

CHAPTER 5

# Waiting lines and self-service

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## Introduction

Most customers dislike waiting in service lines (Katz et al. 1991; Jones and Dent 1994; Kumar et al. 1997). Customers generally view time as a valued resource, so they may decide that the wait is too long and leave the line or not return (Friedman and Friedman 1997; Pruyn and Smidts 1998). Traditionally, operations management techniques have been used to adjust the number of service points or improve the efficiency of the service process. These techniques are successful over time; however, since demand is not known with certainty in many service situations, it may exceed capacity in the short term. When these situations occur, the customers' psychological experience needs to be managed by influencing the perceived waiting time. The customers' perceived waiting time might influence their view of the service quality (Katz et al. 1991). While hospitality managers are continually striving to decrease actual waiting time or manage perceived waiting time, costs must be evaluated. In response to these operating costs, self-service technologies have been incorporated into many service firms. Research on these theoretical concepts of waiting and self-service technologies is based on tenets in marketing, psychology and operations management.

This chapter is divided into four major sections. The first section investigates perceived waiting time research related to psychology and consumer behaviours. The second section examines the possible relationship between waiting time, service quality, and customer satisfaction. The third section explores the ways of managing waiting time management by using psychology, operations research, and management science. Finally, the fourth section discusses the introduction of technology in self-service and customer reactions.

## Perceived waiting time experience and social-psychological theory

Perceived waiting time refers to the customer's perception of the duration of waiting time (Taylor and Fullerton 2000). Individuals perceive waiting time subjectively, based on personal experience and their reaction towards waiting time (Maister 1985). Clemmer and Schneider (1993), Dubé-Rioux et al. (1989) and Pruyn and Smidts (1998) explored the background of these interactions and models in their attempts to suggest the mechanisms of how individuals make decisions, analyse the outcomes of decisions, feel about events, cooperate with difficult situations, and judge other people (Dubé

et al. 1991). These models can be applied to individual reactions towards waiting time in similar ways, such as how an individual feels about waiting time, how one cooperates with the waiting situation and how one judges service providers during waiting time (Hui and Tse 1996). These social-psychological theories and models include dissonance theory, attribution theory, negative affection, field theory, a resource allocation model, an uncertainty reduction model and a sense of control model.

Dissonance theory states that waiting time information prior to the wait reduces a person's dissatisfaction while he is waiting (Clemmer and Schneider 1993). The basic premise of dissonance theory is that a person feels discomfort when he experiences two discordant cognitions (Festinger 1957). To reduce this feeling of discomfort, the person tries to justify his decision by convincing himself that the outcome is worth the effort. Therefore, customers who have prior knowledge of the specific length of waiting have a tendency to accept waiting, and their dissatisfaction is reduced. Clemmer and Schneider's (1993) research investigated how a prior notice of waiting time affected customers' satisfaction of waiting lines in banks. Their research results showed that giving prior information on the duration of waiting time significantly influenced customer satisfaction. Customers who were informed about the duration of waiting time had significantly higher satisfaction levels than those who did not receive any information.

While dissonance theory explains how individuals try to justify their own decisions, attribution theory explains how individuals understand events, define causes and assign blame for different outcomes (Jones and Davis 1965). Attribution theory states that when an individual judges another person's behaviours, he also has a tendency to evaluate the person's intention. For example, if customers recognize that a service provider is making an effort to reduce waiting time, customers will place less blame on the service provider (Bitner 1990; Clemmer and Schneider 1993). Baker and Cameron (1996) stated that if a service provider were busy doing clerical activities instead of serving, customers would be dissatisfied because they perceive the service provider is making them wait longer. This may increase customers' negative affections towards waiting time. Taylor (1994) focused on how delay might cause customers' negative affective reactions such as uncertainty and anger, and how these negative affective reactions influence the overall evaluation of service. Taylor also pointed out that negative affective reactions influenced the overall evaluation of service, and ultimately customers' intention to return. She surveyed airline passengers who were waiting for flights to explore the

relationships between delay, negative affective reactions, and evaluation of service. Results showed that these negative affective reactions were stronger if the customer thought that the service provider controlled waiting time and if the customer was less occupied during waiting time. Taylor concluded that delay indirectly influences the overall evaluation of service and this influence is mediated by negative reactions. Houston et al.'s (1998) study of bank customers confirmed higher levels of negative affect when customers perceived that the bank controlled the wait.

