User Costs and Fuel Consumption at Drive-Through Facilities

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ABSTRACT

In recent years the drive-through facility has become increasingly popular at fast-food establishments and financial institutions. This study was undertaken to examine the user costs and fuel consumption associated with the use of drive-through facilities and to compare the values obtained with similar data for inside servicing. Three fast-food establishments and three financial institutions in small towns in northwestern South Carolina were used to collect the data. Data on arrival patterns, service times, and waiting times were collected by mechanical counting devices and visual observation. From these data, user cost and fuel consumption associated with both inside service and drive-through service were compared. A linear relationship was found to exist between total transaction times and the customer's position in the drive-through line. It was concluded that there was a break-even point beyond which drive-through facilities became more time-consuming and costly than going inside for service. Drive-through facilities were also found to cause the consumption of an excessive amount of fuel. The average fast-food establishment with 2,000 vehicles per week using the drive-through system would cause an excess of 57 gal of fuel per week or 2,960 gal per year to be consumed. The average financial institution with a two-channel drive-through system handling 2,000 vehicles per week would cause an excess of 62 gal of fuel per week or 3,210 gal per year to be consumed.

Today's drive-through facility is an offspring of the drive-in, which was developed in the early 1930s. Throughout the 1950s and 1960s the drive-through facility for both financial institutions and fast-food chains was refined into the form that is so common today. Only during the past 10 to 20 years, however, has the use of drive-through facilities become widespread. This recent growth may well be one more consequence of the trend toward suburban living patterns. With America's dependence on the automobile, it is safe to assume that the drive-through and other related facilities geared toward the automobile will continue to be dominant factors in the marketing of various products and services in the years ahead.

There are many reasons why the drive-through facility has become so popular in recent years, including (a) convenience to customers, (b) speedier handling of transactions, (c) no stand-in-line waiting, (d) the fact that providing drive-through facilities is more economical for businesses than enlarging lobbies and parking lots, (e) difficulty in finding parking spaces in congested areas, and (f) promotional programs by businesses that encourage the use of drive-through facilities. With advantages such as convenience and waiting in comfort, it is no surprise that the drive-through facility has flourished in our automobile-oriented society.

Six basic drive-through designs have been developed to serve customers: island facilities, annex or peninsula-type facilities, auto-bank facilities, wall-type facilities, drive-through facilities, and garage-bank facilities. The terms used to identify most of the designs are self-explanatory. Modern fast-food chains and financial institutions use the wall-type and drive-through facilities almost exclusively. The wall-type facility is simply a drive-through built onto the side of an existing building; it is particularly popular because it can be retrofitted onto an existing building. The drive-through is a wing adjacent to the main building.

In recent years the fast-food industry has adopted a slight variation of the standard wall-type drive-through facility. Instead of driving directly to the main building and placing an order, customers now place their order at an "order window," or "menu board," and then drive around the building to pay for the food at a pick-up window. This design is a unique solution that is particularly appropriate for fast-food businesses. The effects of this type of design will be discussed in the context of this paper.

PURPOSE AND OBJECTIVES

It is generally assumed that if a person is in a hurry, the drive-through is the quickest and most efficient means of doing business. But is this assumption always correct? Is the drive-through facility always quicker and more economical than doing business inside? One of the primary purposes of this study was to determine at what point, if any, the drive-through became less economical for the customer than doing business inside. From this information, an economic guideline could be established to help customers decide which facility (inside or drive-through) to use.

Until the early 1970s, the United States had what appeared to be an unlimited gasoline supply at its disposal. In 1973, political factors caused the Organization of Petroleum Exporting Countries to limit crude oil supplies, and prices increased rapidly. Long lines developed at service stations and the image of dwindling fuel supplies was particularly disturbing. Again, in 1979, talk of shortages surfaced as gasoline prices rose well over $1 per gallon. If nothing else, this fuel panic made Americans aware of just how much energy they were wasting. Be-

cause the drive-through is a convenience that causes automobiles to consume more fuel, one of the objectives of this study was to estimate how much this convenience is costing in terms of excess fuel consumption.

This study involves only drive-through facilities in small towns where adequate parking is not a serious problem. In large metropolitan areas where parking is a problem for the customer, the economics of a drive-through facility may be completely different from that developed in this study.

This study also neglects the economic impact of the drive-through to the owner of the facility. In many cases the drive-through is an efficient means of providing temporary storage of customer vehicles. The drive-through allows the owner to provide fewer parking spaces and as a result requires less land acquisition or allows the use of the available land for other purposes. This economic benefit will become more significant as land costs rise in larger urbanized areas.

PROCEDURES

Drive-through facilities were divided into two general classifications: fast-food establishments and financial institutions. Three financial institutions and three fast-food establishments were selected for the study, each at locations that, it was hoped, would provide high peak-period volumes and long queues (number of automobiles waiting to be served).

Traffic counters were used to establish hourly and daily customer arrival patterns at these facilities. During the same time intervals, a program of observing and recording customer waiting and service times was conducted for actual transactions at the drive-through facilities. From these data, customer waiting times and service times were established based on the customer's position in the queue. Data were also collected for inside service during comparable time periods.

From this information, a comparison was then made of the time required for inside service versus that required for drive-through service, and user costs were estimated for each of these services. Based on computed service times and waiting times, an estimate was also made of how much additional fuel was required to use drive-through facilities.

DESCRIPTION OF THE DRIVE-THROUGH FACILITIES

Fast-Food Establishments

One of the fast-food establishments included in the study was a Wendy's restaurant located at the intersection of Greenville Street and North Fant Street in Anderson, South Carolina. The 1980 population inside the Anderson city limits was 27,313, although the Anderson urban area has a population of approximately 50,000. As is common with fast-food drive-through facilities, this one consisted of a menu board and a pick-up window with sufficient distance between the two locations to accommodate five to six vehicles. The maximum practical queue length at the menu board was approximately 10 to 12 vehicles.

