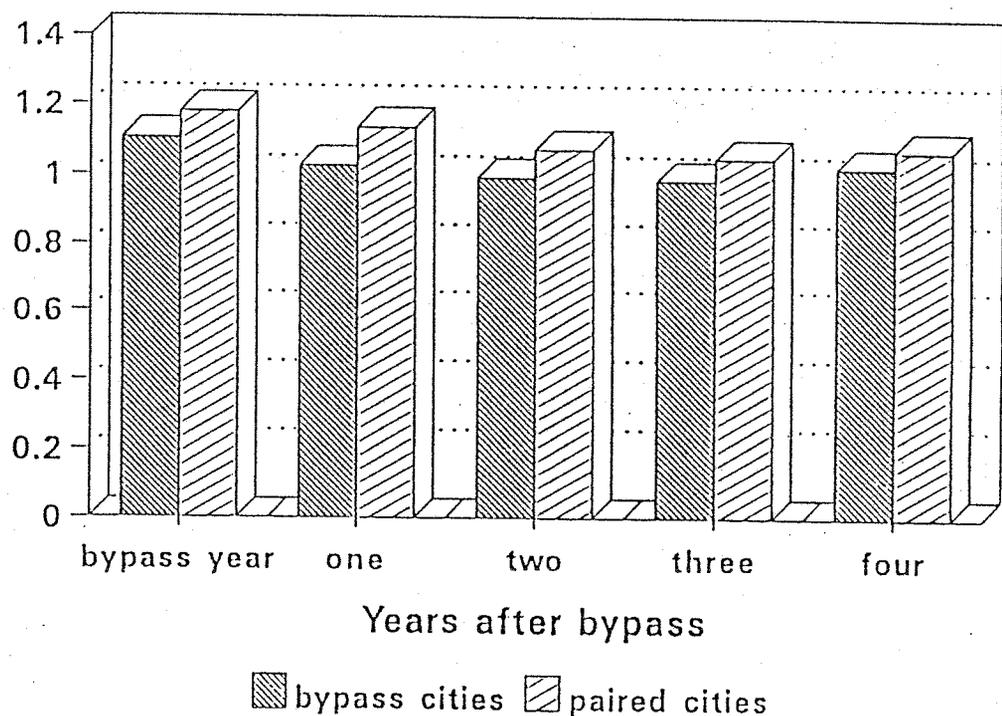


Figure 9

Food Sales Pull Factors-Iowa Bypass vs. Paired Cities

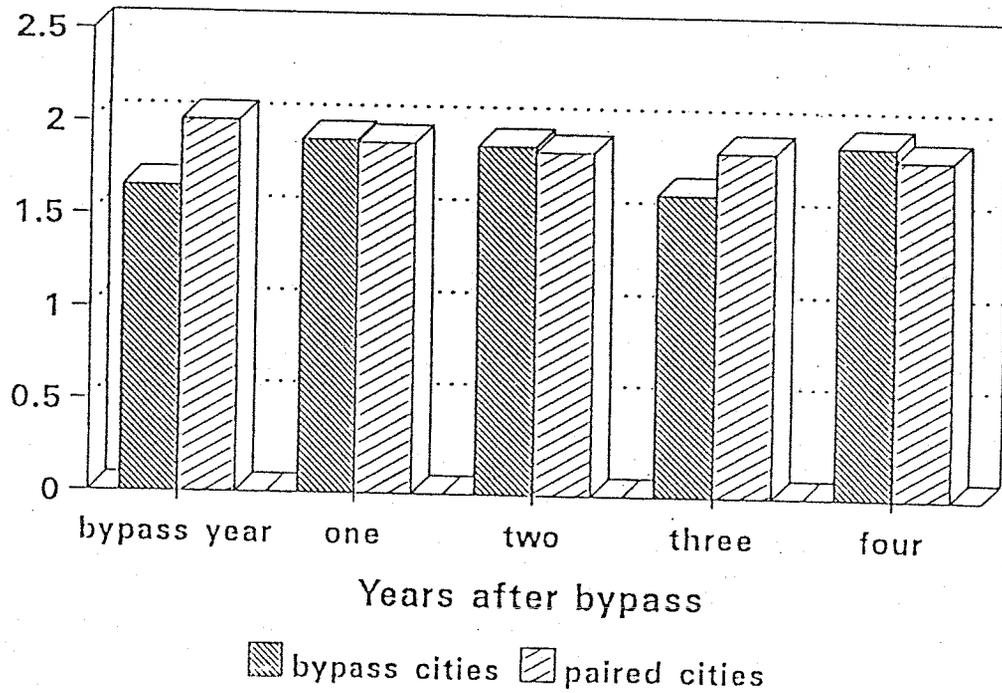


Figure 10

Furniture Sales Pull Factors-Iowa Bypass vs. Paired Cities

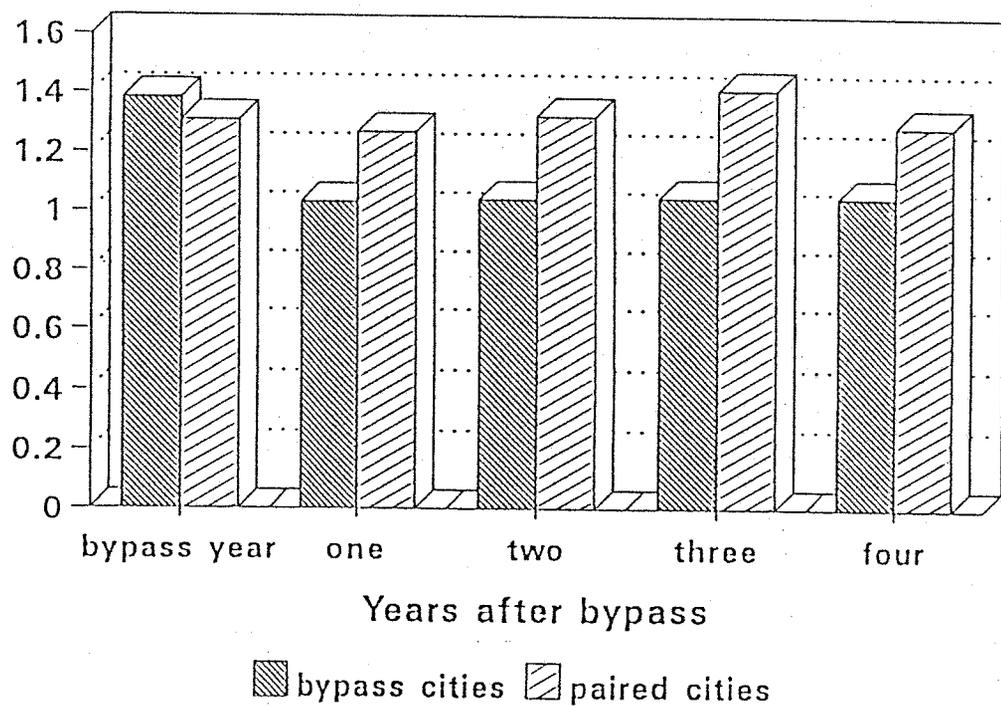


Figure 11

General Merchandise Sales Pull Factors Bypass vs. Paired Cities

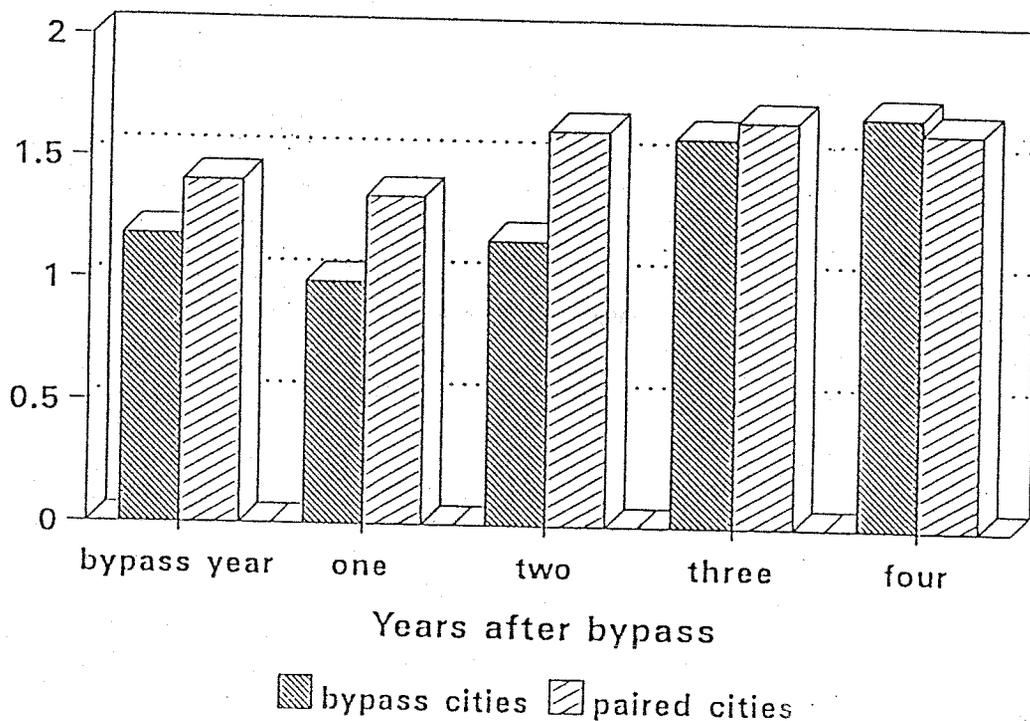


Figure 12

Miscellaneous Sales Pull Factors-Iowa Bypass vs. Paired Cities

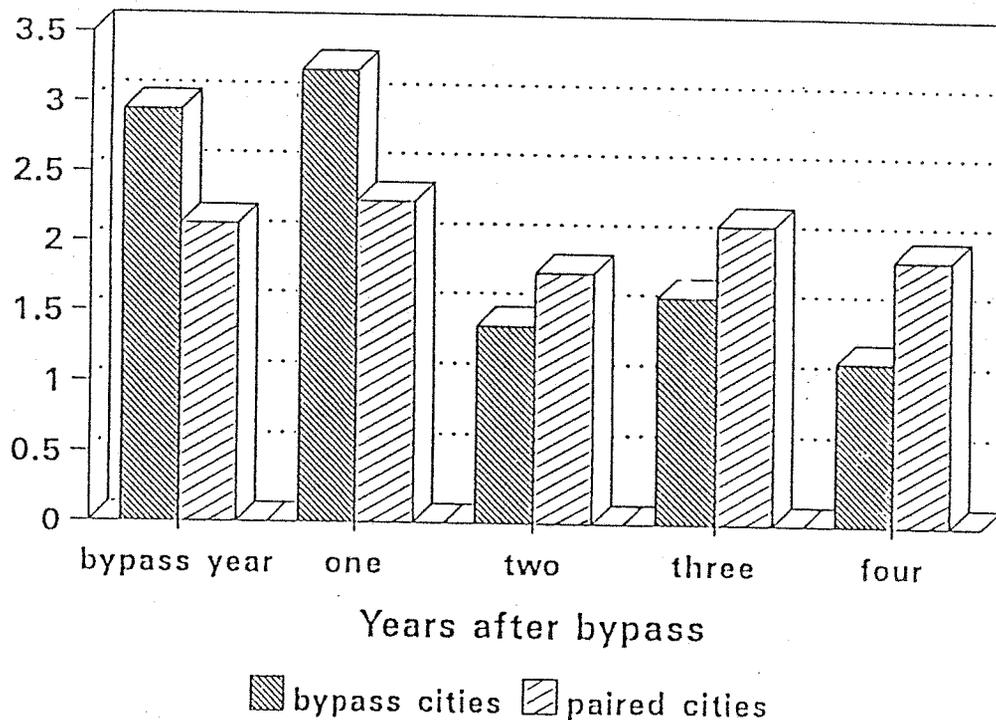


Figure 13

Services Pull Factors-Iowa Bypass vs. Paired Cities

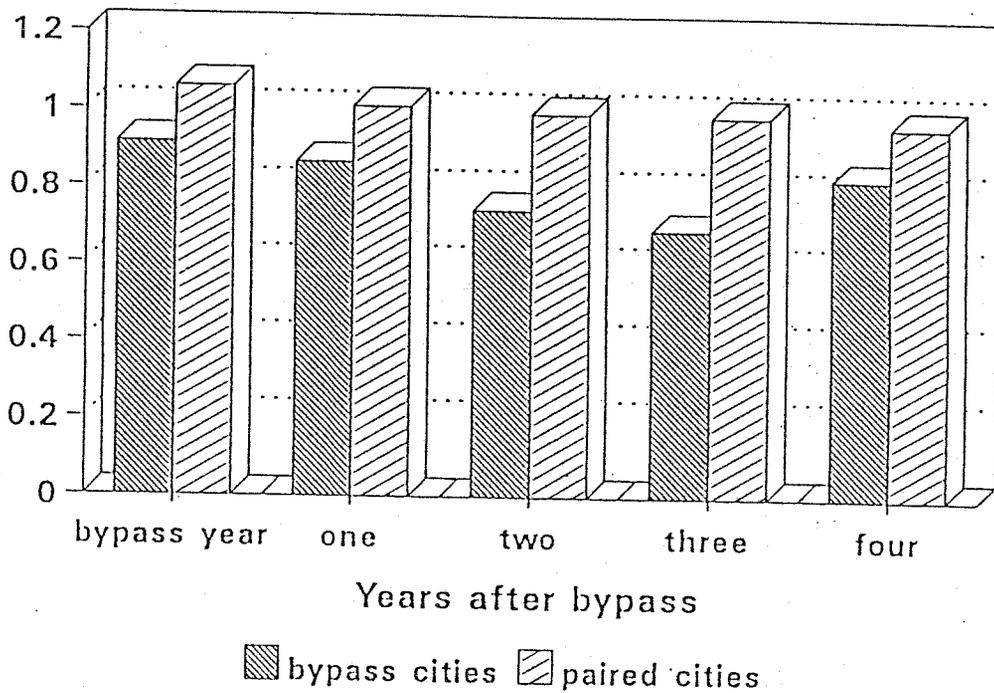


Figure 14

Specialties Pull Factors-Iowa Bypass vs. Paired Cities

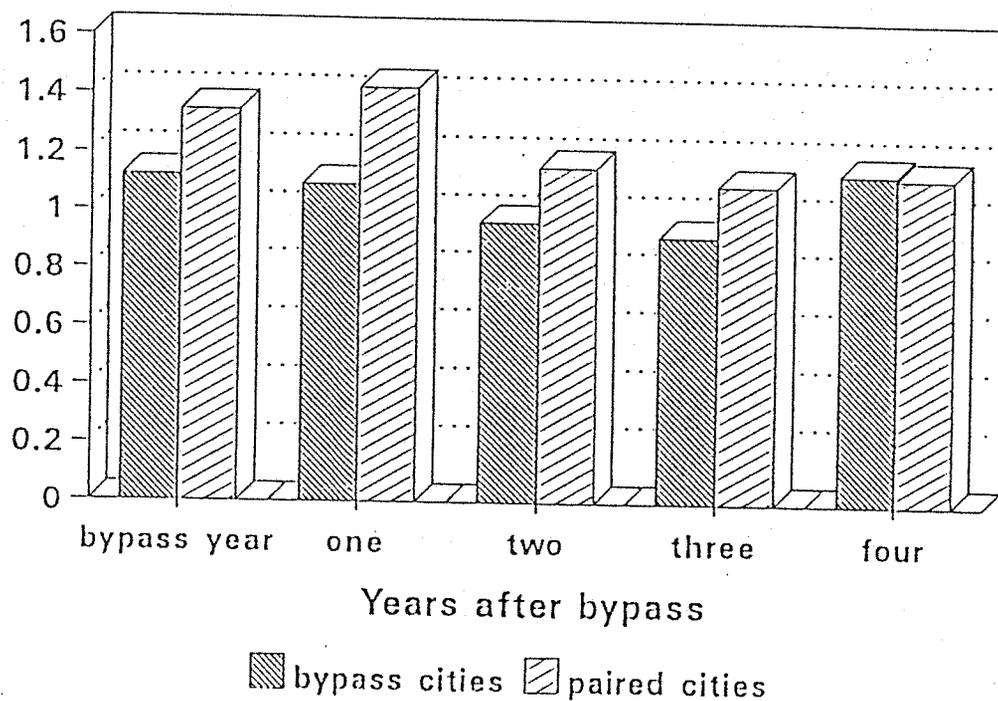


Figure 15

Utilities Pull Factors-Iowa Bypass vs. Paired Cities