While Taylor (1994, 1995) focused on control of delay and degree of filled time, Dubé et al. (1991) focused on the stage of service when the delay occurred. In a field experiment with high-school students, an 8-min delay was artificially created during three different stages of the service process: The delay occurred either before the service started (preprocess), in the middle of the service procedure (in-process) or after the service had finished (post-process). Dubé-Rioux et al. concluded that the delays that occurred preprocess and post-process caused stronger negative affective reactions than when the delay occurred in-process of the service procedure.

This conclusion is consistent with Lewin's (1943) field theory, which states that an individual is goal directed. If there are barriers to make the goal hard to reach, the individual feels a negative affect. Therefore, these barriers are the source of negative affective reactions in a person's psychological field. For example, in a restaurant, the customer's main goal is to consume a meal. When waiting time becomes too long, the customer feels upset because the delay keeps the customer from accomplishing the goal of dining. For this service situation, the delay is a source of negative affective reaction. When delays occur during preprocess or post-process, customers feel like they are outside of the process scope, and the impact of delay on customers' feelings is stronger. On the contrary, when delays happen during in-process, customers feel like they are inside the process scope, which makes them 'inside of the goal region', and delays at this point do not cause intensive negative feelings. Hui et al. (1998) used this basic experimental model, but added three categories of delays: procedural, correctional and unknown. Procedural delays occurred when customers had to wait due to an existing queue and correctional delays were atypical due to service breakdowns, such as computers being out of service. Unknown delays were procedural delays that weren't explained. Hui et al. (1998) found that procedural and unknown delays yielded more negative impacts on customer responses during the preprocess stage than the in-process stage, while correctional

delays yielded the opposite affect. While Hui et al. (1998) and Dubé-Rioux et al. (1989) and Dubé et al. (1991) claimed that the timing of delay at different stages of the service process can magnify negative affective reactions, Zakay (1989) asserted that a person's cognitive time estimate is a key factor for the length of perceived waiting time.

The resource-allocation model (Zakay 1989) states that providing waiting information will diminish customers' awareness of the passage of time. When a person is more conscious about the time spent waiting, he may reduce their service evaluation. However, distractions and information would make a person less conscious about the length of time. For example, if a person watches TV during the waiting period, he will pay less attention to the passage of time, and the perceived waiting time will be reduced. Hui and Tse (1996) found that providing information about the waiting time significantly improved customers' evaluations of service. When customers were told the waiting duration and queuing information, customers' attention towards the passage of time was reduced. Katz et al. (1991) investigated bank customers' perceived waiting time and found that if management gave waiting duration information to customers, it reduced customers' perceived waiting time, but did not increase service satisfaction.

Another possible reason for better service evaluations when waiting time information is provided is based on the uncertainty reduction model. The uncertainty reduction model states that people tend to have stress when uncertainty exists. Applying this premise to waiting situations, the uncertainty of duration and cause of waiting could make customers more stressed (Osuna 1985). Information such as expected waiting time, cause of waiting and the number of people ahead of the customer reduces the uncertainty of the waiting situation. Since the customer knows how long the waiting time will be, what causes the wait and how many people are waiting, the customer understands the whole waiting situation, which reduces uncertainty. Consequently, this information reduces stress and enhances service evaluation (Taylor 1994). Absence of control also can cause stress for the waiting customers, because a sense of control significantly influences people's psychological reactions towards stressful situations (Langer and Saegert 1977). Hui and Tse (1996) tested the value of information on the waiting duration and queuing length on customers' evaluation of service. Results showed that for short waits (5 min), no information was needed; for intermediate waits (10 min), waiting duration information was evaluated higher than queuing information; and for long waits (15 min),

queuing information was more effective than waiting duration information.