The second fast-food establishment included in the study was a Burger King located at the intersection of North Main Street and West Fredericks Street in Anderson, South Carolina. The drive-through facility consisted of a menu board and a pick-up window with enough space between the two locations to store five or six vehicles. A maximum practical queue length of approximately 15 to 20 vehicles was possible at the menu board.

The third fast-food establishment included in the study was a Hardee's located near the intersection of US-123 and S.C. Highway 93 in Easley, South Carolina. The town of Easley had a 1980 population of 14,264. The short distance between the menu board and the pick-up window at this drive-through facility restricted vehicle storage to only two vehicles. However, the menu board had an almost unlimited queueing potential because a large parking lot was adjacent to the facility.

Financial Institutions

An important criterion in the selection of financial institutions for the study was that there be significantly different levels of capacity as evidenced by a varying number of drive-through channels. With this criterion in mind, the authors chose the American Federal Savings and Loan operation located at the intersection of Pickens Drive and North Main Street in Liberty, South Carolina. The town of Liberty had a 1980 population of 3,167. This financial institution had a single-channel drive-through built on the back of the building. Because of the location and configuration of the access, patrons could cause traffic congestion for vehicles trying to enter the institution's parking lot. The maximum practical queue length at the drive-through window was limited to three or four vehicles.

Another financial institution included in the study was the First Federal Savings and Loan in Easley, South Carolina, at the intersection of US-123 and Pilgrim Drive. The drive-through at this location was a two-channel system with a maximum queue length of seven vehicles for each channel. Because of a significant increase in drive-through customers at this financial institution in recent years, vehicle storage was sometimes inadequate during peak periods.

Another financial institution included in the study was Southern Bank, located at the intersection of North Main Street and Carter Street in downtown Anderson, South Carolina. The drive-through at this location consisted of a three-channel system with adequate space for a long queue length in each channel. The operation of Southern Bank was different from that of the other two financial institutions examined in that the drive-through remained open from 1:00 to 3:00 p.m. when the facilities inside were closed. Thus, the bank patron had no choice but to use the drive-through facility during this period.

ANALYSIS OF THE DATA

Financial Institutions

Traffic Volumes and System Characteristics

Mechanical traffic counters were used to establish hourly and daily traffic patterns at the drive-through facilities of the financial institutions. Roughly 14 percent of the drive-through traffic occurred on Monday, Tuesday, or Wednesday, with Thursday accounting for 22 percent and Friday accounting for almost 36 percent of the weekly volume. Hourly counts revealed peak periods at noon and late in the afternoon. Maximum peak periods occurred during the extended hours of 4:00 to 6:00 p.m. on Friday.

The distribution of service times (defined as the time customers were actually being served) at the drive-through facilities was found to be negative exponential. The mean service time for 676 observations was 1.96 min. Service times were less than 4.0 min in length 88 percent of the time.

The total amount of time the customer spent in the drive-through system was divided into waiting-time and service-time components to better understand the process that a customer experiences while waiting in line to be served. Figure 1 is a plot of waiting times at one-, two-, and three-channel financial institution drive-throughs as a function of queue length. It can be seen that observed waiting times follow a generally linear relationship with queue length. As shown in Figure 2, service times decreased slightly as queue lengths increased. This behavior may be attributed to the addition of extra tellers as lines got longer or to faster work by tellers as queue lengths increased.

By combining waiting and service times, the average total time spent in the system can be plotted against queue length. Figure 3 presents observed data points obtained at one-, two-, and three-channel systems. The data closely approximate a linear relationship with correlation coefficients for each line greater than 0.95 (where 1.0 represents a perfect linear relationship). A theoretical line (broken line) has also been added based on the overall average service time of the three drive-through facilities of 2.0 min. Deviations in the slope in the linear relationships reflect the variation of service times among the three drive-through systems. The single-channel system, with an average service time of 1.45 min, exhibits a flatter slope. The two- and three-channel systems, which have average service times approaching the overall 2.0-min average, have slopes that more closely correspond to the

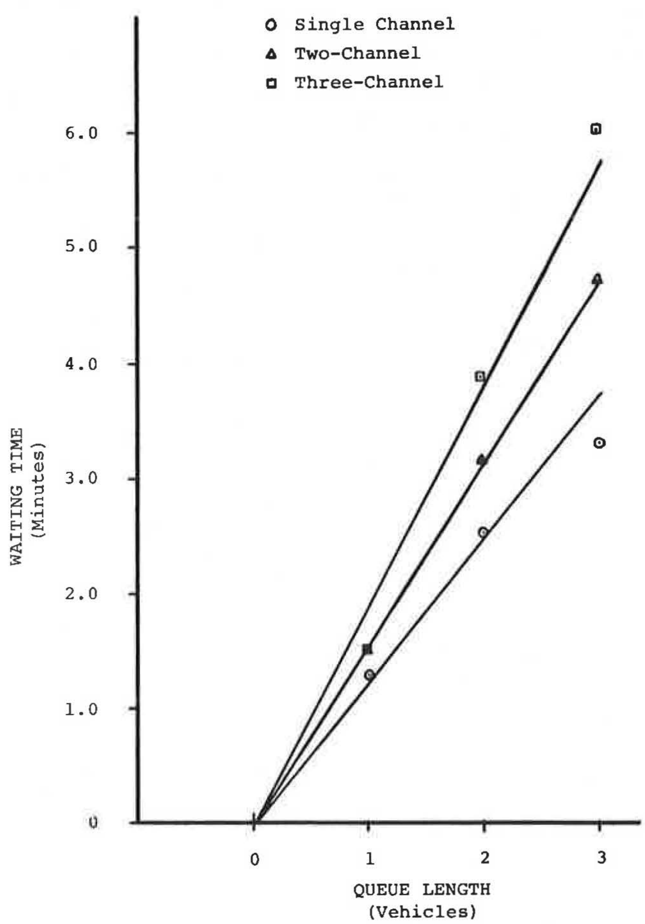

FIGURE 1 Waiting time versus queue length for financial institutions with one-, two-, and three-channel drive-through systems.