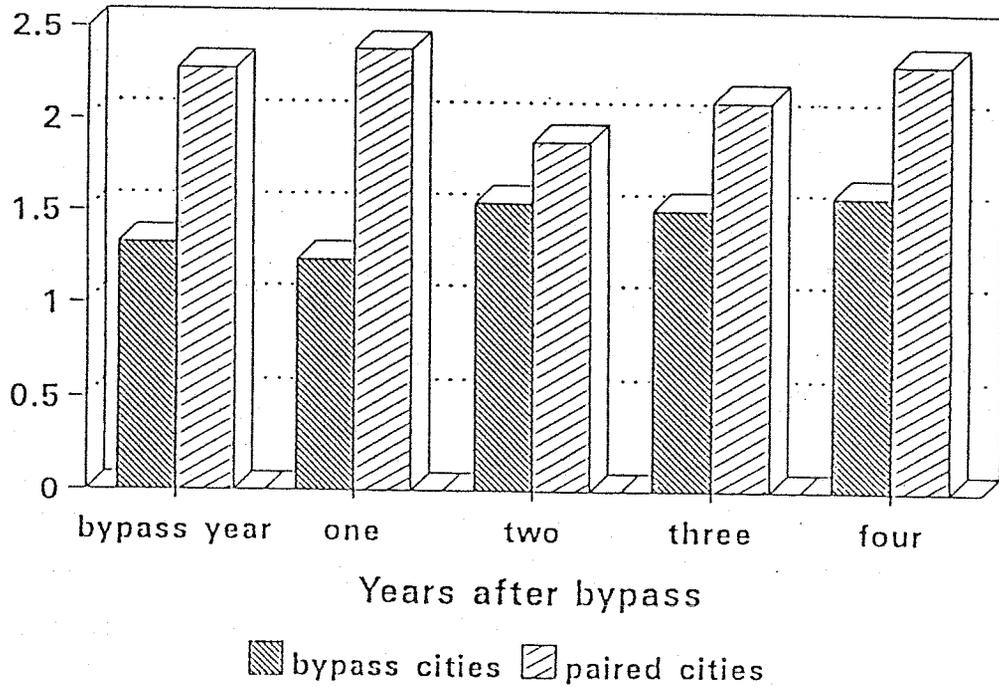


Figure 16

Wholesale Sales Pull Factors-Iowa Bypass vs. Paired Cities

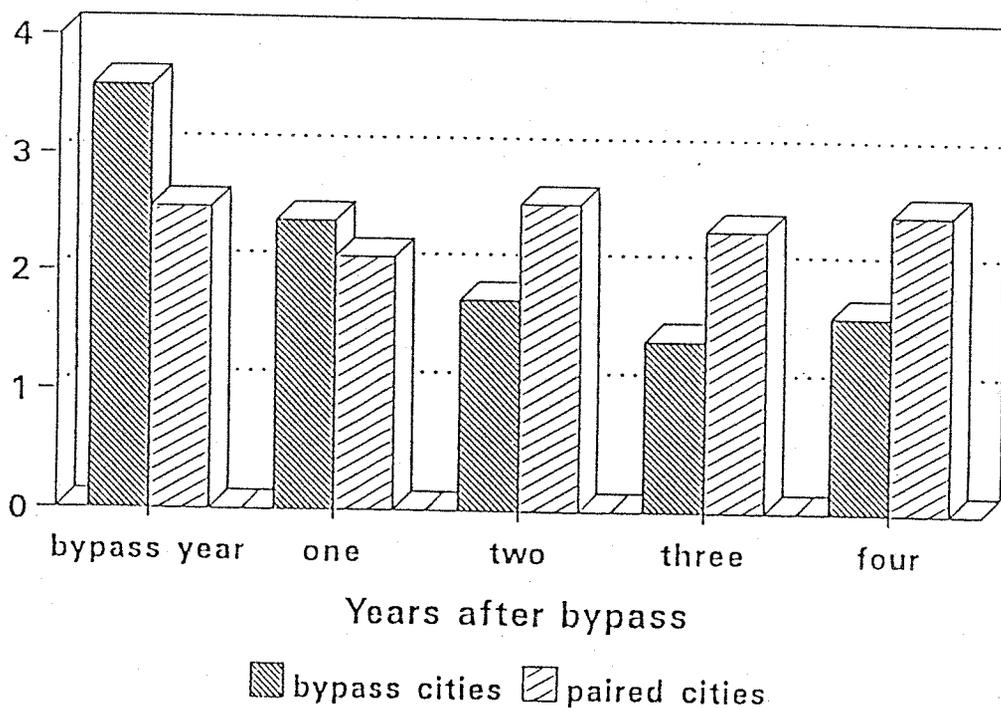


Figure 17

Apparel Sales Pull Factors-Minnesota

Bypass cities vs. Paired cities

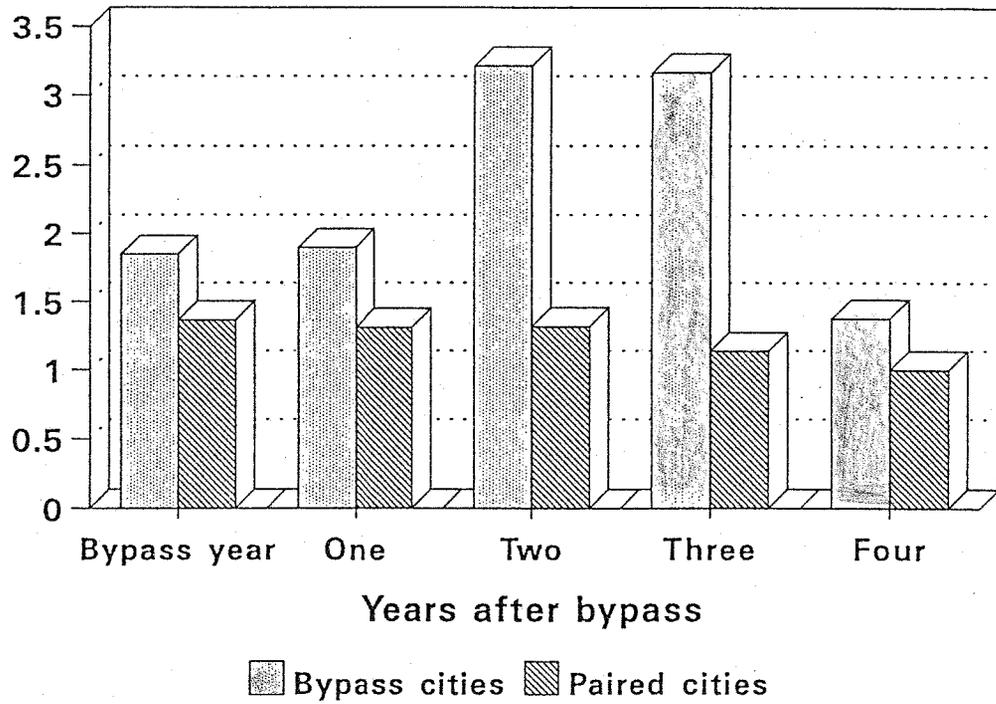


Figure 18

General Merchandise Pull Factors

Bypass cities vs. Paired cities

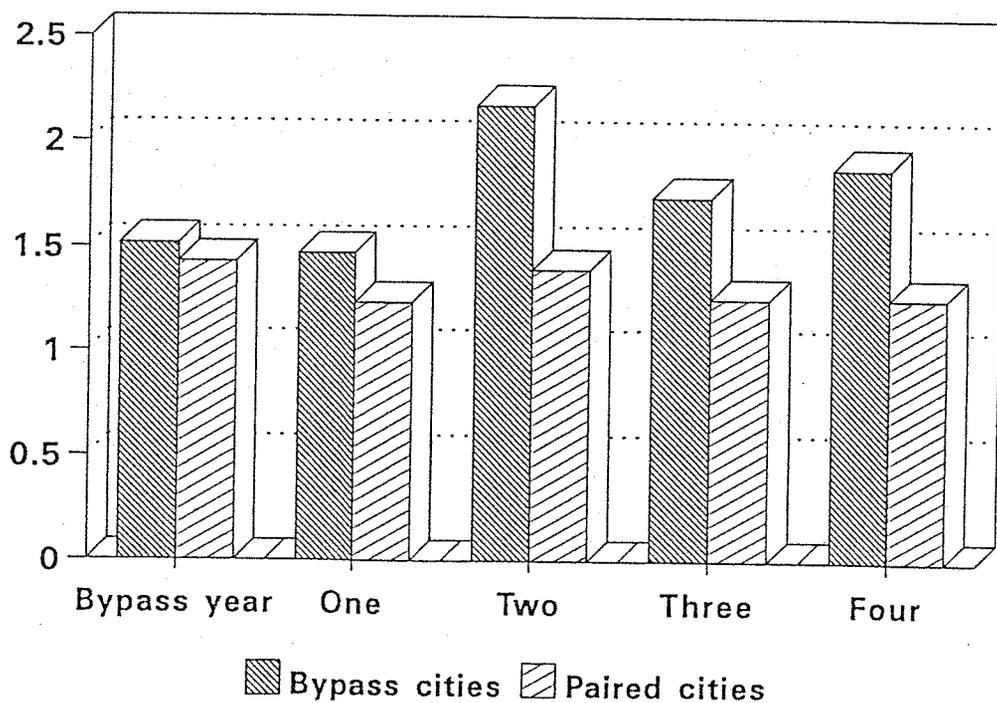


Figure 19

Food Sales Pull Factors-Minnesota

Bypass cities vs. Paired cities

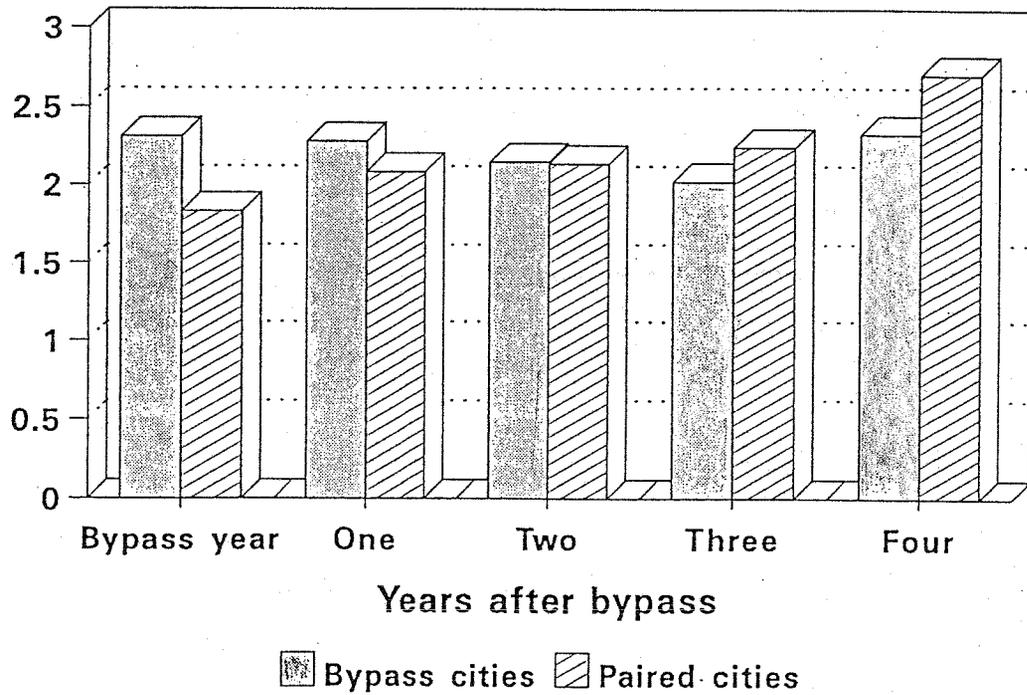


Figure 20

Auto Sales Pull Factors-Minnesota

Bypass cities vs. Paired cities

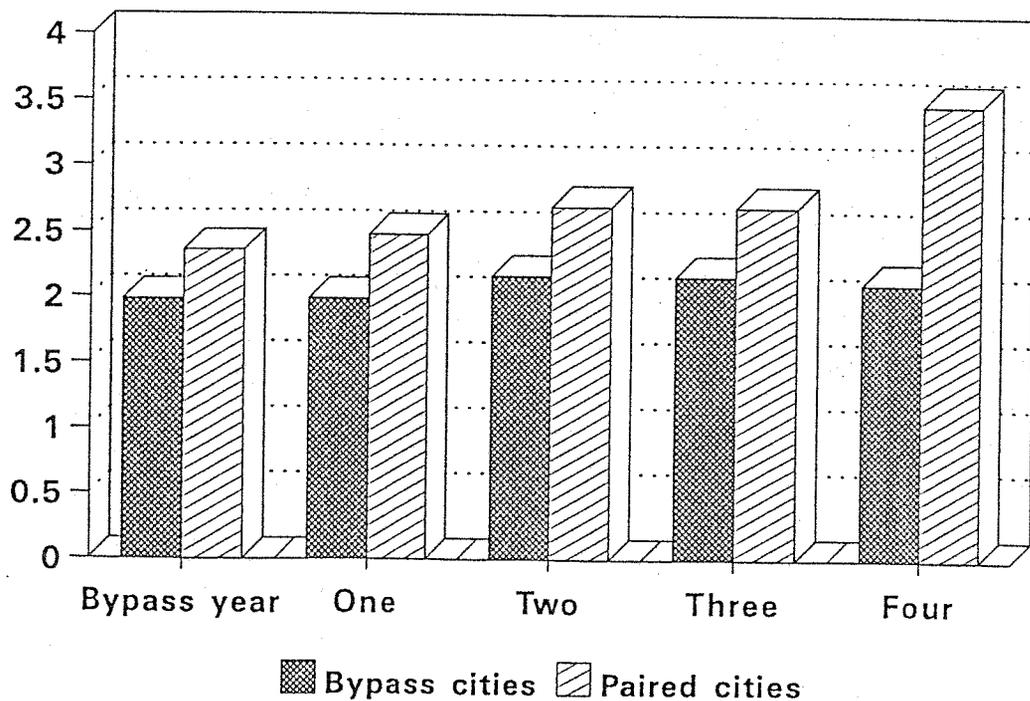


Figure 21

Lumber Sales Pull Factors-Minnesota

Bypass cities vs. Paired cities

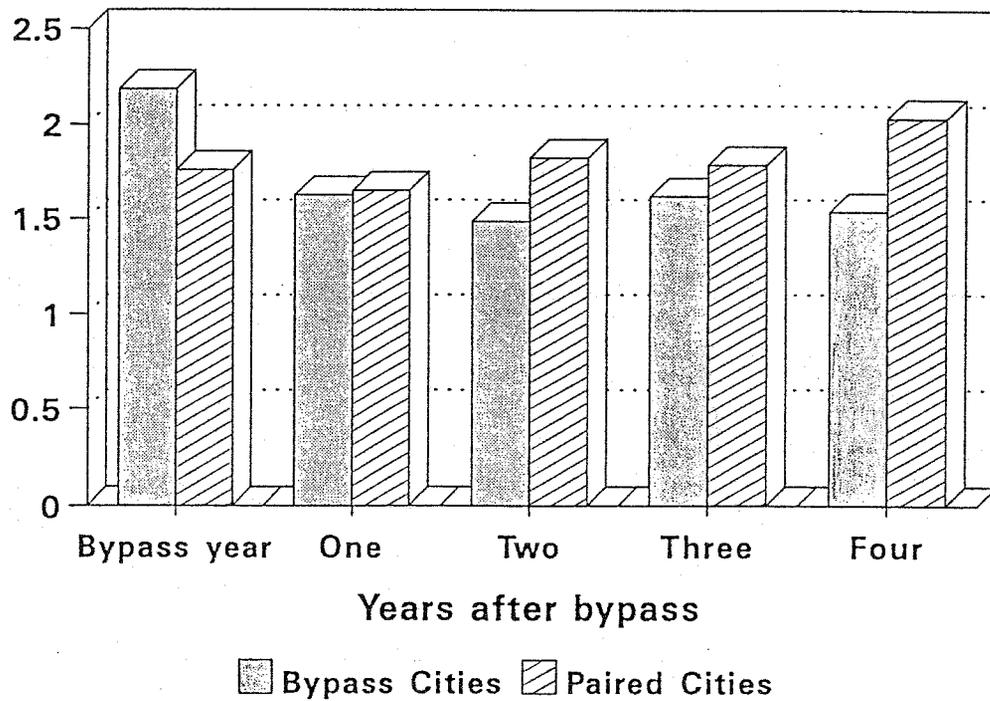


Figure 22

Furniture Sales Pull Factors-Minnesota

Bypass cities vs. Paired cities

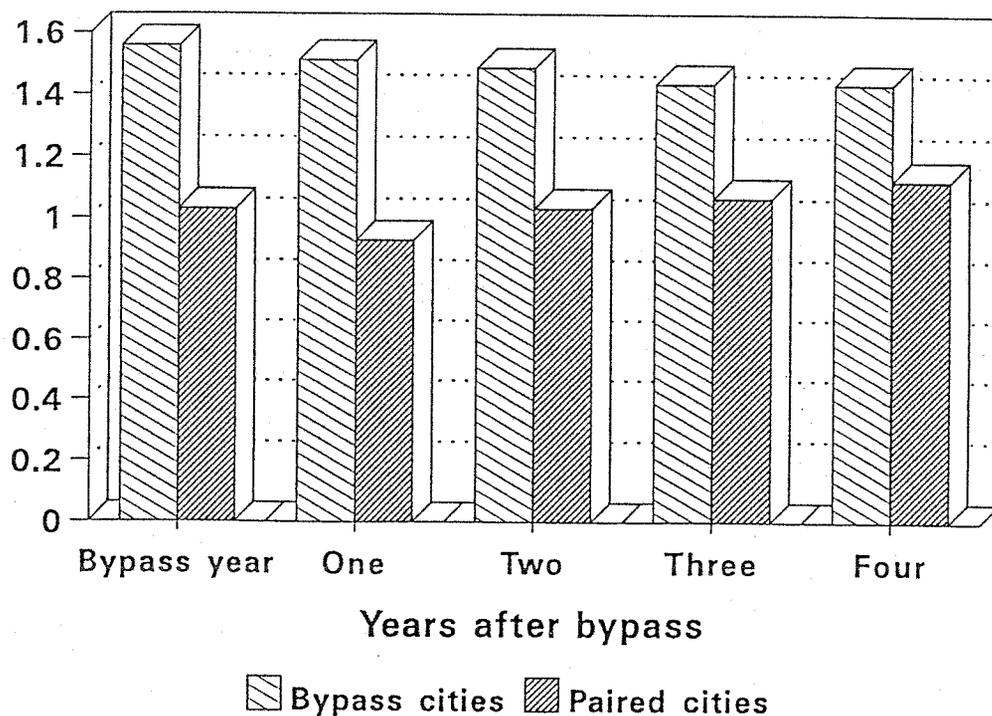


Figure 23

Eat & Drink Sales Pull Factors-Minnesota

Bypass cities vs. Paired cities

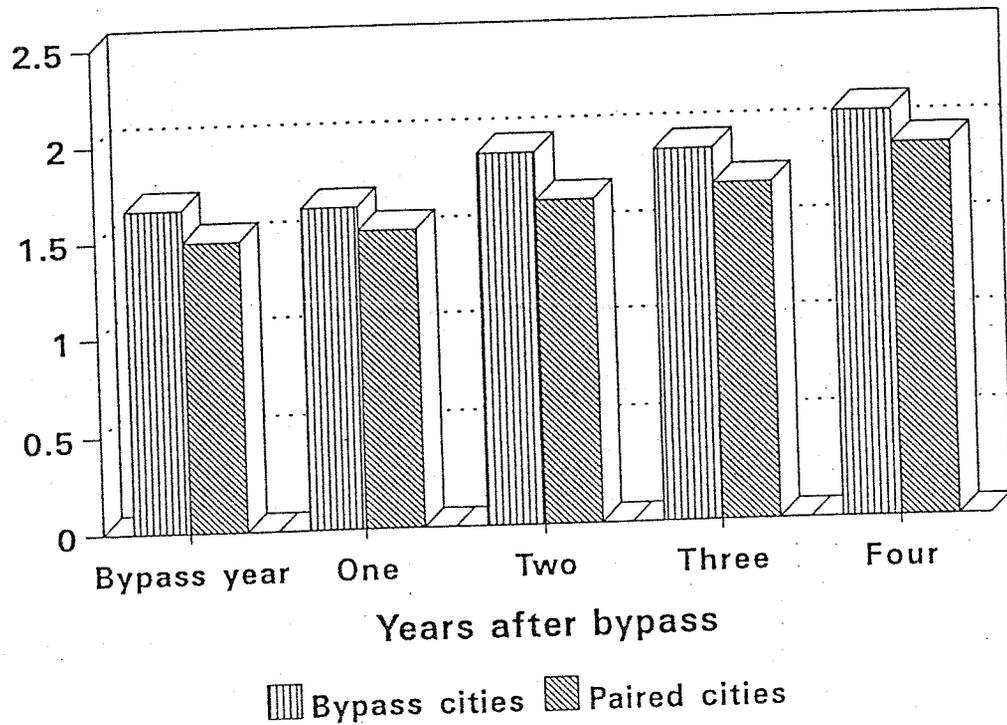


Figure 24

Miscellaneous Sales Pull Factors

Bypass cities vs. Paired c

"Minnesota" is deleted

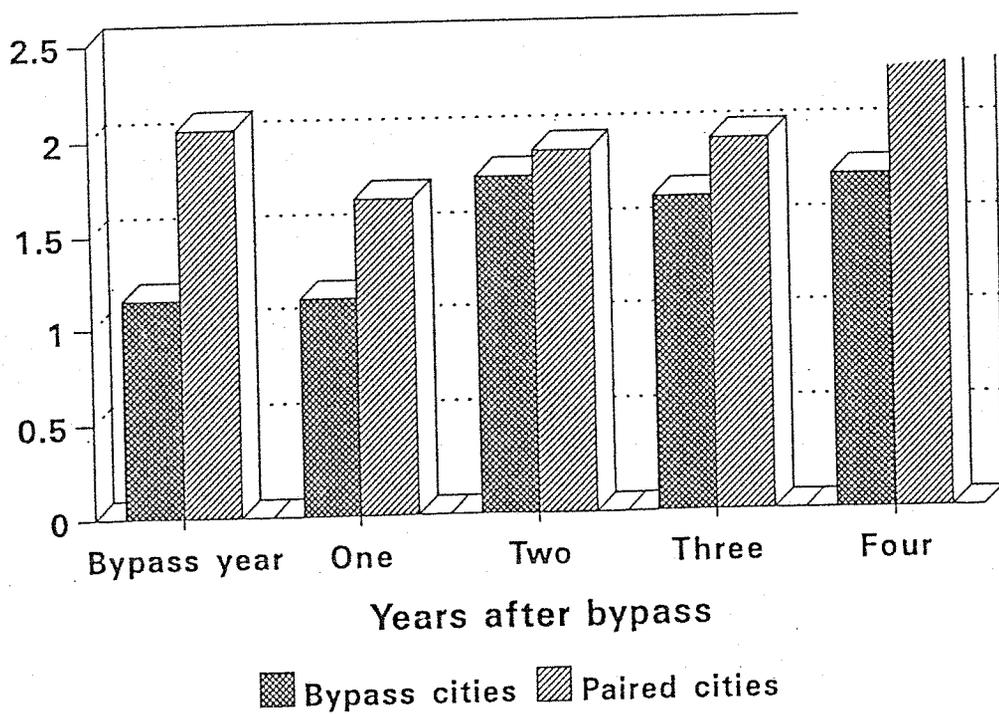


Figure 25

Total Sales Pull Factors-Iowa Bypass Cities vs. Control Cities

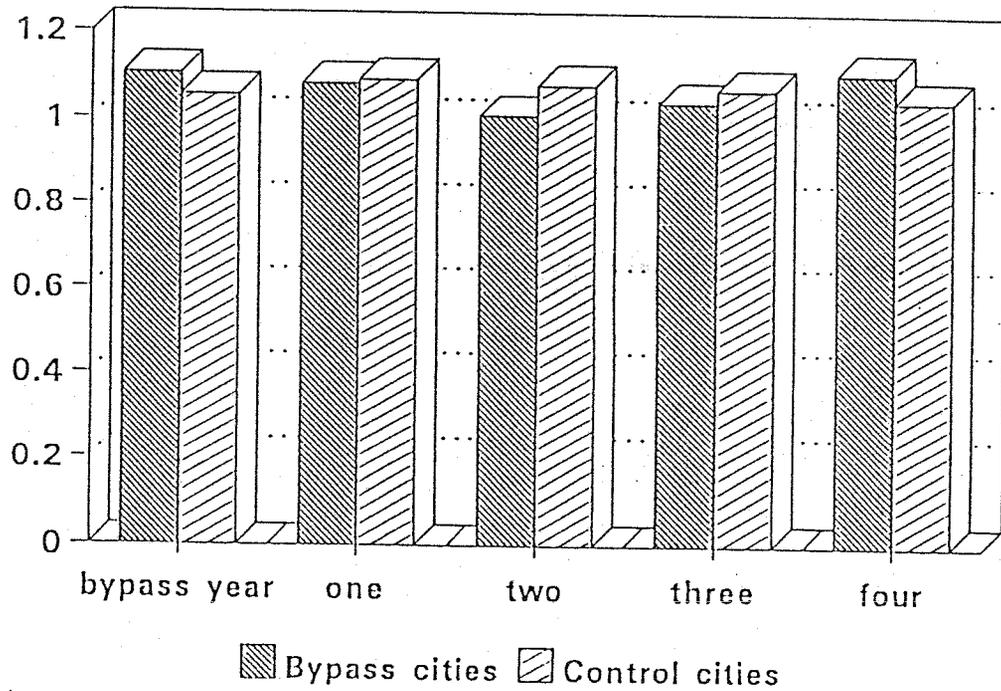


Figure 26

Apparel Sales Pull Factors-Iowa Bypass Cities vs. Control Cities

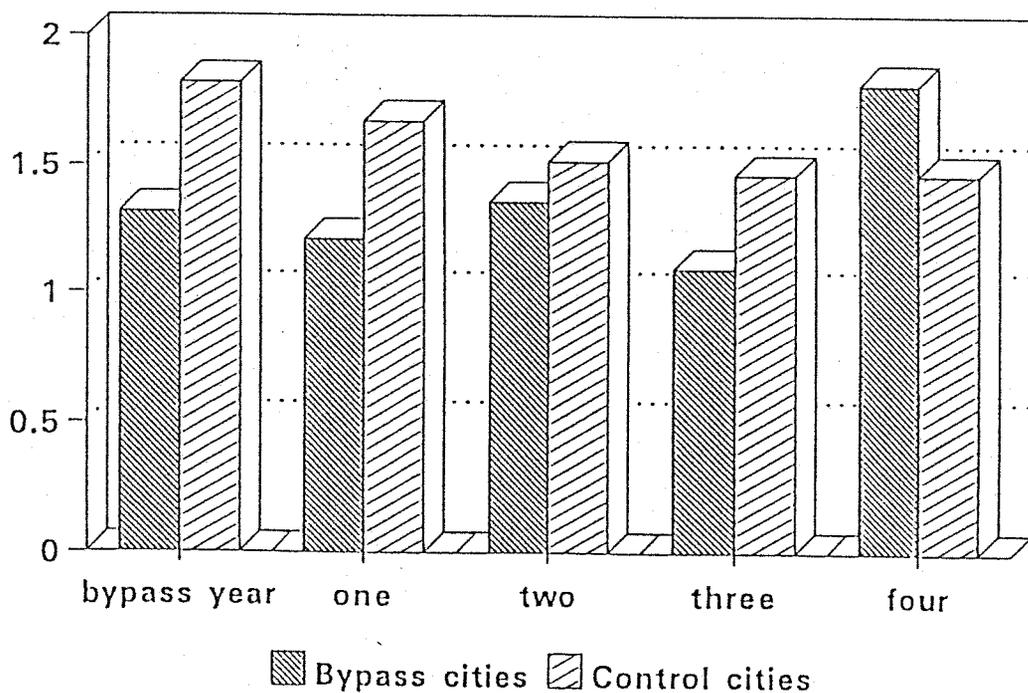


Figure 27

Building Sales Pull Factors-Iowa

Bypass Cities vs. Control Cities

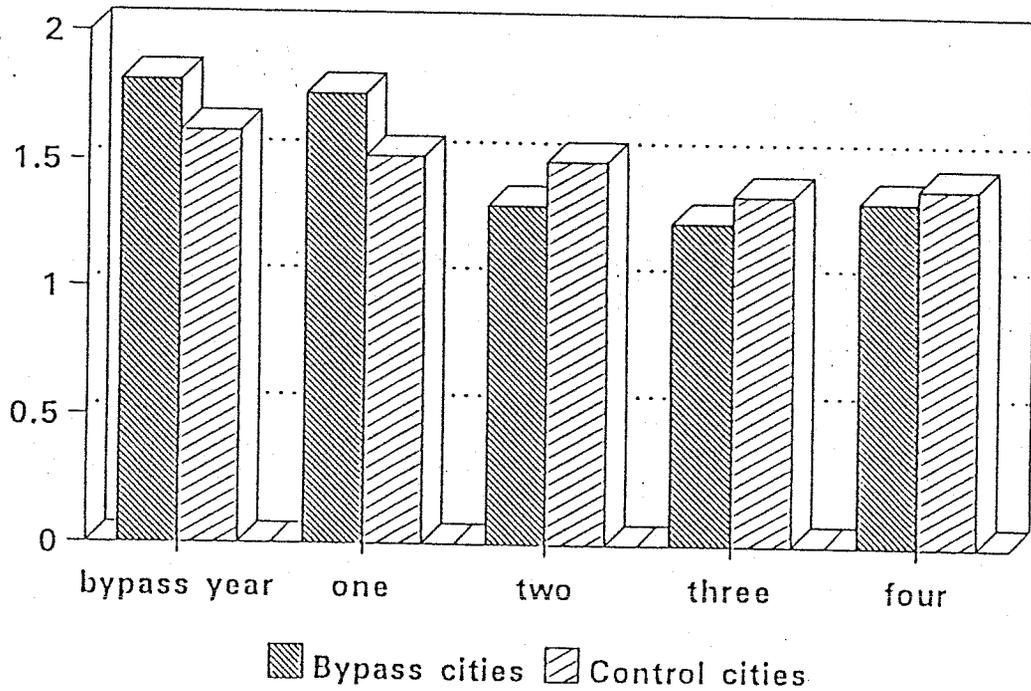


Figure 28