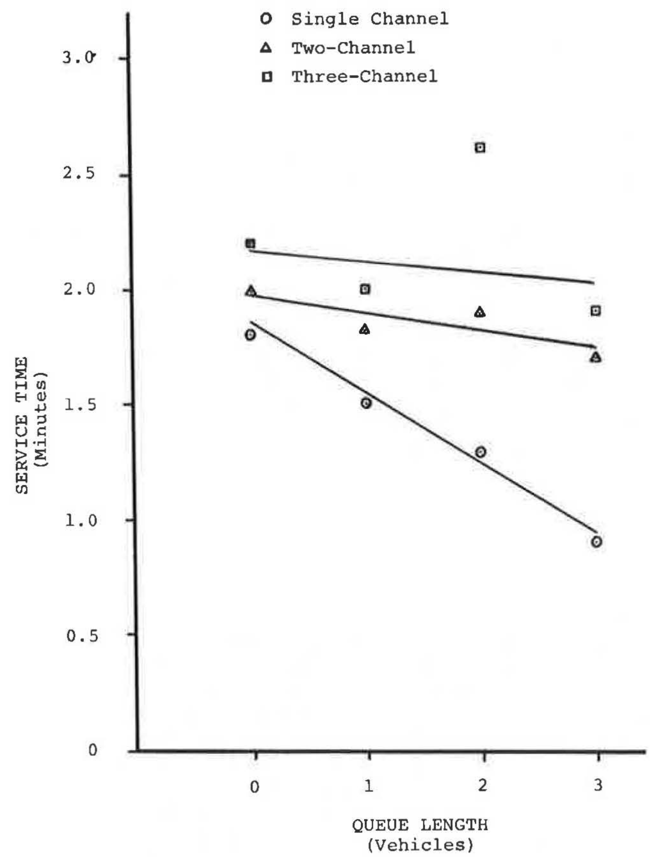

FIGURE 2 Service time versus queue length for financial institutions with one-, two-, and three-channel drive-through systems.

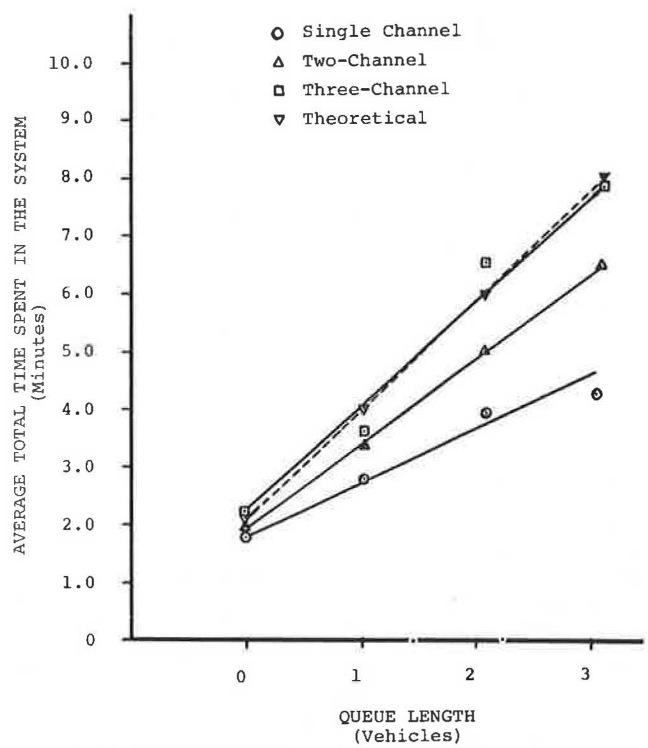

FIGURE 3 Average total time spent in the system versus queue length for financial institutions with one-, two-, and three-channel drive-through systems.

theoretical curve. The following equation describes the linear relationship for the theoretical curve:

$$\text{Total time (minutes)} = 2.00 + 2.00X \quad (1)$$

where X is queue length = 0, 1, 2, 3, ...

This relationship is the basis for the development of user costs at drive-through facilities versus the patron's position in the queue. The total time spent in the system will be used to estimate fuel consumption and to determine the time cost of using a drive-through facility for any queue length.

Average total times (including waiting time and service time) required for operations inside the facility varied between peak and off-peak periods. The average total time was 2.6 min for off-peak periods and 3.4 min for peak periods. The increase in times reflects longer waiting times caused by longer queues during peak periods.

User Costs

Inside Facilities

The cost of inside service at a financial institution is determined by summing the value of personal time and the cost of fuel necessary to start a vehicle engine. The amount of time needed to use an inside facility can be divided into five components: (a) time to park and get out of the vehicle, (b) time to walk into the facility, (c) time to make the transaction (including waiting in line), (d) time to walk back to the vehicle, and (e) time to enter the vehicle and start the engine. A value is obtained by summing the various components of time that will be used to determine user costs associated with inside service. The total amount of time necessary to use the inside service at financial institutions was found to average 3.9 min for off-peak periods and 4.7 min for peak periods. Using a conservative estimate of the value of a person's time as $5.00 per person per hour, the cost of time to the customer becomes $0.325 during off-peak periods and $0.39 during peak periods.

The other component of cost associated with obtaining inside service at financial institutions is the fuel necessary to start a vehicle engine when the customer leaves the facility. Using an engine idling rate of 650 gal per 1,000 hr, a cost of $1.15 per gal of gasoline, and an engine start equivalent to 15 sec of idling time, fuel costs are estimated at $0.03 per engine start.

Combining the costs of time and fuel, the cost of using inside facilities at financial institutions becomes $0.33 (rounded) per customer during off-peak periods and remains at $0.39 during peak periods. It is obvious that time cost is the dominant cost component and fuel cost is almost negligible.

Drive-Through Facilities

The total amount of time a customer spends in a drive-through system is a function of the customer's position in the line or queue. Therefore, it is appropriate to develop a relationship between user costs and queue length. The fuel cost of engine idling and the value of personal time amount to $0.132 per minute and $0.833 per minute, respectively. Thus, the total user cost is $0.965 per minute of time spent in the system. By multiplying this number by the time values obtained from Equation 1 describing the theoretical line in Figure 3, costs can be computed in relation to queue length. Figure 4 shows the costs of using a drive-through facility as a function of the position of the patron in the queue.

Figure 4 indicates that during off-peak periods inside service is more economical for the customer if at least one automobile in the drive-through system is being served. During peak-period operations, inside service is more economical when there are two or more vehicles per channel in the drive-through system.

Using an average weighted value of time spent in the drive-through system of 3.1 min and a range of weekly volume of 500 to 3,000 vehicles, fuel consumption values were computed for various levels of weekly customer volume for drive-through and inside operations. Table 1 shows the results of these computations with column 3 providing fuel consumption data for drive-through operations and column 4 providing fuel consumption data for inside operations. By subtracting the values in column 4 from the values in column 3, the excess fuel consumption associated with the use of the drive-through can be computed. The results in column 5 show that excess fuel consumption varies from 16 to 93 gal per week for the use of drive-through facilities. For a typical two-channel drive-through that handles 2,000 vehicles per week, the excess fuel consumption is 62 gal per week.

Fast-Food Establishments

Traffic Volumes and System Characteristics

On the basis of combined data from the three fast-food establishments, daily counts showed that Friday had the highest volume of drive-through traffic, approximately 18 percent. Sunday had the lowest volume with less than 10 percent of the weekly volume. The peak period of the day was from 12:00 noon to 1:00 p.m., when 13 percent of the total daily traffic occurred.

Based on 834 observations of drive-through operations at fast-food establishments, the average amount of total time spent in the drive-through system was 2.8 min. The observations of drive-through operations comprised 68 percent peak-period data and 32 percent off-peak data. The distribution of the total time was negative exponential. Only 6 percent of the customers spent over 5 min in the drive-through system.

In order to improve efficiency at their drive-through operations, fast-food establishments have adopted what is known as the menu-board concept or the multiple-window system. This system enables customers to place an order and then drive around the building to pay for it. Because of this arrangement, there are no well-defined service-time or waiting-time components for data analysis. As Figure 5 shows, waiting time is defined as the time it takes to reach the menu board to place an order. Service time is defined as the time spent at the pick-up window itself. However, a third component of time involved in this type of configuration is herein defined as the "in-transit" time, which represents a combination of waiting-time and service-time components. In-transit customers are actually being served to a certain degree because their food is already being prepared inside. In order to determine the amount of service being provided, inside preparation techniques would have to be studied.

Figures 6, 7, and 8 graphically show the time components of a vehicle entering a fast-food drive-through facility as a function of queue length. The peak-period waiting time of a vehicle, as shown in Figure 6, increases gradually and then follows a linear pattern as queue length increases. Data were insufficient to develop a waiting-time curve for

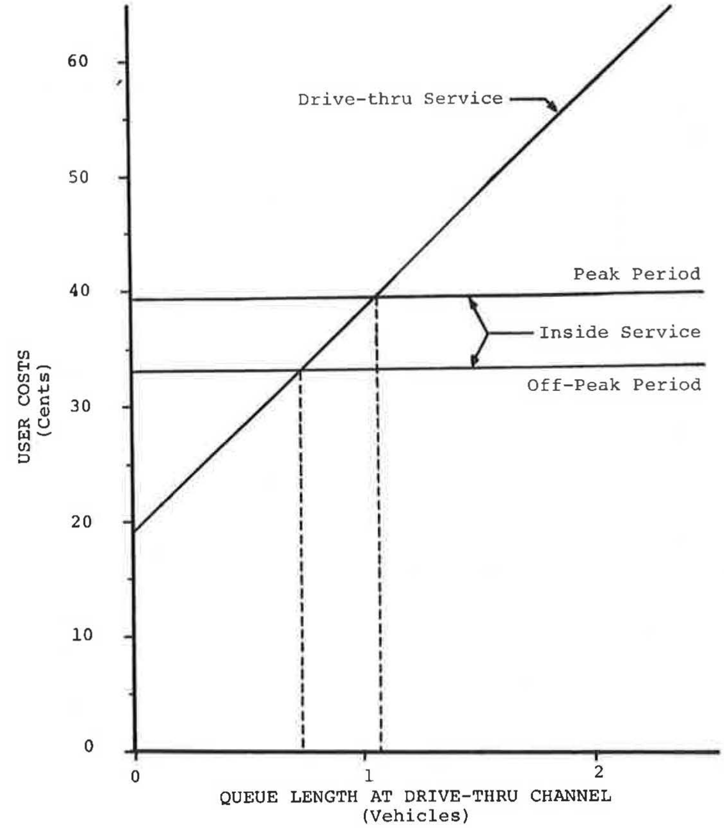

FIGURE 4 User costs for inside service and drive-through service at financial institutions.