Auto Sales Pull Factors-Iowa

Bypass Cities vs. Control Cities

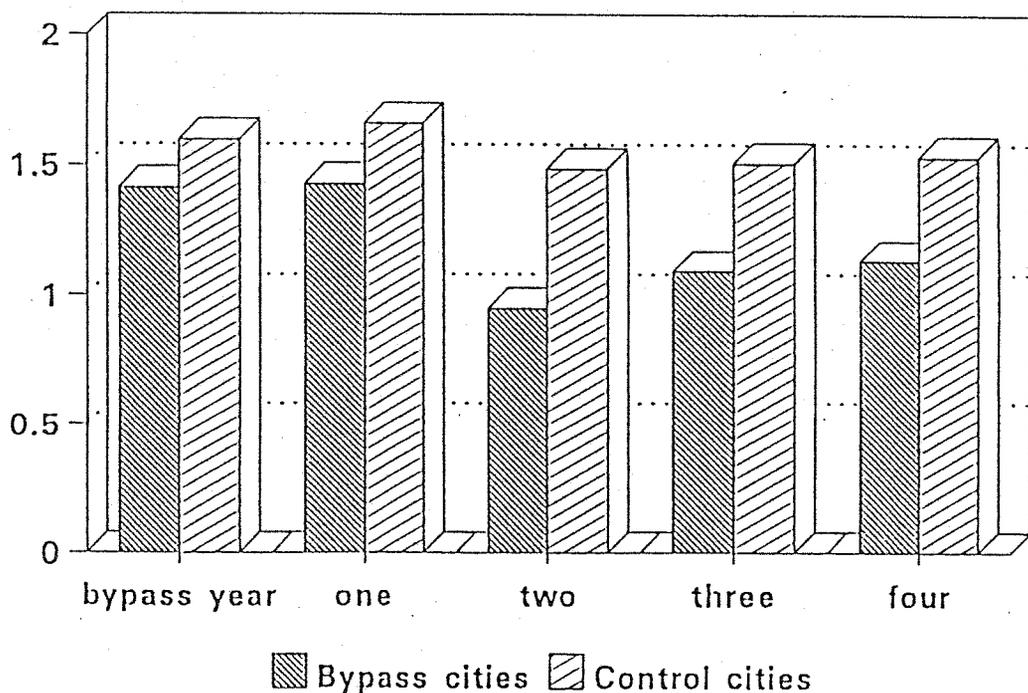


Figure 29

Eat & Drink Sales Pull Factors-Iowa Bypass Cities vs. Control Cities

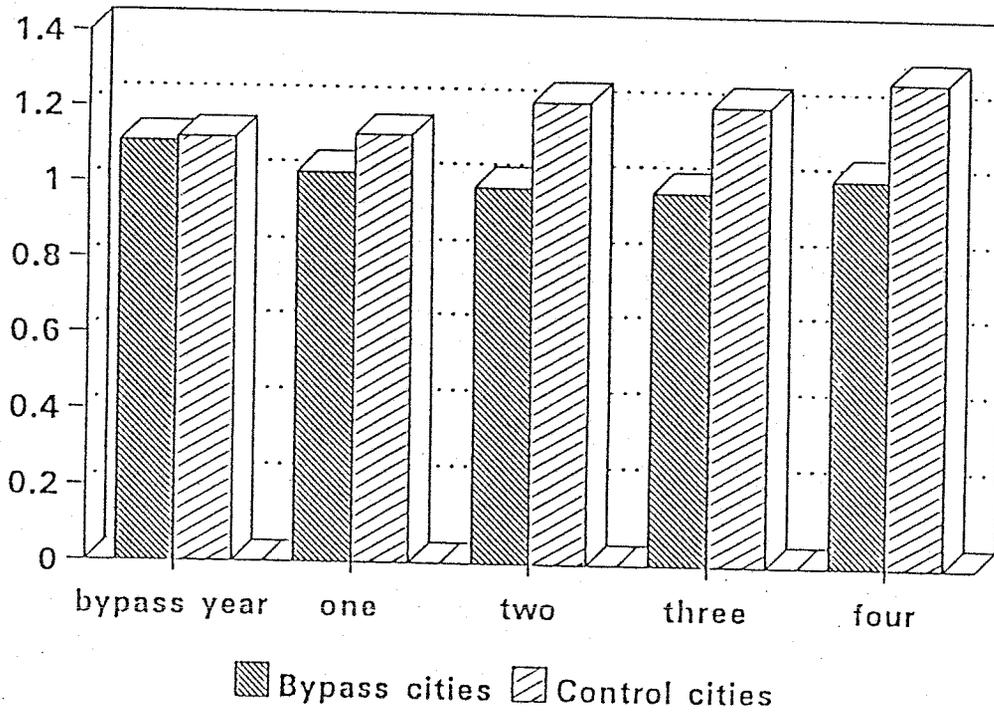


Figure 30

Food Sales Pull Factors-Iowa Bypass Cities vs. Control Cities

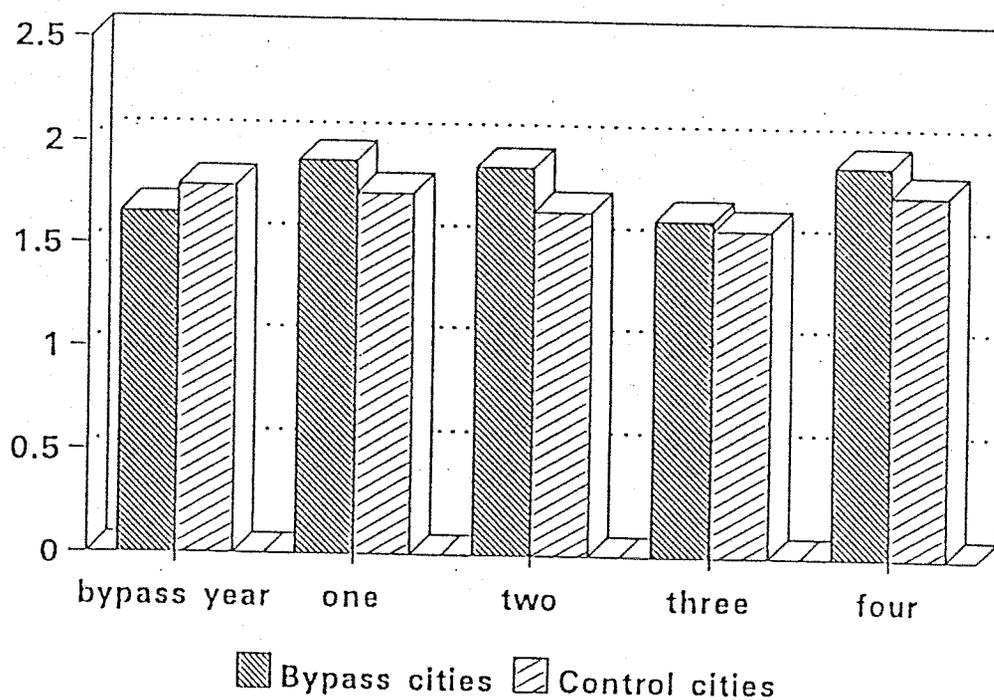


Figure 31

Furniture Sales Pull Factors-Iowa Bypass Cities vs. Control Cities

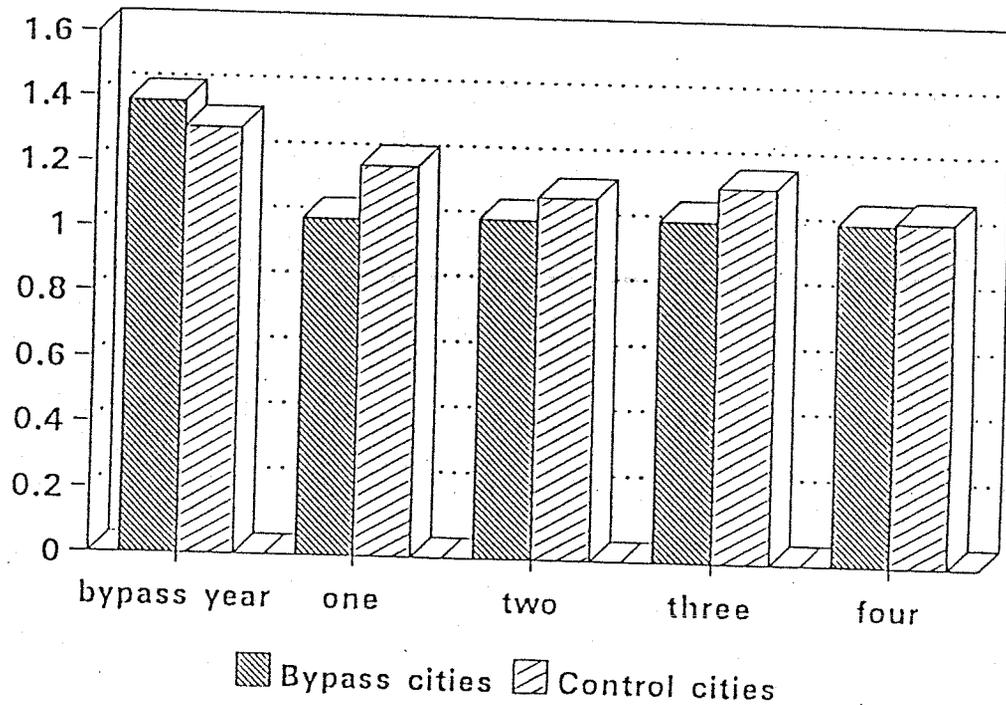


Figure 32

General Merchandise Pull Factors-Iowa Bypass Cities vs. Control Cities

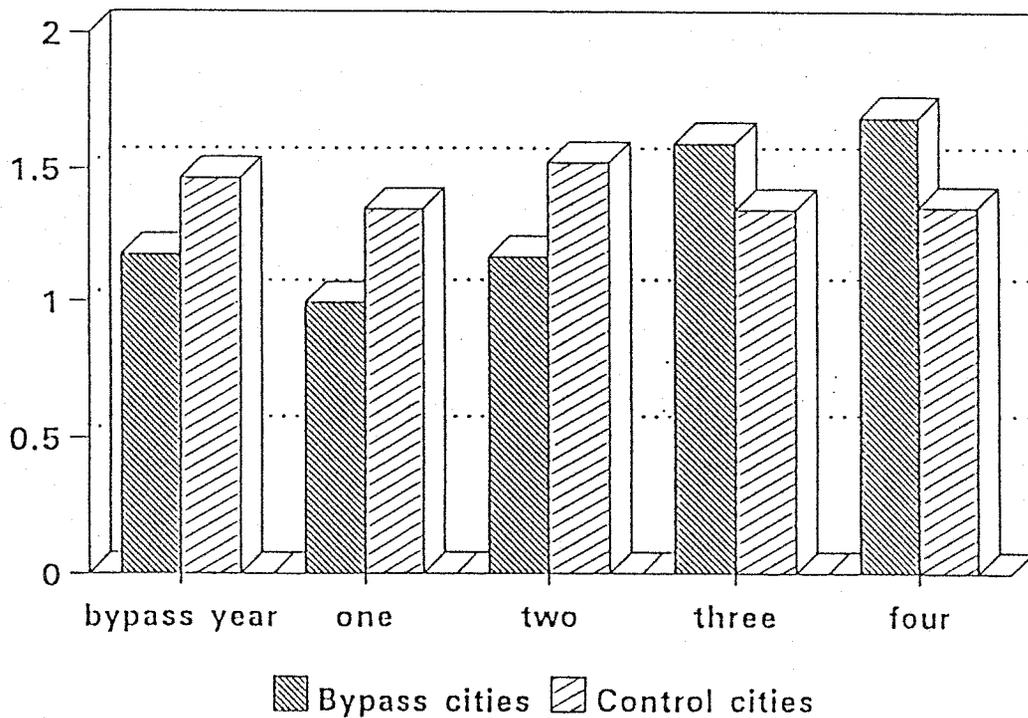


Figure 33

Miscellaneous Sales Pull Factors-Iowa Bypass Cities vs. Control Cities

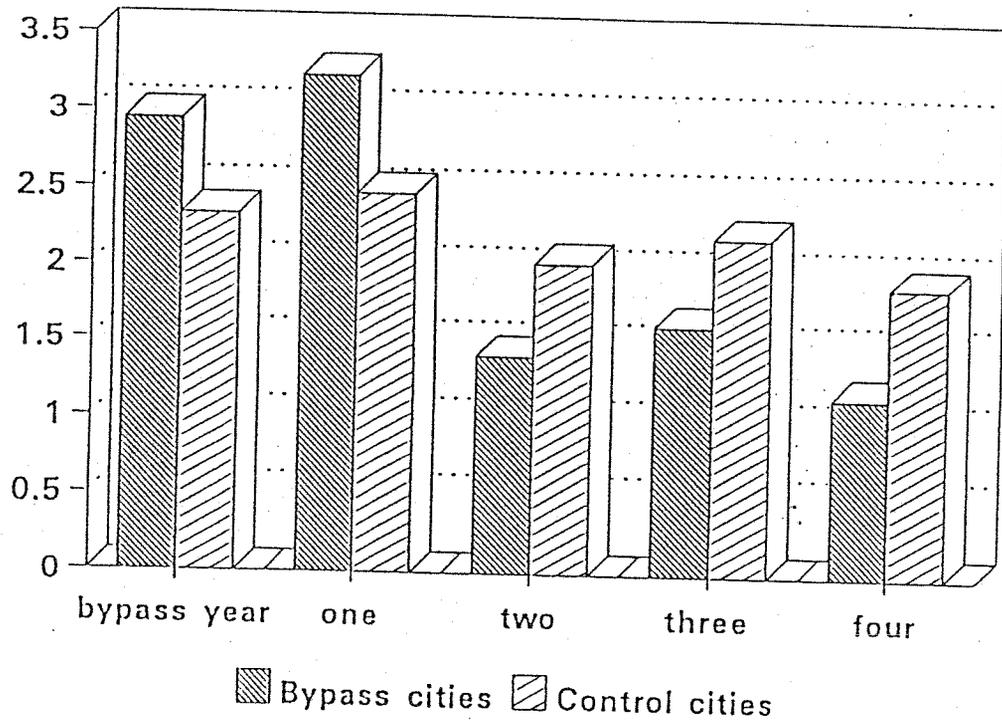


Figure 34

Services Pull Factors-Iowa Bypass Cities vs. Control Cities

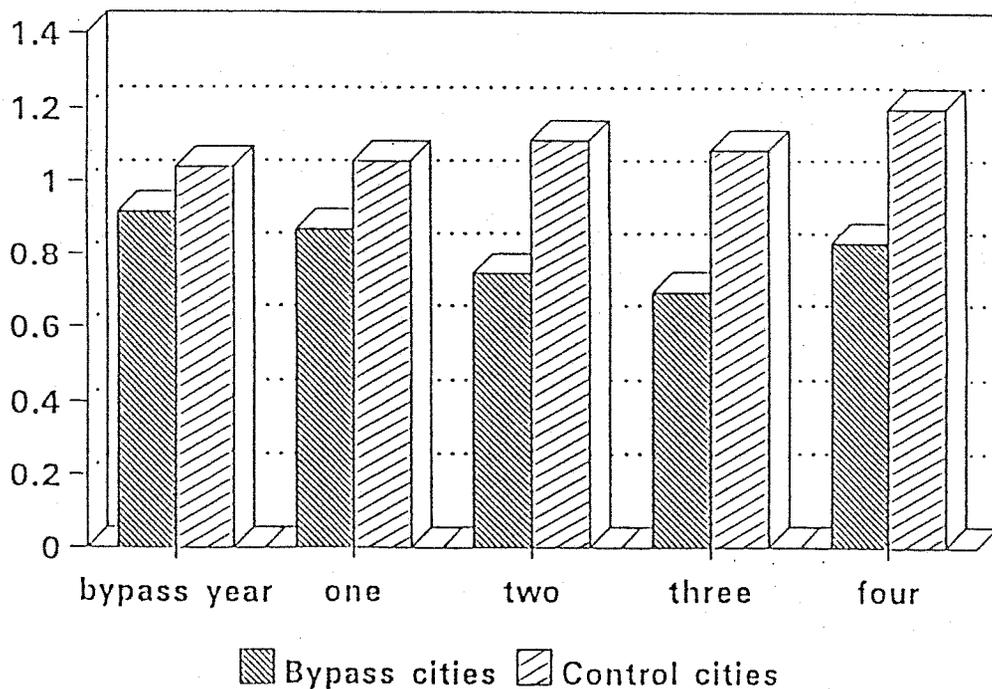


Figure 35

Specialties Pull Factors-Iowa

Bypass Cities vs. Control Cities

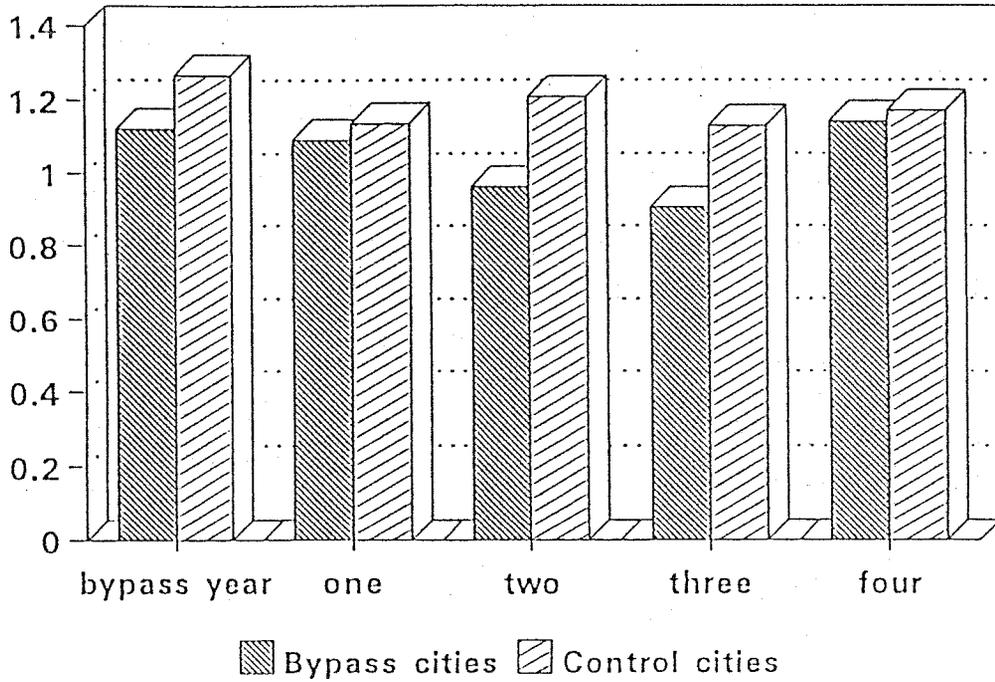


Figure 36

Utilities Pull Factors-Iowa

Bypass Cities vs. Control Cities

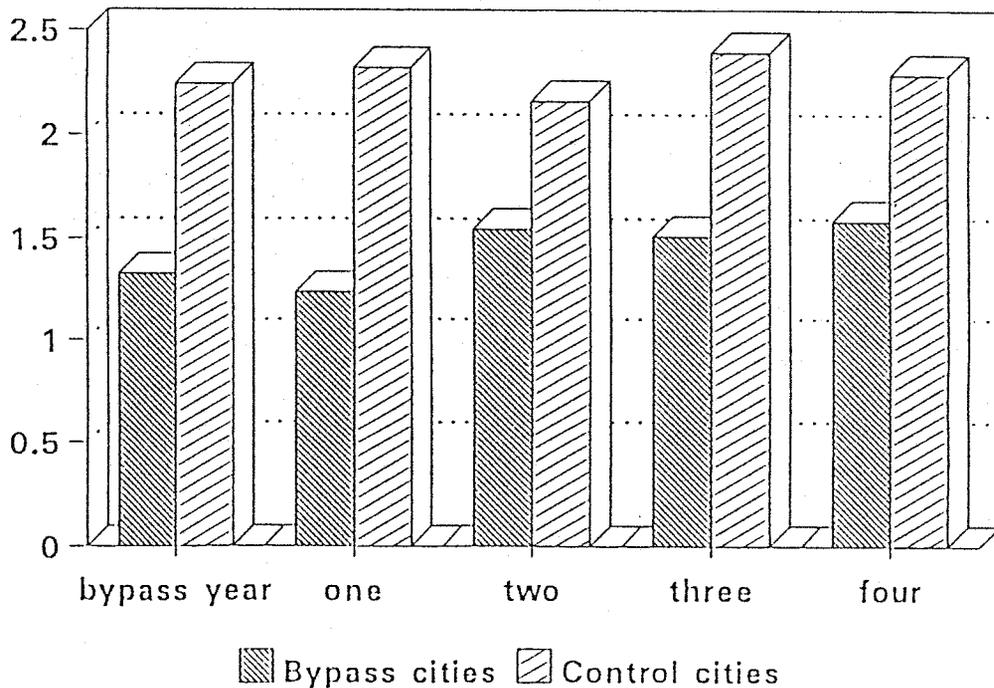


Figure 37

Wholesale Sales Pull Factors-Iowa

Bypass Cities vs. Control Cities

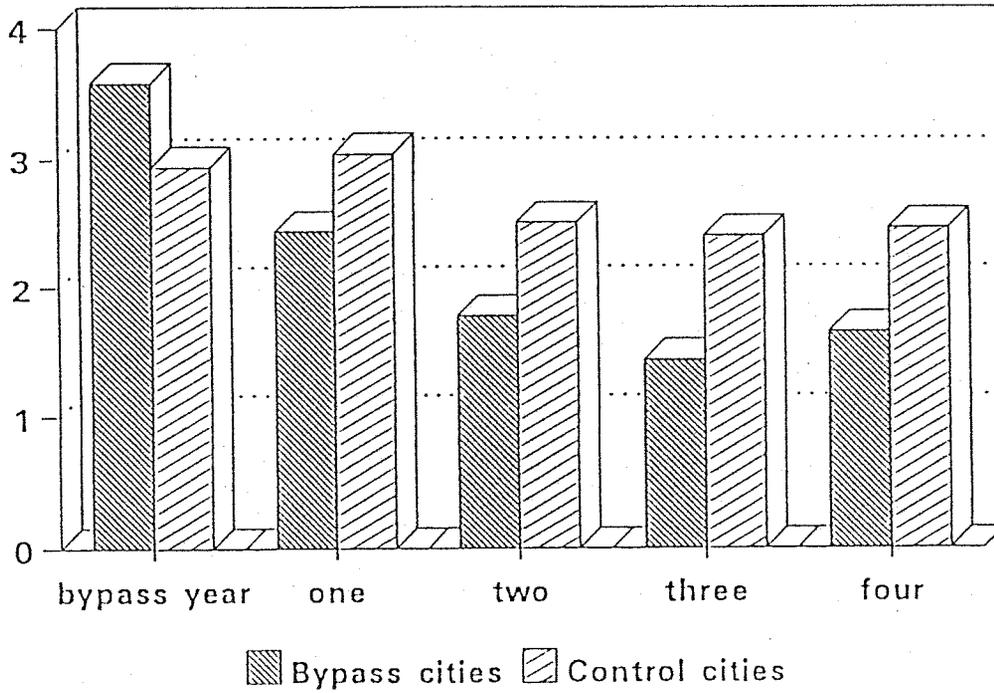


Figure 38

IMPACT OF HIGHWAY NOISE

QUESTION 1

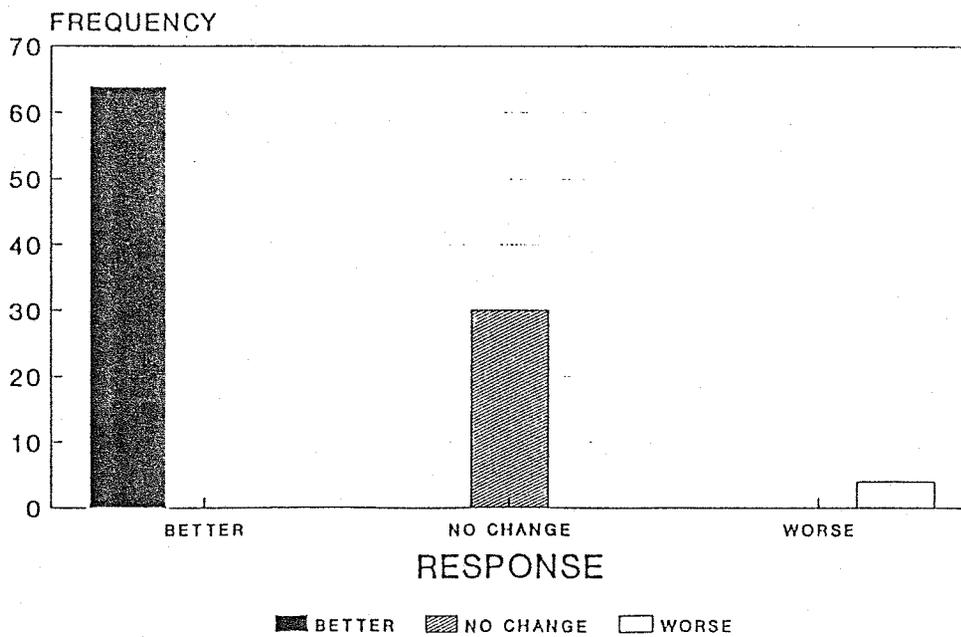


Figure 39

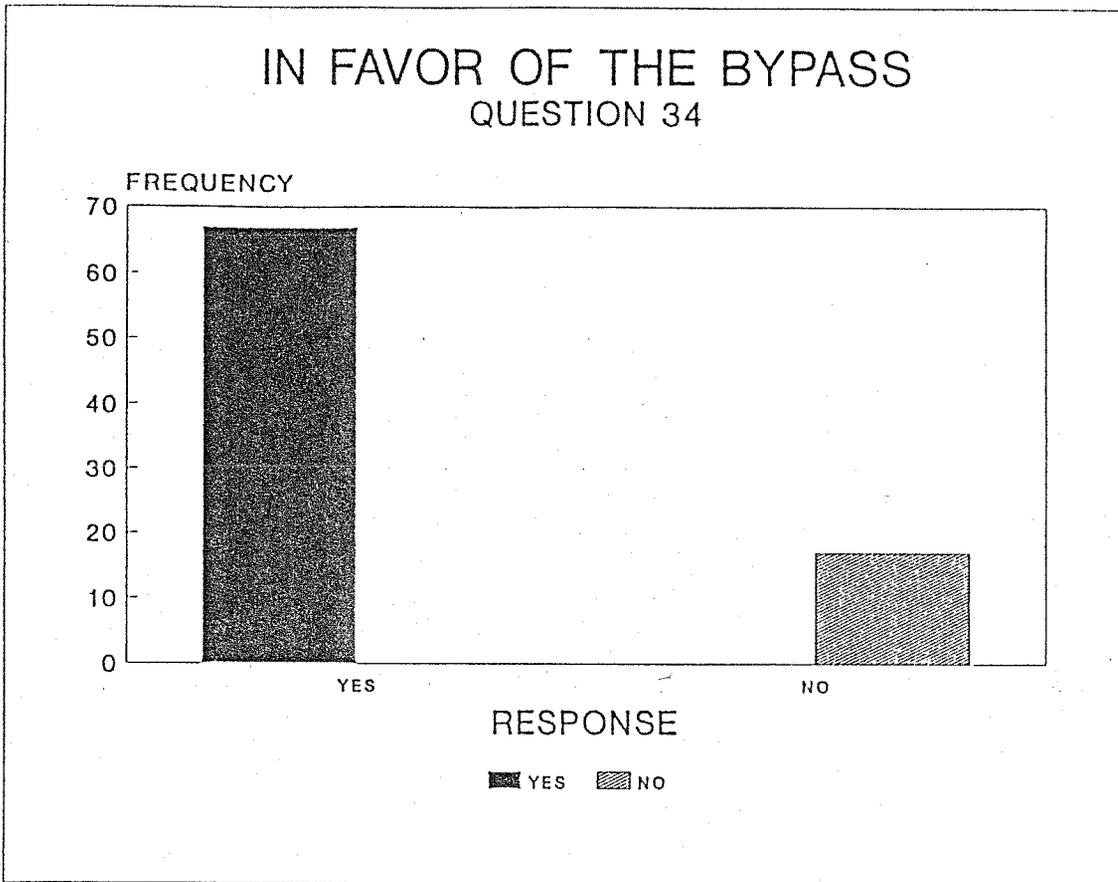


Figure 40

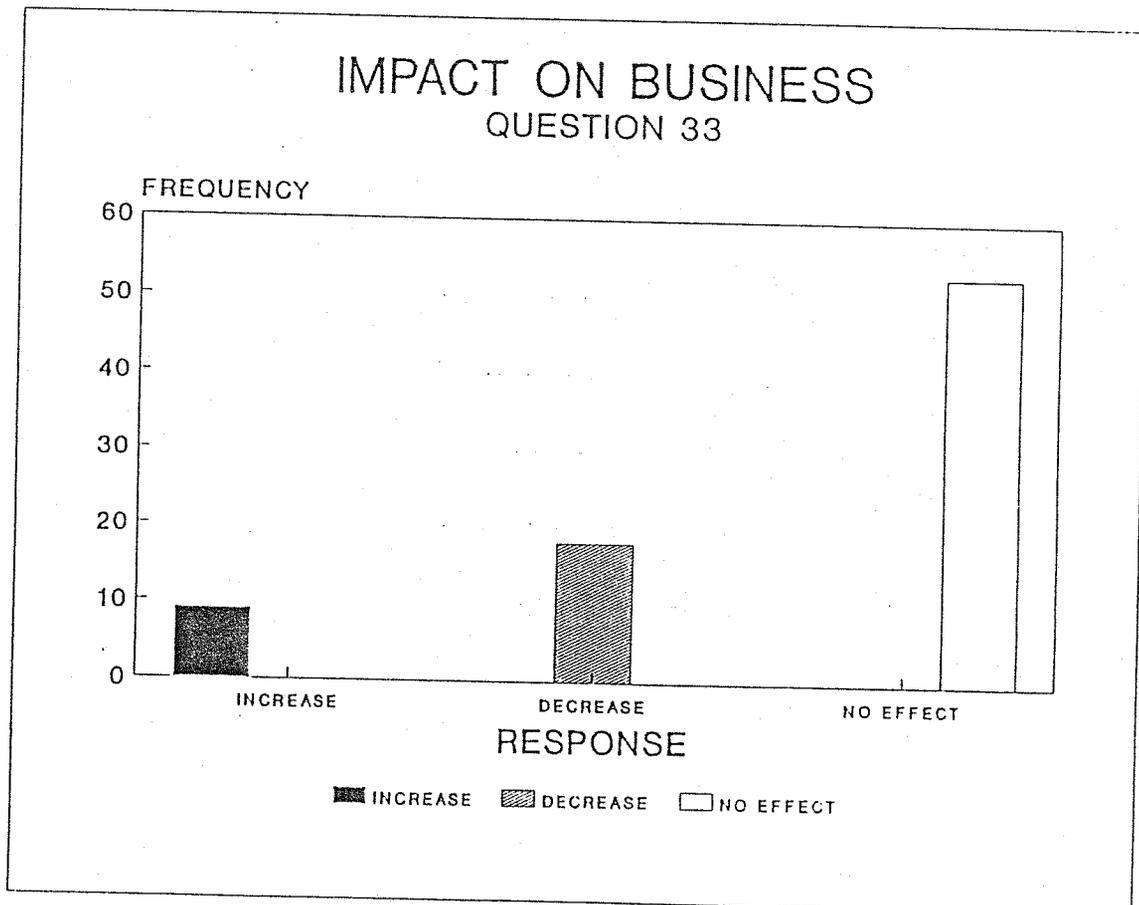


Figure 41

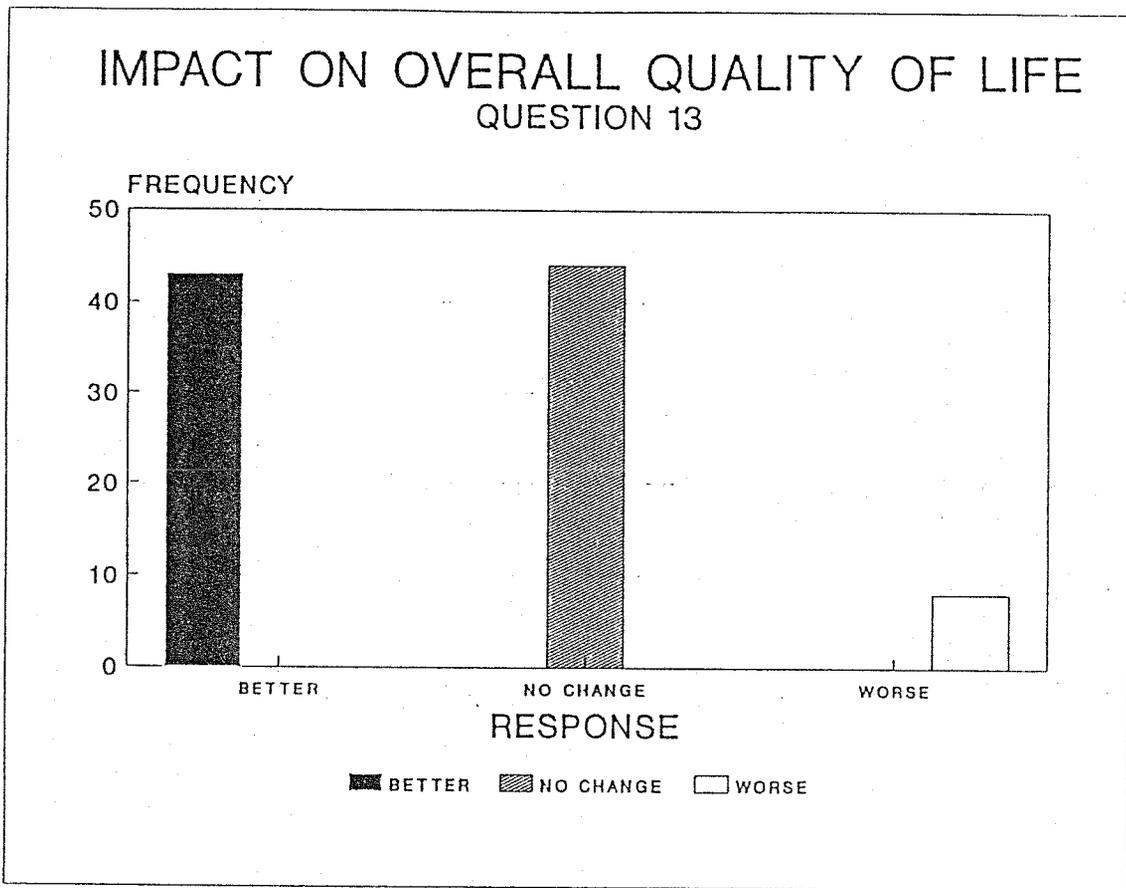


Figure 42

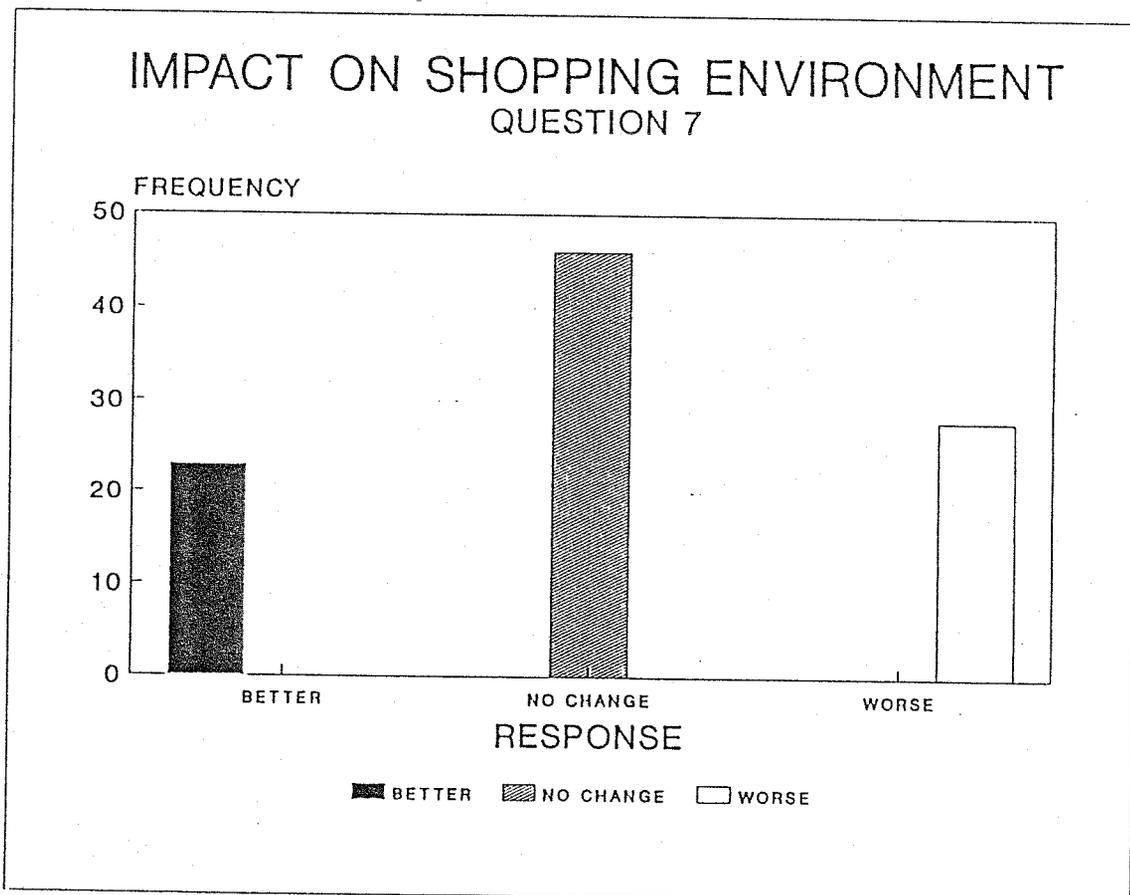


Figure 43

BUSINESS LOCATION RELATIVE TO BYPASS