TABLE 1 Weekly Fuel Consumption at Financial Institution Drive-Through Facilities for Various Levels of Weekly Customer Volume

Assumed No. of Channels in System	Vehicles per Week	Fuel Consumed in Drive-Through (gal)	Fuel to Start Engine (gal)	Excess Amount of Fuel Consumed (gal)
1	500	17	1	16
1 or 2	1,000	34	3	31
2	1,500	50	4	46
2 or 3	2,000	67	5	62
3	2,500	84	7	77
3 or 4	3,000	101	8	93

off-peak periods. However, a similar linear relationship with a steeper slope would be expected. In-transit times are presented in Figure 7 for peak, off-peak, and overall conditions. The slope of the three curves, as was true for waiting- and service-time curves, depended on the vehicle storage capability of the drive-through facility. The in-transit curves initially increased sharply when queue length increased and then flattened to become approximately constant when the queue was four to five vehicles long. The reason for this was that once a steady queue of five or more vehicles developed, the storage space between the pick-up window and the menu board remained fully occupied. Assuming that there was available storage for five vehicles, patrons entering the queue would first have to wait for the five vehicles ahead of them before they could be served. As seen in Figure 8, service times also became roughly constant as queue length increased beyond four or five vehicles for both peak and off-peak period conditions. Therefore, the constant in-transit times resulted from the product of constant service times and the fixed storage capacity of the drive-through facility. As noted earlier for financial institutions, service times depended on the time of day and the queue position of a vehicle. The leveling of service times at a queue of five to six vehicles, as shown in Figure 8, indicates that maximum system efficiency has been achieved.

The three components of system time are combined in Figure 9. For both peak and off-peak periods, the relationship between queue length and total time spent in the drive-through system is linear. The two equations are as follows:

Off-peak period

$$\text{Total time (minutes)} = 2.20 + 0.89X \quad (2)$$

where X is queue length = 0, 1, 2, 3, ...

Peak period

$$\text{Total time (minutes)} = 1.78 + 0.46X \quad (3)$$

where X is queue length = 0, 1, 2, 3, ...

On the basis of 537 observations of inside operations, the average total time a customer spent in the service line was 3.0 min, including both waiting time and service time. Like the situation involving inside servicing at financial institutions, it was difficult to monitor customers entering and exiting the waiting line during peak periods; therefore, no attempt was made to separate waiting time and service time.

User Costs

Inside Facilities

The cost components for using a drive-through at a fast-food establishment were almost identical to those outlined earlier for financial institutions. The only difference was in the average transaction time. The average total transaction time of 3.0 min at a fast-food establishment remained constant during both off-peak and peak operations. Walking times and the time necessary to get in and out of a vehicle

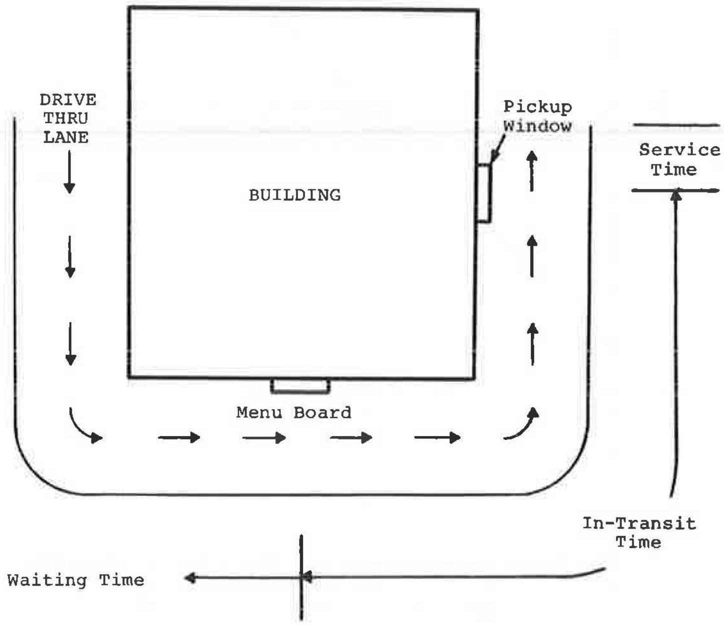

FIGURE 5 Components of system time for a typical fast-food drive-through facility.

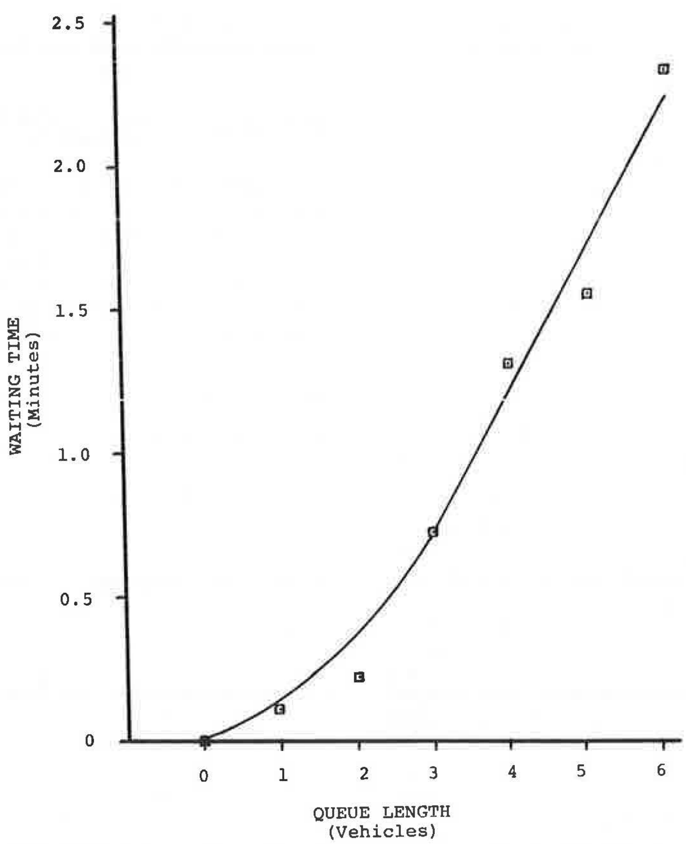

FIGURE 6 Peak period waiting time versus queue length at fast-food drive-through facilities.