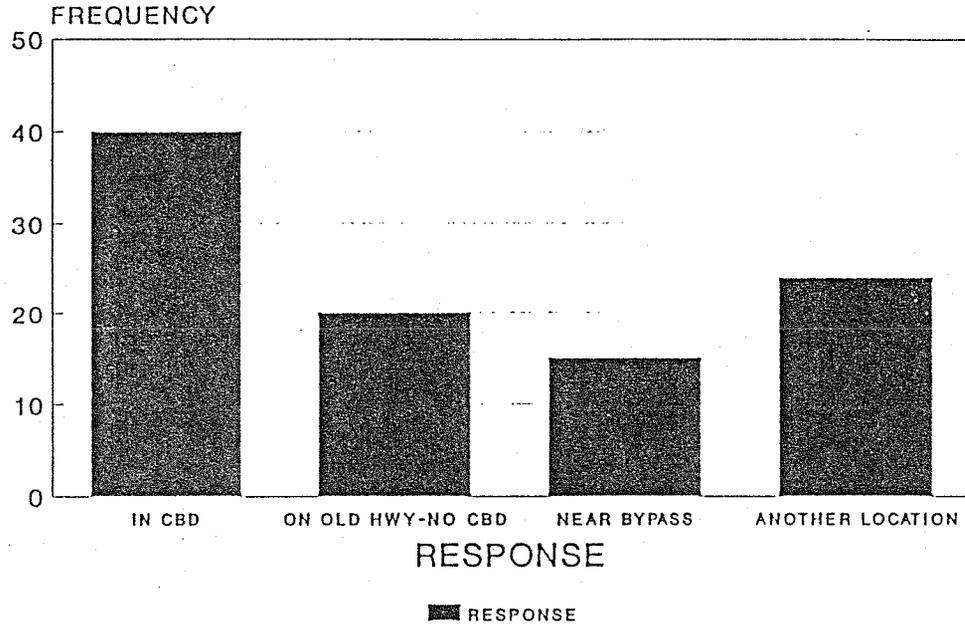


Figure 44

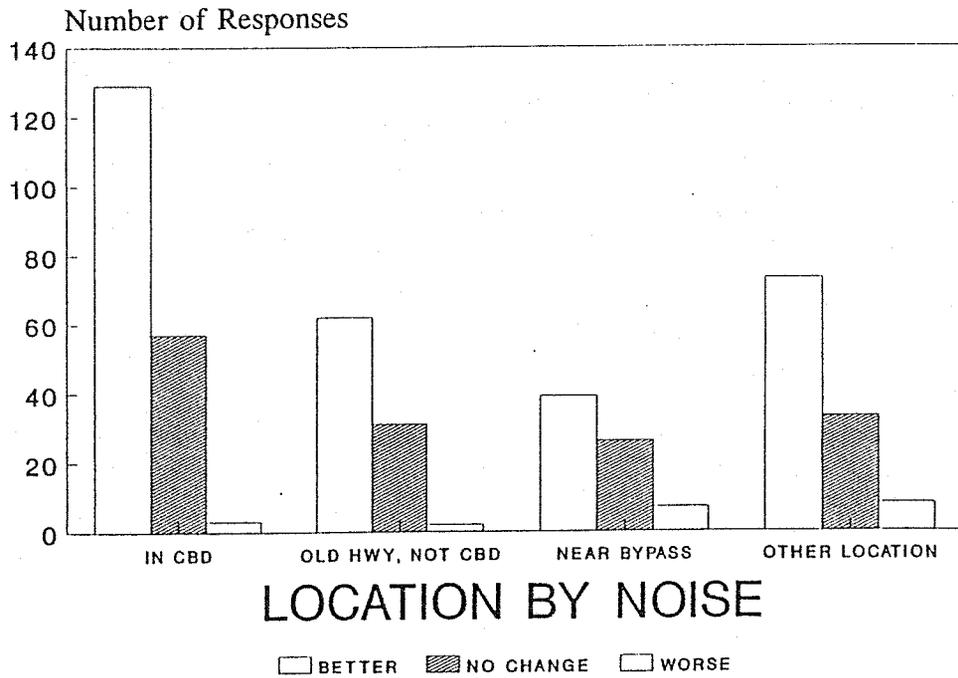


Figure 21. Merchants' perceptions of traffic noise from four locations in the community.

Figure 45

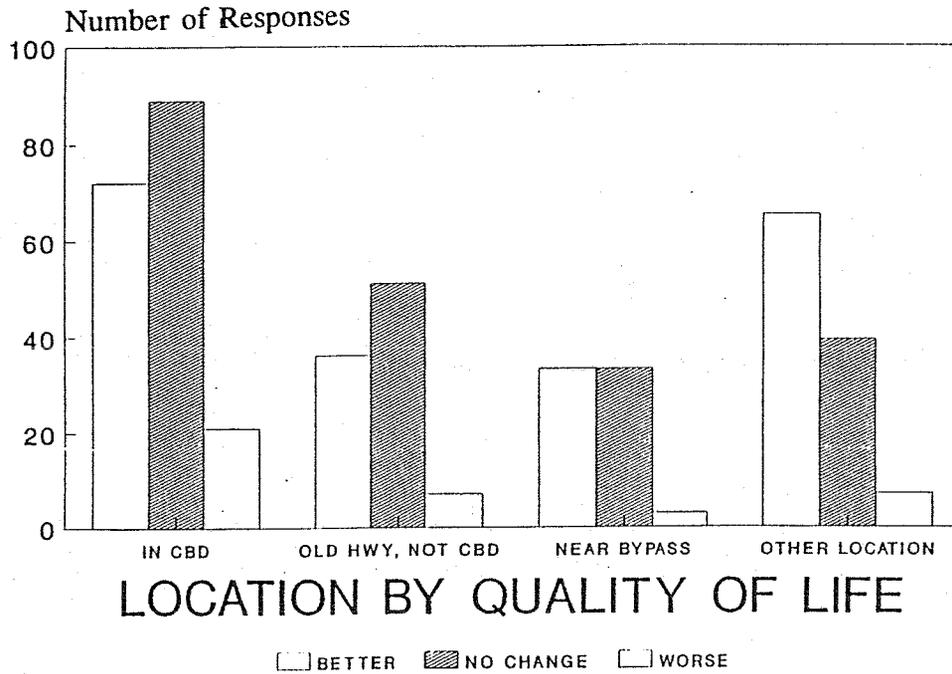


Figure 27. Merchants' perception of the quality of life in their community from four locations.

Figure 46

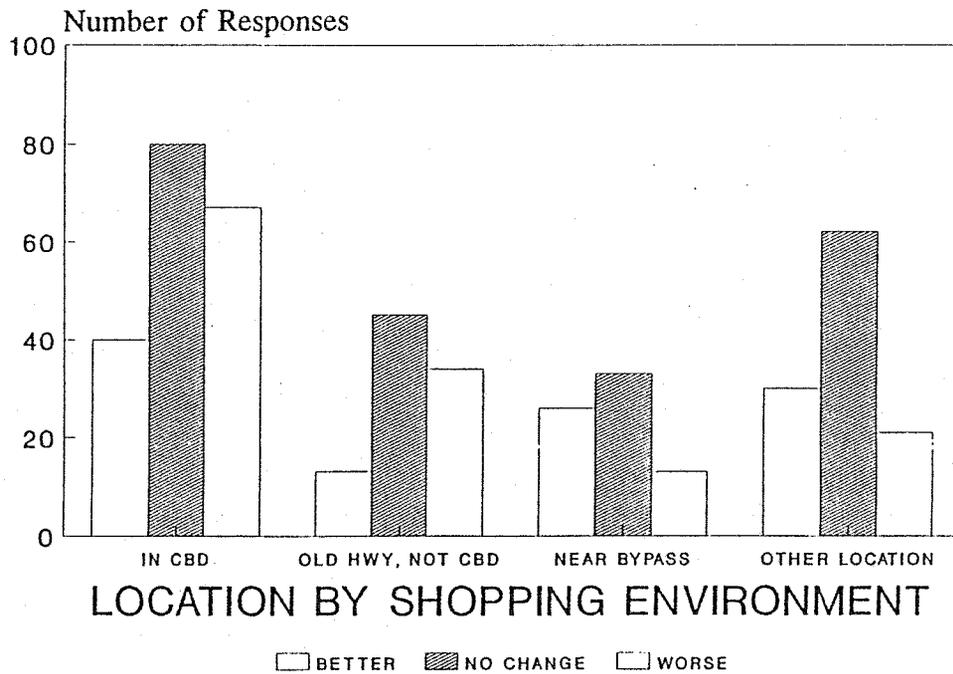


Figure 23. Merchants' perceptions of the shopping environment in their community from four locations.

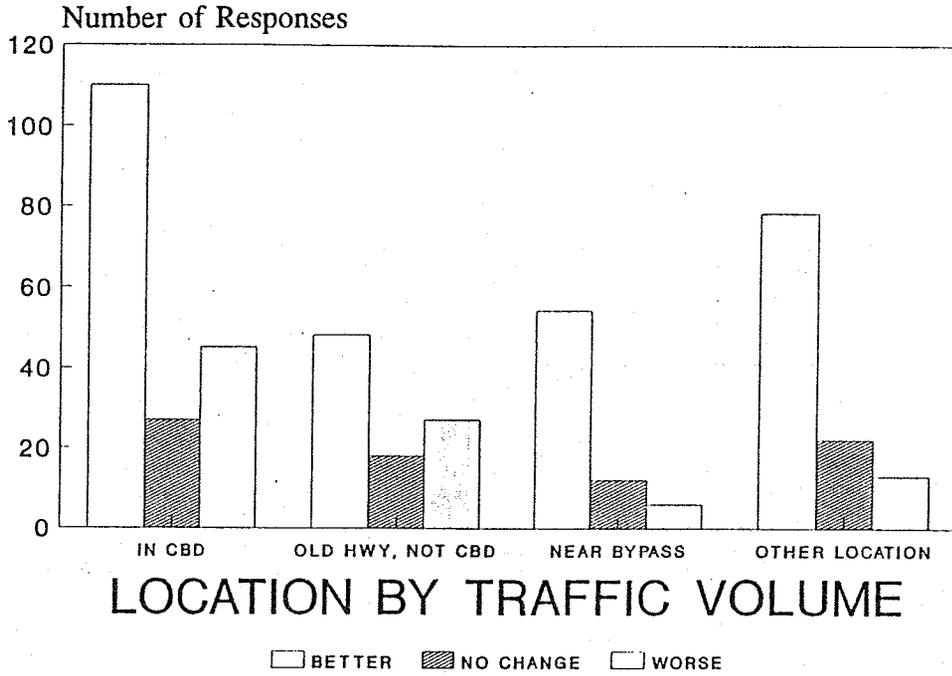


Figure 22. Merchants' perceptions of traffic volume from four locations in the community.

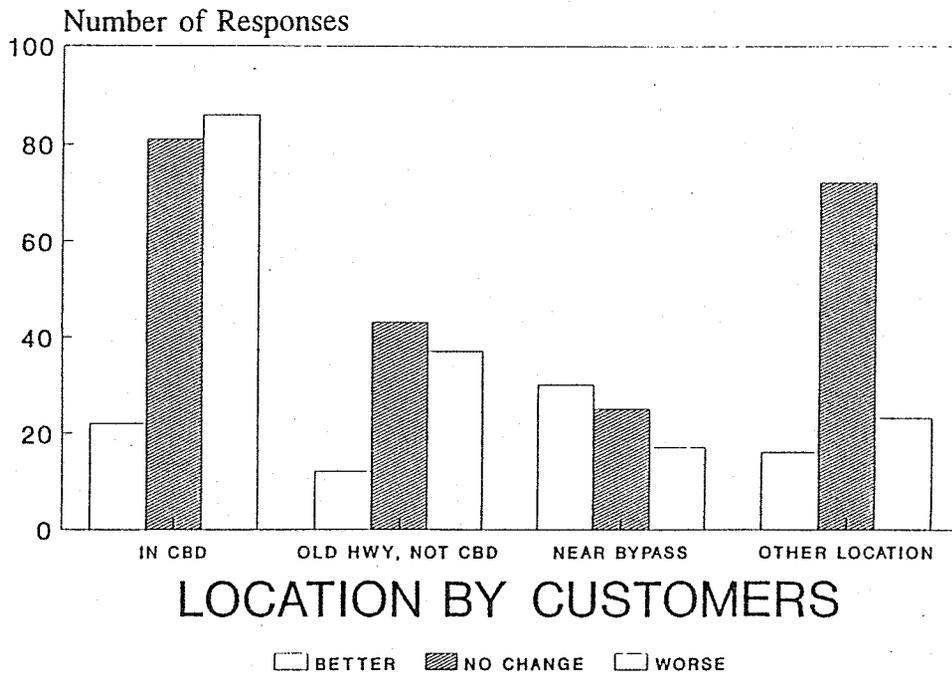


Figure 24. Merchants' perceptions of numbers of customers from four locations in the community.