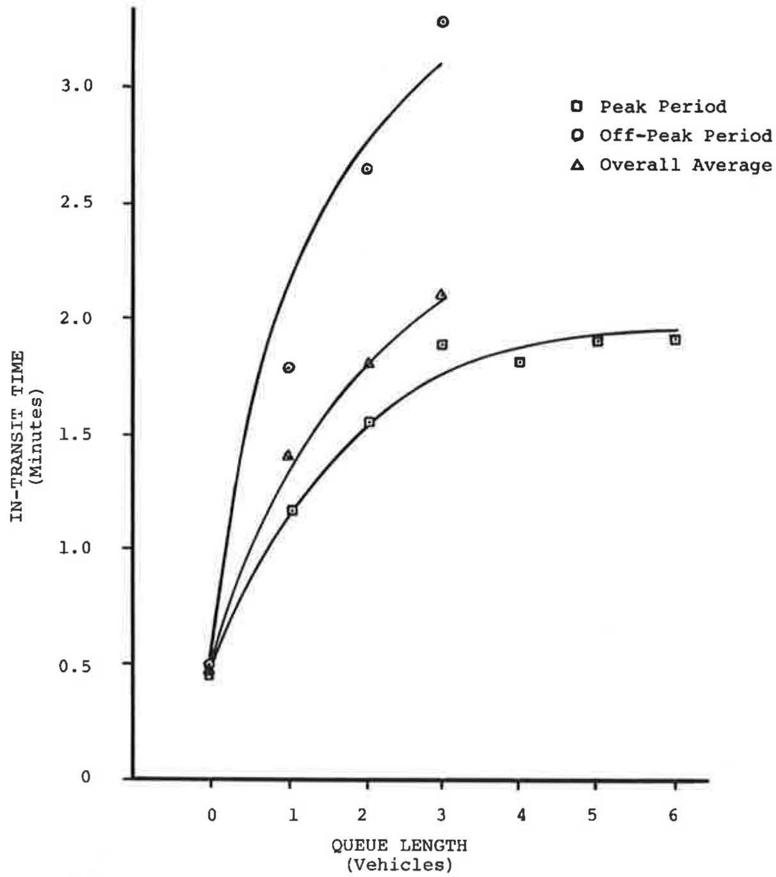

FIGURE 7 In-transit time versus queue length at fast-food drive-through facilities.

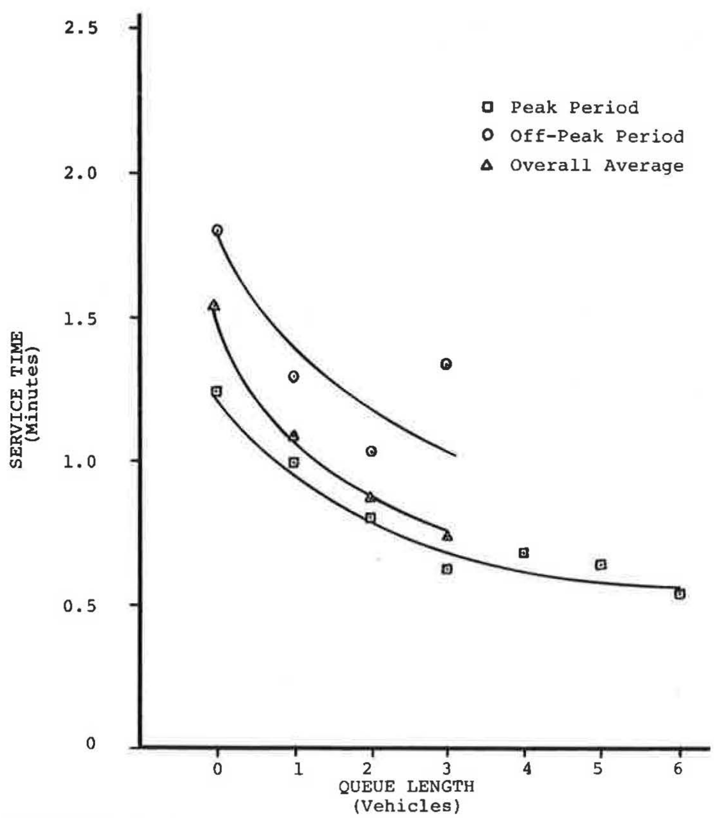

FIGURE 8 Service time versus queue length at fast-food drive-through facilities.

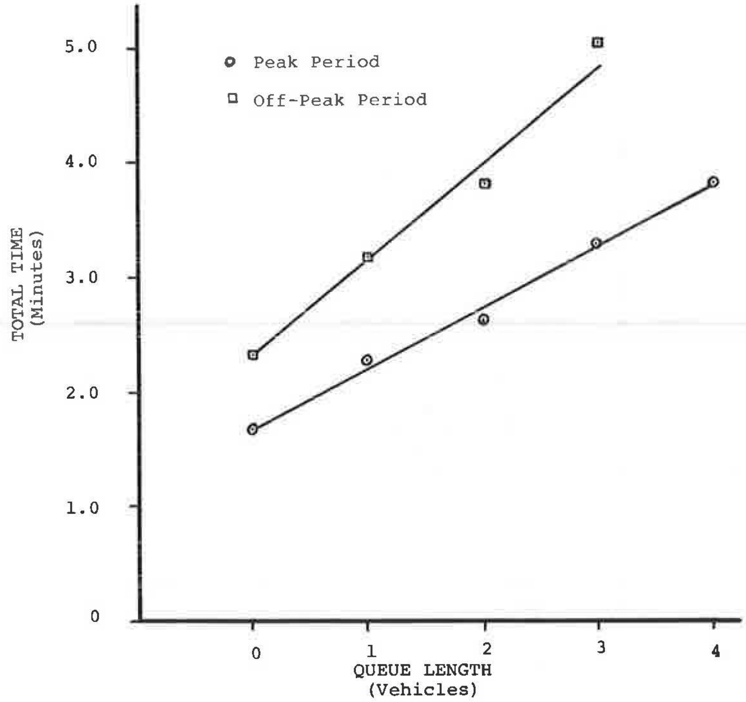

FIGURE 9 Total time in the drive-through system versus queue length for fast-food establishments.

were the same as those estimated for financial institutions (30 sec and 10 sec, respectively). Multiplying these times by the value of time of $5.00 per hour and including the cost of starting an automobile engine, the average cost of using inside facilities was $0.36 per customer. Like the situation at the financial institutions, the value of time spent at fast-food establishments ($0.357) was greater than the cost of fuel ($0.03).

Drive-Through Facilities

Costs associated with the use of drive-throughs at fast-food establishments were also similar to those at financial institutions. By relating waiting times to queue lengths, a series of user costs was developed. As described earlier, user costs for any type of drive-through were $0.965 per minute of time in the system. This cost included the value of time, fuel, engine oil, and engine wear. Multiplying this number by the time values obtained from Equations 2 and 3 that define the linear relationships in Figure 9 yields the data needed to establish a user cost relationship based on queue length. This relationship is shown in Figure 10.

Figure 10 also establishes the break-even point of cost between drive-through and inside service for peak or off-peak periods. The horizontal line represents the cost of doing business inside fast-food establishments, which was earlier reported as $0.36 per customer. For off-peak periods, the break-even point of cost occurs at a queue length of just under two vehicles. For peak periods, the break-even point of cost occurs at a queue length of just over four vehicles. In other words, if there are two or more vehicles in the drive-through line during off-peak periods or five or more vehicles in the line during peak periods, then inside service is more economical for the arriving customer. As was the case for financial institutions, the break-even point for inside versus drive-through service was not significantly affected by increasing or decreasing walking times in and out of the facility by 50 percent. This is because the walking time is short relative to the total time spent inside.

Fuel Consumption

In order to predict weekly fuel consumption for fast-food drive-through facilities, the average queue lengths for peak and off-peak periods were obtained. These figures were 1.92 and 0.73 vehicle, respectively. The average queue lengths were then weighted according to the amount of peak and off-peak traffic the fast-food establishments generated. With a weighting of 52 percent peak-period traffic, an average queue length of 1.35 vehicles was computed. Thus, the average weighted time spent at a fast-food drive-through facility was approximately 2.9 min. Using the average volume of 2,000 vehicles per week per facility, the weekly fuel consumption of each drive-through was 62 gal. If these customers were to use inside facilities instead, the fuel consumption for starting 2,000 automobile engines would be 5 gal. Thus, the average fast-food drive-through facility handling 2,000 vehicles per week causes a net amount of 57 gal of excess fuel consumption. Using the same estimate of 2,000 vehicles per week, the annual fuel consumed at the drive-through operation is 2,960 gal. Table 2 presents weekly excess fuel consumption data at fast-food drive-through facilities for various customer volumes. It can be seen that excess fuel consumption ranges from 15 to 86 gal per week per facility, depending on the number of patrons using the facility.

SUMMARY AND CONCLUSIONS

Because the drive-through facility has become a widespread phenomenon in recent years, this study's primary purpose was to examine the economics of the

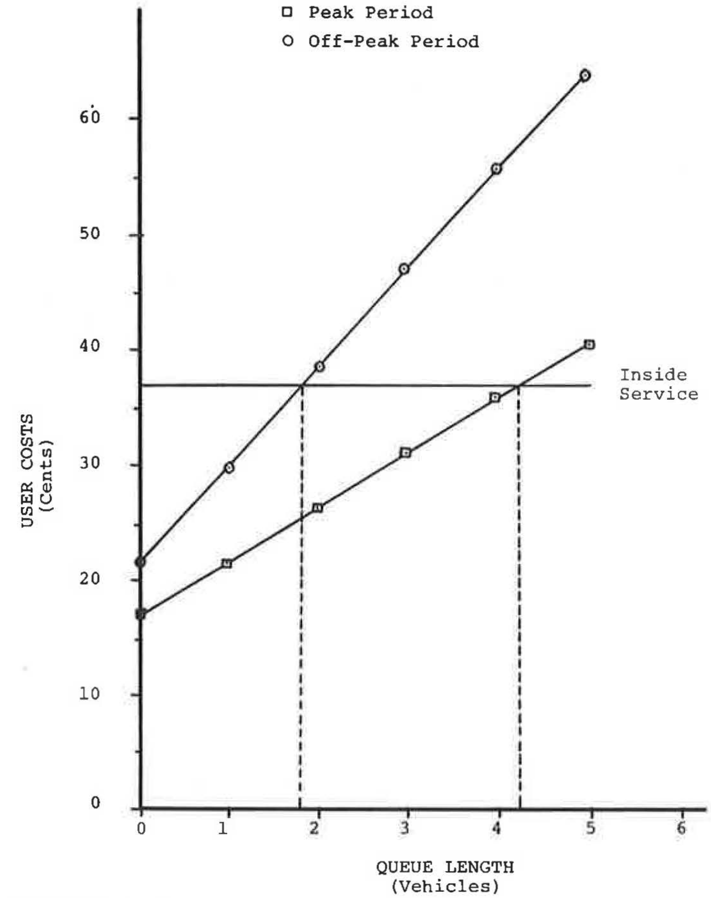

FIGURE 10 User costs of inside service and drive-through service at fast-food establishments.