Figure 49

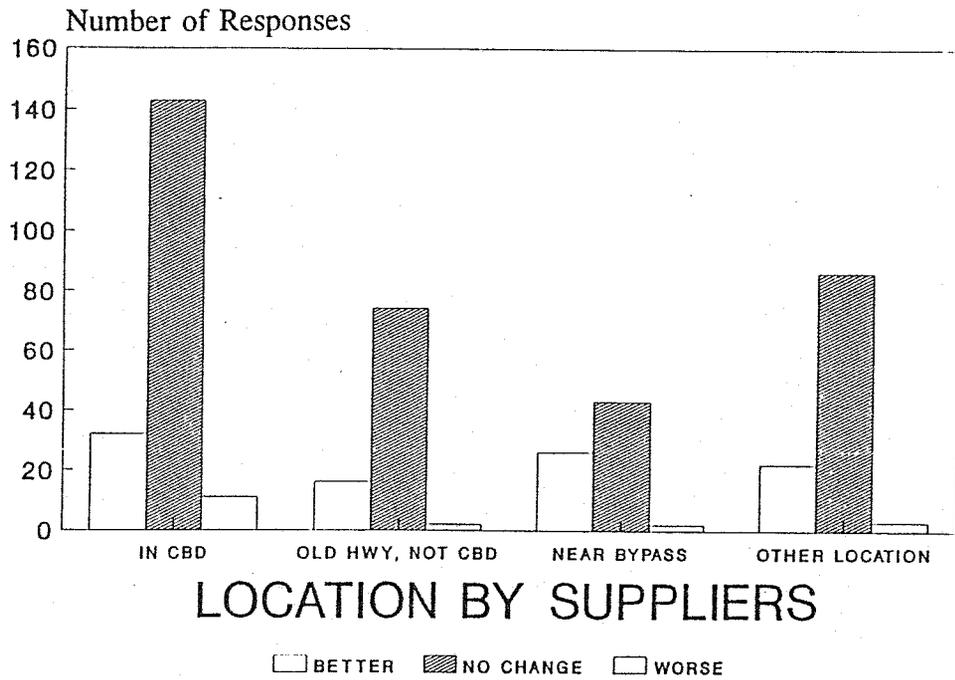


Figure 26. Merchants' perceptions of suppliers' ability to reach their stores from four locations in the community.

Figure 50

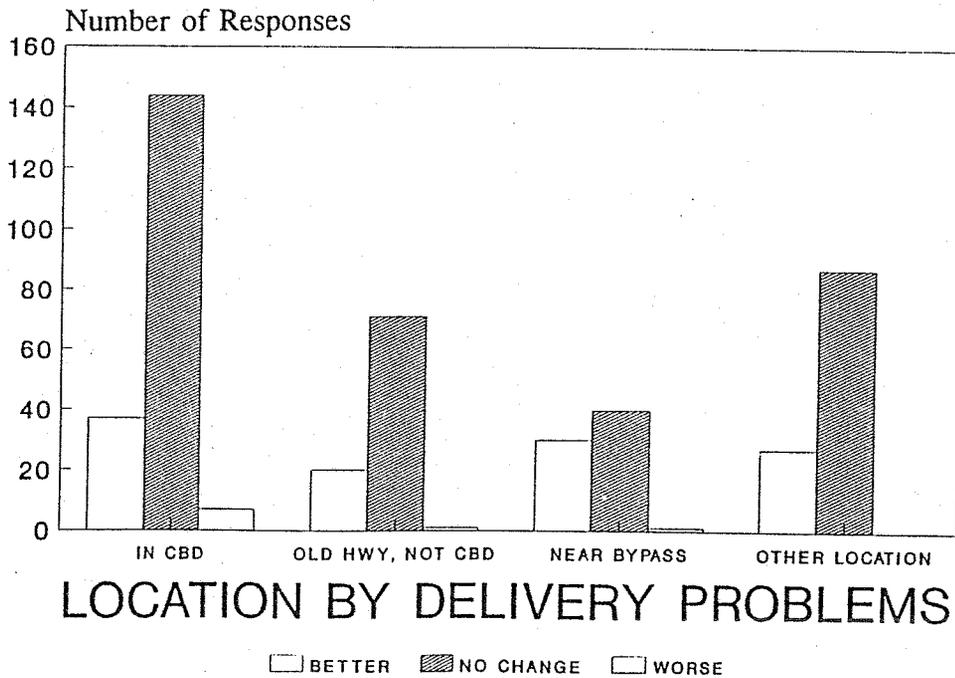


Figure 25. Merchants' perceptions of delivery problems from four locations in the community.

Figure 51

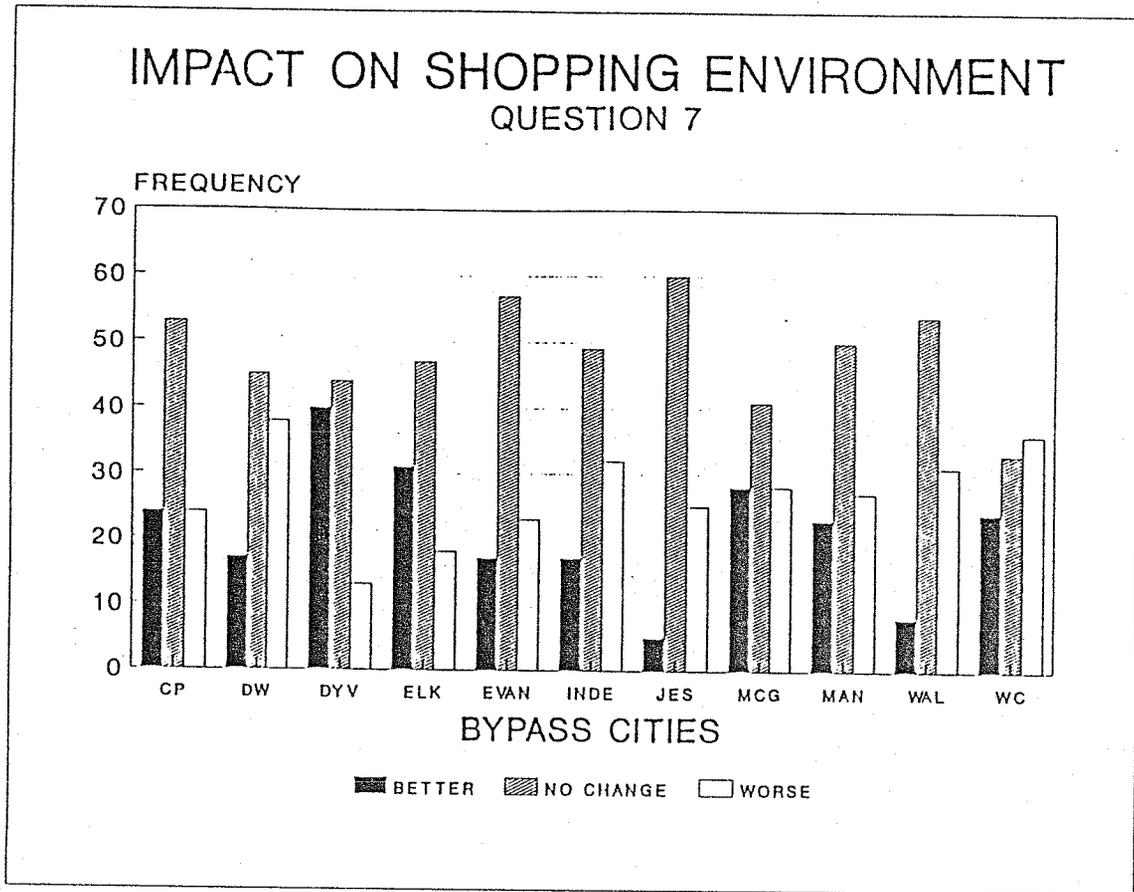


Figure 52

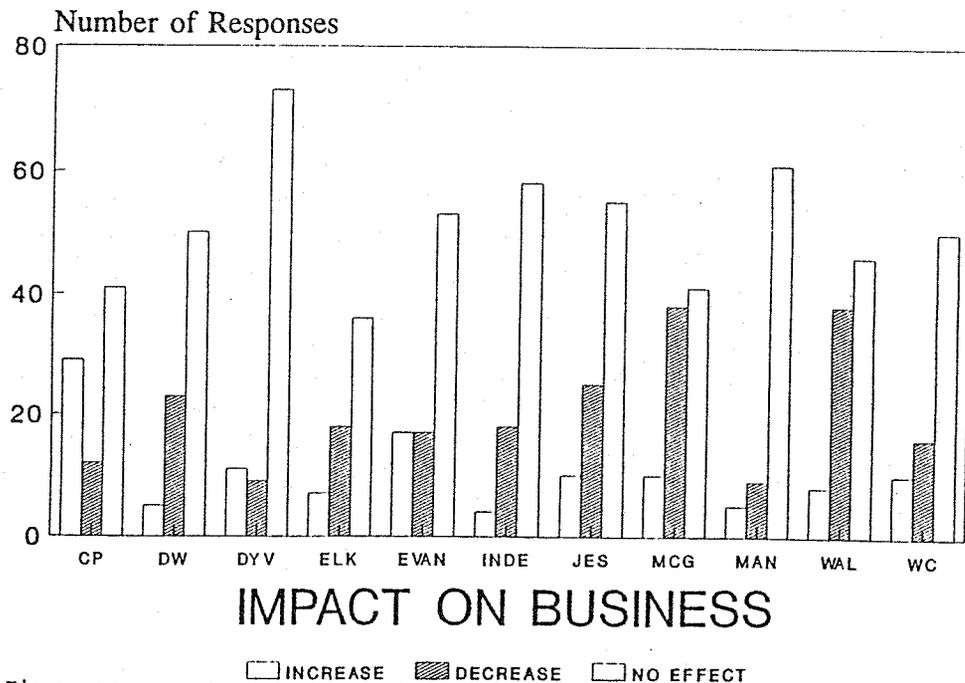


Figure 34. Merchants' perceptions of the effect of the bypass impact on their business activity according to bypassed city.

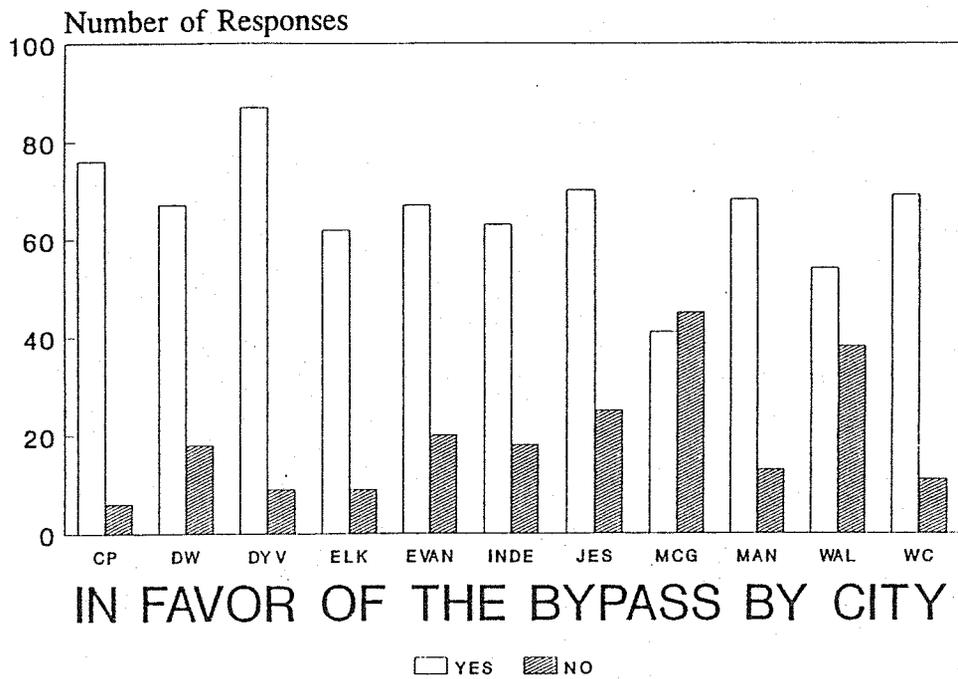


Figure 32. Merchants in favor of or opposed to the bypass according to their bypassed city.

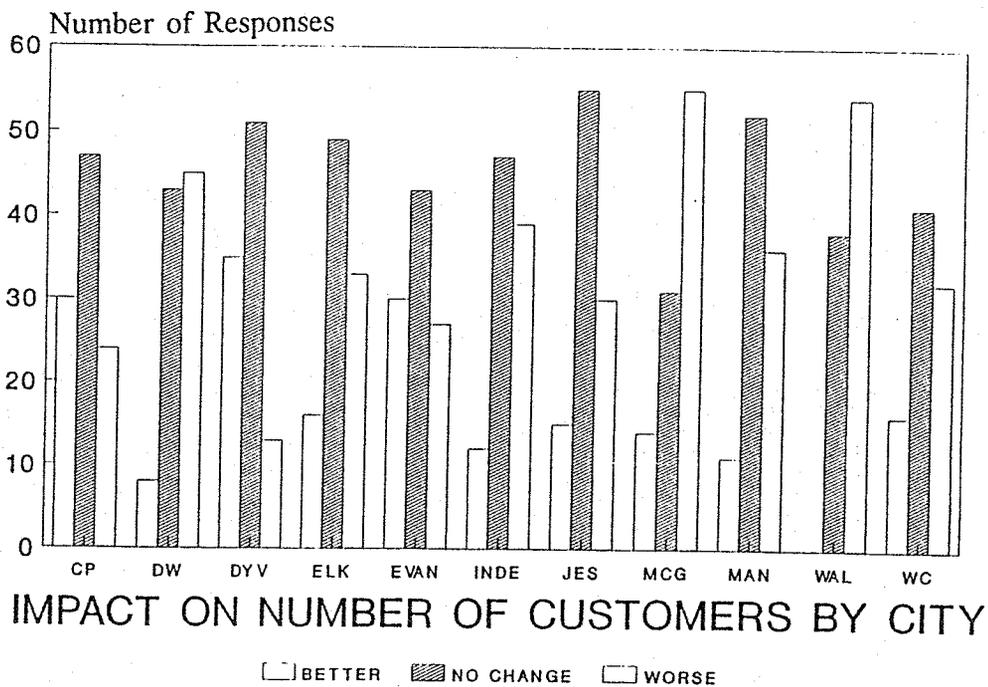


Figure 33. Merchants' perceptions of number of customers by their bypassed city.

Figure 55

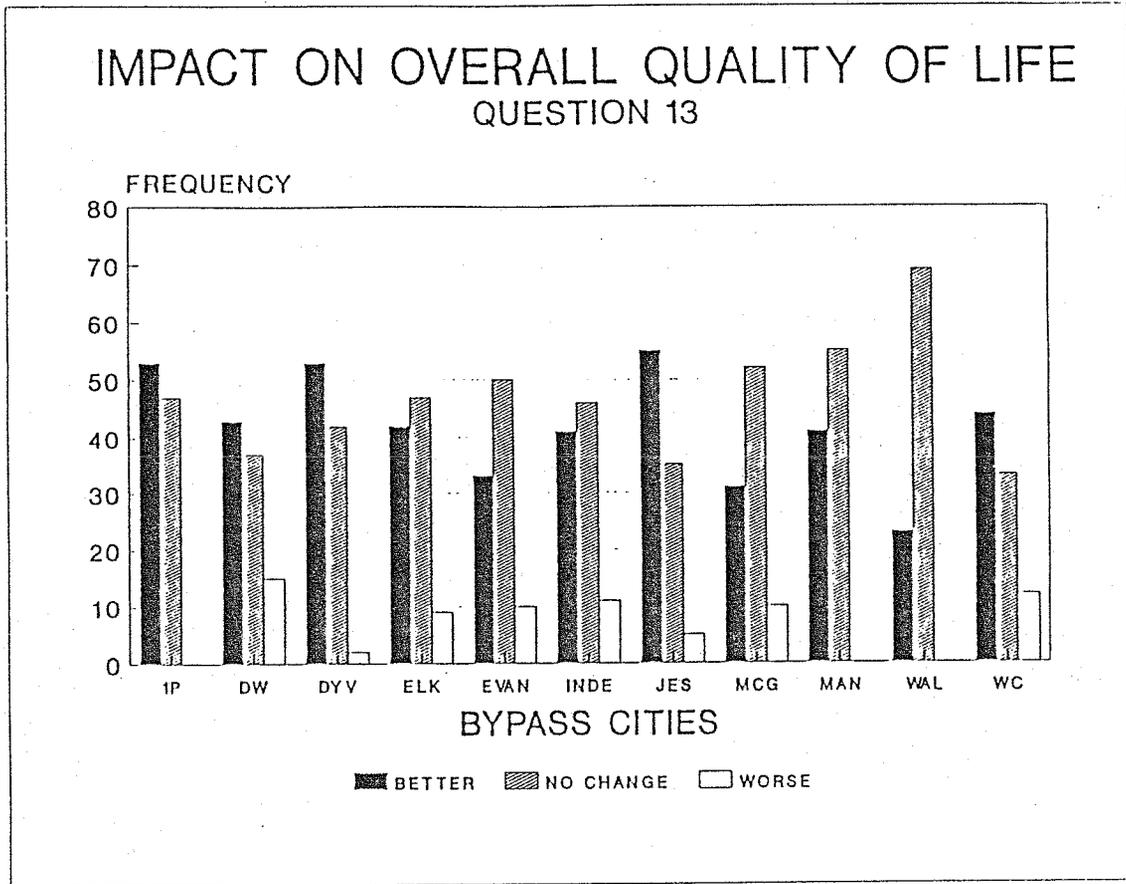


Figure 56

IMPACT OF HIGHWAY NOISE QUESTION 1

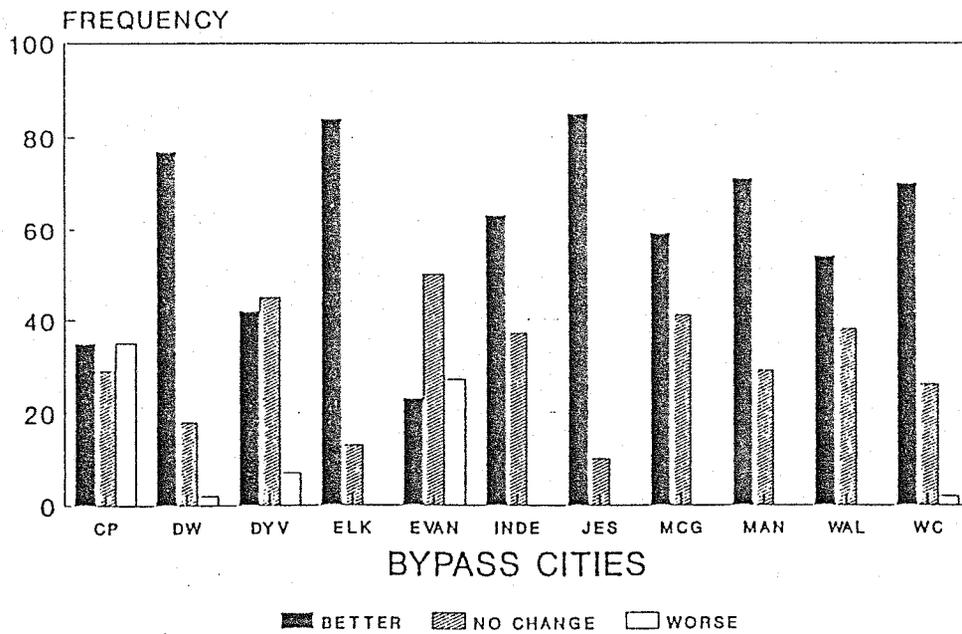


Figure 57

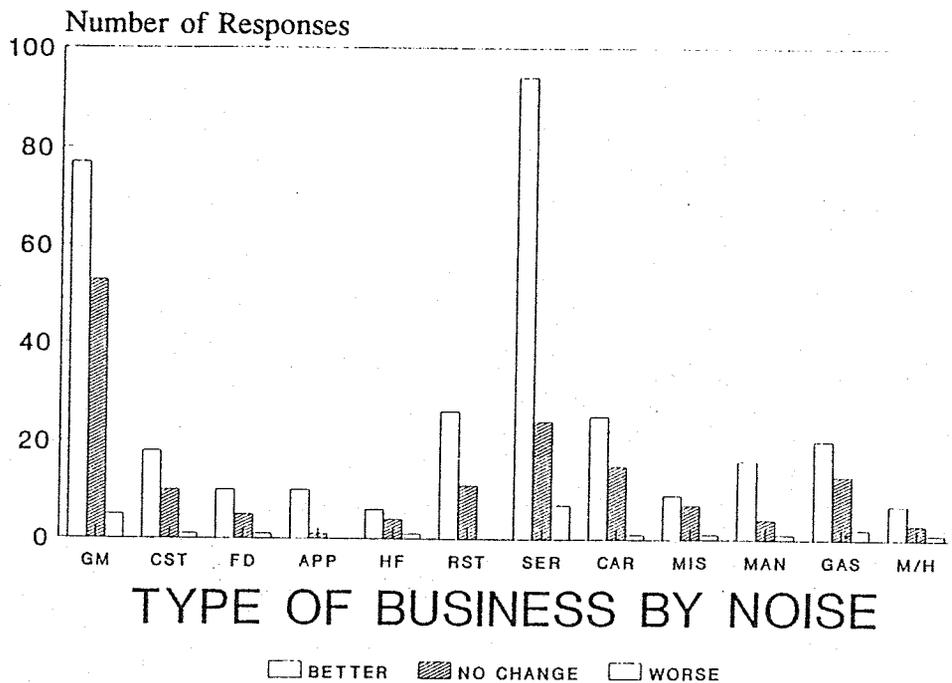


Figure 28. Merchants' perceptions of traffic noise according to the type of business they operate.

Figure 58

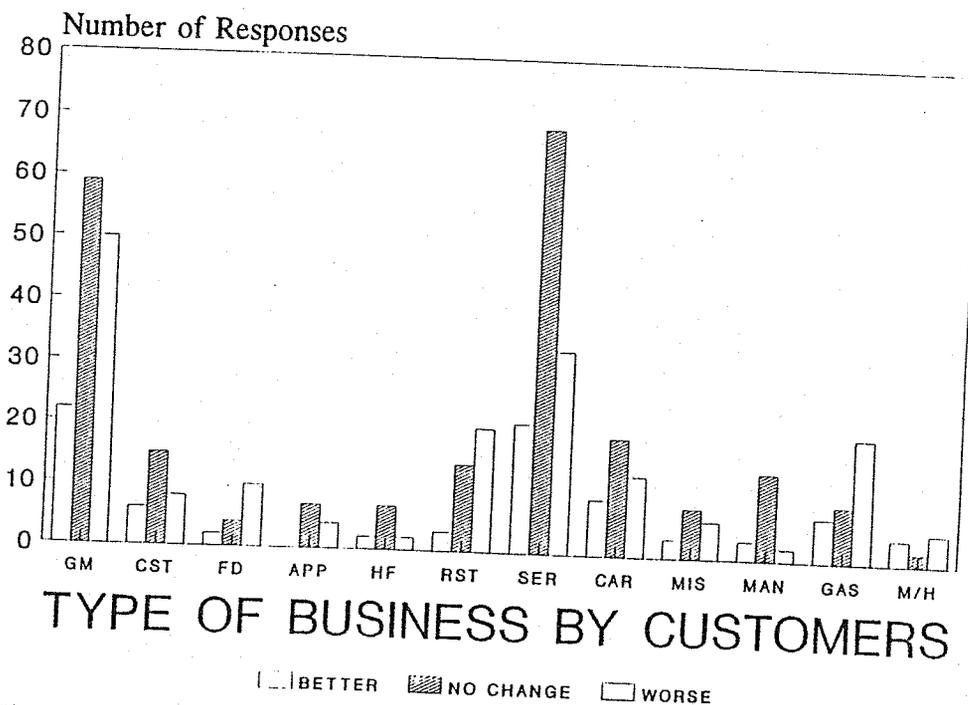


Figure 29. Merchants' perceptions of the number of customers according to the type of business they operate.

Figure 59

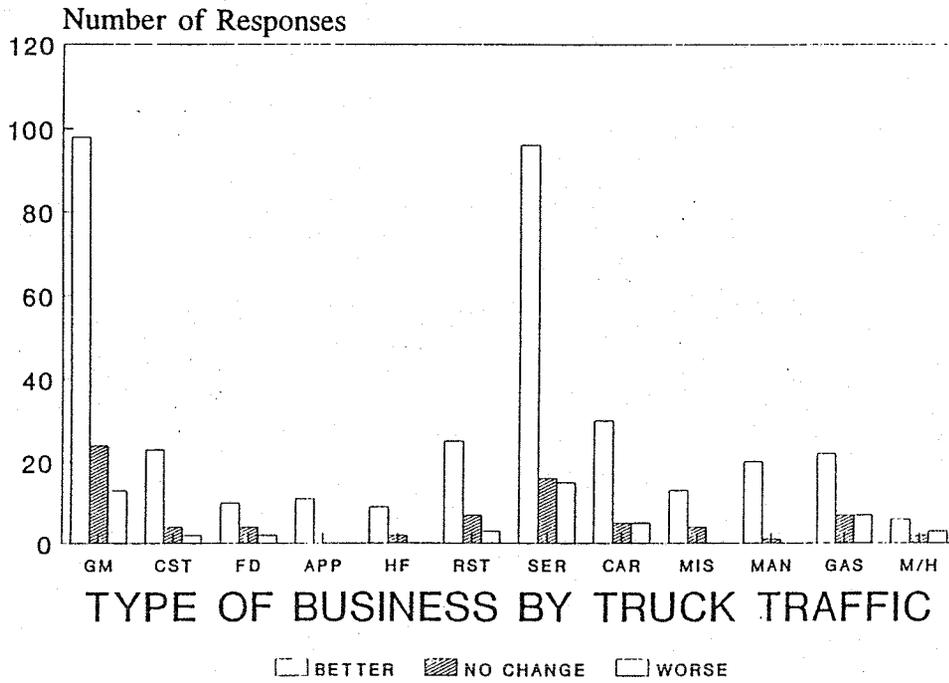


Figure 30. Merchants' perceptions of truck traffic according to the type of business they operate.

Figure 60

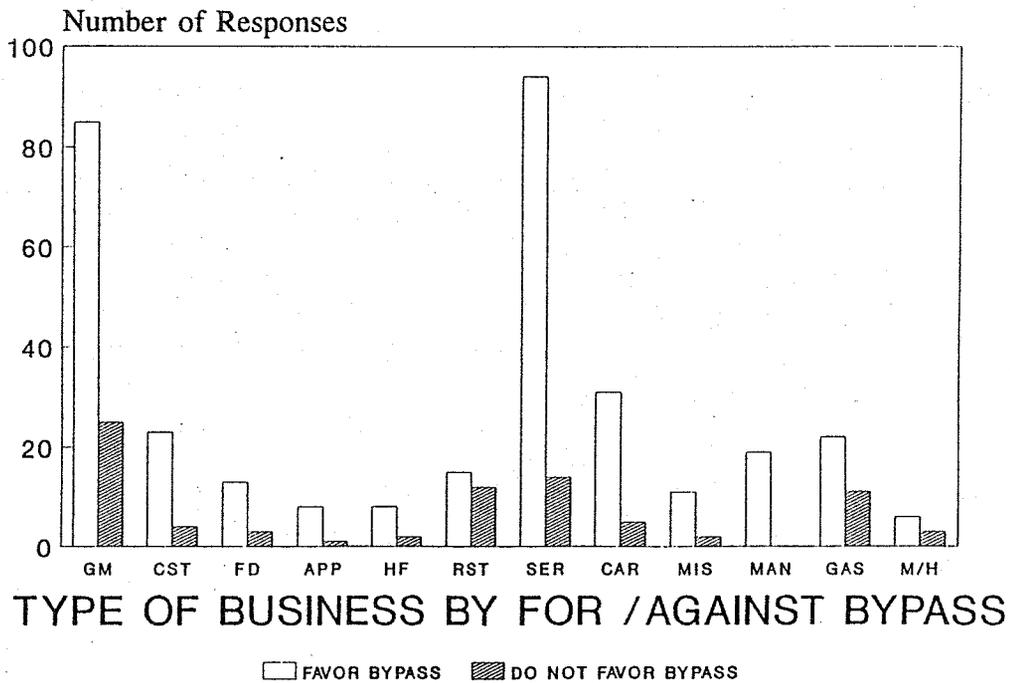


Figure 31. Merchants in favor of or opposed to the bypass according to the type of business they operate.

APPENDIX 1

SURVEY INSTRUMENT

I. Records indicate that Interstate 380 from Waterloo to Cedar Rapids was opened to traffic in 1984. The construction of Interstate 380 caused Walker to be bypassed.

A. What impact, if any, has the Highway Bypass had on the following? (Circle one number for each response)

	Better	No Change	Worse
Highway noise.....	1	2	3
Traffic volume.....	1	2	3
Dirt and dust.....	1	2	3
Accident rates.....	1	2	3
Truck traffic.....	1	2	3
Parking problems.....	1	2	3
Shopping environment.....	1	2	3
Customers.....	1	2	3
Suppliers.....	1	2	3
Freight delivery problems.....	1	2	3
Travel time for persons coming to/leaving your place of business.....	1	2	3
Overall costs of doing business.....	1	2	3
Overall quality of life.....	1	2	3
Other _____			

B. What types of businesses were most adversely affected by the Highway Bypass?

C. Have new businesses developed along the Bypass that have diverted business away from you?

1. YES
2. NO

D. Were restrictions placed along the Bypass to prevent or reduce new commercial development with direct access to the Bypass route?

1. YES
2. NO ↴

IF NO: Would you be in favor of such restrictions?

1. YES
2. NO

E. Regarding informational signs along the Bypass route:

1. Was "signage" placed along the Bypass route to advise and direct traffic to Highway Commercial type business?

1. YES

2. NO

IF NO:

1. Should signage be made available?

1. YES

2. NO

IF YES:

1. Do you believe the signage is adequate?

1. YES

2. NO

2. Do you feel that signage to direct or advise traffic of Highway Commercial services (motels, restaurants, service stations, truck stops) along with tourism and community sites would be beneficial?

1. YES

2. NO

F. What, if any, changes would you make concerning the current signage along the Bypass route?

II. Please describe your business by answering these questions.

A. Primary type of business? (Circle one number only)

1. Cafe/Restaurant
2. Tavern/Beverage/Tobacco Store
3. Truck stop
4. Service Station
5. Construction/Building Materials
6. Manufacturing
7. Transportation/Utilities
8. Wholesale Trade
9. Retail Trade (Other than those listed above)
10. Finance/Insurance/Real Estate
11. Services (Other than those listed above)

B. In what year did present management assume control of this business?

— — — — (YEAR)

C. Where is this business located in relation to the Bypass? (Circle one number only)

1. In the Central Business District
2. On the old highway but not in the Central Business District
3. Near the Bypass
4. At another location

D. In what year was this business established at its present location?

— — — — (YEAR)

E. For businesses starting operation before the bypass:

1. What has happened to this business since the opening of the Bypass? (Circle one number only)

1. Significant increase
2. Significant decrease
3. No significant effect

2. If you knew then what you know now, would you be in favor of a Bypass?

1. YES
2. NO

3. If this business has increased or decreased since the opening of the bypass, do you feel this change is due to the Bypass?

- 1. YES
- 2. NO

4. Rate factors that may have had an effect on this business. (Circle one number for each response.)

	No Effect				Major Effect
Other businesses close to or along the Bypass.....1	2	3	4	5	
Shopping mall(s) in your community.....1	2	3	4	5	
Shopping mall(s) in another community.....1	2	3	4	5	
State of the economy.....1	2	3	4	5	

III. Please use this space to make any comments that you believe would be helpful to this study.

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