TABLE 2 Weekly Fuel Consumption at Fast-Food Drive-Through Facilities for Various Levels of Weekly Customer Volume

Vehicles per Week	Fuel Consumed in Drive-Through (gal)	Fuel to Start Engine (gal)	Excess Amount of Fuel Consumed (gal)
500	16	1	15
1,000	31	3	28
1,500	47	4	43
2,000	62	5	57
2,500	78	7	71
3,000	94	8	86

drive-through system from the standpoint of the customer and to determine how much excess fuel automobiles consume when customers use these facilities.

The time that a customer spent at a drive-through facility was related to the customer's position in line. The data obtained reveal that the average drive-through service time for financial institutions was 2.0 min. Thus, the linear equation total time (TT) = 2.00 + 2.00X was developed to predict the total time spent in the system as a function of the customer's position in the queue.

For fast-food establishments, service times varied greatly and depended on peak or off-peak operations and queue position. Linear relationships were also developed to compute total time spent in the system. For off-peak periods, the equation TT = 2.20 + 0.89X was used. For peak periods, the equation TT = 1.78 + 0.46X was used to estimate total time as a function of queue position.

The average total time of 3.0 min was determined for inside service at fast-food establishments. This value represented both peak and off-peak operations. At financial institutions, the average total time was 2.6 min for inside service during off-peak periods. This value increased to 3.4 min during peak-period operations.

User costs were computed for drive-through and inside service. These costs included the value of time and fuel costs, oil costs, and engine wear costs for idling vehicle engines. These costs indicated that for financial institutions inside service was more economical to the customer when one or more vehicles per lane were in the drive-through during off-peak periods and two or more vehicles per lane were in the drive-through during peak periods. For fast-food drive-through facilities, inside service was more economical during off-peak periods when two or more vehicles were in the drive-through system and during peak periods when five or more vehicles were in the system.

Fuel consumption at drive-through facilities was also computed. For the average financial institution handling 2,000 vehicles per week through a two-channel drive-through system, 62 gal of excess fuel were consumed per week, or 3,210 gal annually. For the average fast-food establishment handling 2,000 vehicles per week through the drive-through system, an excess of 57 gal of fuel was consumed per week, or 2,960 gal annually.

A number of significant conclusions can be drawn from the data that were collected and analyzed. First of all, customers using the drive-through may not always be served as quickly as customers using inside

facilities. In other words, drive-through facilities are not always the fastest means of doing business. An economic guideline was established in this study to help the customer decide which type of facility to use.

It can also be concluded that many of the service-time and waiting-time characteristics found in this study can be of use in determining adequate storage design characteristics for drive-through facilities. Developing a proper design for the expected number of drive-through patrons is essential to the effectiveness of the drive-through system. Inadequate design can lead to traffic problems that can contribute to congestion on the surrounding street network and to inefficient operation that discourages business.

Based on observations of customer preference, another conclusion of the study is that the drive-through is certainly a convenience for which Americans are willing to pay a premium in user costs. Whether the reason is the desire of customers to remain in the comfort of their automobile or the convenience the drive-through provides of conducting business in more casual attire, the drive-through has made its mark on our society and will continue to provide service for many years in the future.

It has been documented in this study that drive-through facilities consume thousands of gallons of excess fuel on an annual basis. In the event of another serious fuel shortage, the use of drive-through facilities in areas where adequate parking is available should be discouraged as a public policy in an effort to conserve fuel that would otherwise be consumed in an unproductive and wasteful manner.

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Utility Industry Progress Toward Implementing Electric Vehicle Introduction

GERALD MADER and ORESTE BEVILACQUA

ABSTRACT

The work of the Electric Vehicle Development Corporation (EVDC) is summarized. Founded in 1983, EVDC is charting and pursuing a realistic course for electric vehicle (EV) commercialization in the United States. The corporation's first objective is to support the development of an EV for use in commercial fleets. EVDC plans to demonstrate a market-acceptable commercial EV that uses near-term battery and drivetrain technology in the late 1980s. To accomplish this, five interrelated elements are being addressed: market identification, electric van specification, organization participation, electric van development, and financing and promotion. An advanced EV is expected to be introduced in the early 1990s. EVDC is moving from a technology-driven toward a market-driven approach to EV promotion that emphasizes the vehicle's advantages to the end user or consumer. EVDC hopes to accelerate EV promotion through coordinated vehicle design efforts, performance testing, and EV demonstrations, and by inducing special electric utility incentives such as lower off-peak rates. The coordinated participation of various EV stakeholders (the U.S. Department of Energy, the EV User Task Force, manufacturers, and the Electric Power Research Institute) is required to ensure that EVDC's planned EV introduction strategy is successful. Drawing these diverse organizations together is an arena in which EVDC can play an important leadership role.

The Electric Vehicle Development Corporation (EVDC) is a nonprofit organization formed in November 1983 to advance the development and introduction of electric vehicles (EVs). The corporation's nucleus consists of 30 U.S. utilities that serve a collective population of over 70 million consumers. By the end of 1985, EVDC membership is expected to include more than 50 utility companies as well as business and industrial organizations with EV interest.

EVDC's most important role is to chart and pursue a realistic course for EV commercialization in the United States. EVDC has developed a step-by-step approach to accomplish this commercialization and is working with and through other organizations toward