To determine the effects of offering wait duration information and explanations for delays, Groth and Gilliland (2006) developed a laboratory test using students. Results indicated that providing no explanation led to more positive attitudes than when the service provider caused the delay. These results are not consistent with Hui and Tse (1996); however, the delay in the Groth and Gilliland study was 15 min. A conceptual framework that combines attribution theory and assimilation-contrast theory, based on perceptions and expectations, cultural models of time perception, and social injustice was proposed by Nie (2002). Nie encouraged further research on the relationships between the factors within the framework.

Another potential factor is 'social regard'. Butcher and Heffernan (2006) define this as 'making the customer feel valued in the social interaction'. They conducted an experimental in a café setting, adjusting actual wait times and friendliness of the service employee and offering an employee apology for the wait. The level of social regard perceived by the customers influenced their positive word of mouth and repeat visitation intention.

In summary, social and psychological theories help to explain the mechanism of how individuals react or feel towards waiting time. However, these social and psychological theories must be integrated with the marketing aspects of service quality and customer satisfaction for a more complete view of waiting behaviour.

## Waiting time, service quality and customer satisfaction

Service quality and customer satisfaction are directly related to operational success; however, they are difficult to manage because they are intangible and hard to quantify.<sup>1</sup> For several decades, many research studies were conducted to investigate service quality and customer satisfaction. Research on customer satisfaction started in the 1970s, and service quality research started in the 1980s (Oh and Parks 1997). In this section, research studies that relate waiting time to customer satisfaction and service quality will be reviewed to explore how perceived or actual waiting times might influence customer satisfaction or evaluation of service quality.

<sup>1</sup>See also Chapter 13.

Customer satisfaction is considered to be a response rather than an attitude, and service quality is considered to be an attitude or global judgement (Oh and Parks 1997), which also influences customer satisfaction (Cronin and Taylor 1992). Generally, extended waiting time is considered to be a negative factor for evaluation of service quality and customers' satisfaction (Chebat and Filiatrault 1993). Davis and Vollman (1990) found a direct relationship between actual waiting time and satisfaction in a fast food setting. A later study by Davis and Heineke (1998) explored the same issue.

Parasuraman et al. (1985) suggested that delay would negatively influence several attributes, and consequently the overall evaluation of service. Berry and Parasuraman (1991) also stated that promptness or punctuality is an important element of service reliability, which is a strong attribute of overall evaluation of service quality for customers. Using these premises in a study with airline passengers, Taylor (1994) concluded that waiting time influences overall evaluation of service quality negatively. An extended waiting time lowered customers' evaluation for the tangible and reliability attributes of service quality Taylor (1995).

Roslow et al. (1992) suggested that waiting time and service quality are two main keys to determine customer satisfaction. From their research with bank customers, they concluded that waiting time is a more important determinant of customer satisfaction than service quality. Tom and Lucey (1995) agreed that there are negative relationships between waiting time and customer satisfaction, and customers are satisfied when they wait for shorter time periods than they expected. Pruyn and Smidts (1998) also suggested that the disconfirmation of personal acceptable waiting time and perceived waiting time influences appraisal of the wait, and the appraisal of the wait influences satisfaction. They stated that perceived waiting time is a stronger determinant of customer satisfaction than actual waiting time.

Lee and Lambert (2005) surveyed customers in a scramble cafeteria to determine if service quality was influenced by the discrepancy between the expected waiting time and the perceived waiting time. Their results supported results by Parasuraman et al. (1985) in that the discrepancy influences the reliability aspect of service quality, but not tangibility, responsiveness or assurance aspects. Customers whose perceived waiting time was longer than either their expected or reasonable time reported lower satisfaction scores.

Hwang and Lambert (2005) utilized the scenario method to determine satisfactory, unsatisfactory and very unsatisfactory waiting times for customers in a multi-stage restaurant.

Customers' waiting times for being greeted, being seated, ordering, being served, receiving the check and paying varied, depending on what level of service they were willing to accept; however, they ranked the greeting and ordering stages as the most important stages.

Customers' assessment of service quality and their overall satisfaction is clearly related to their waiting time. These concepts need to be further explored to determine the interrelationships between the various waits and the customers' expectations.

## Waiting time management

Reducing waiting time has been an important issue for the service industry since waiting time influences customer satisfaction and their evaluation of service quality. Perception management and operations management are two major approaches to managing waiting time (Tom and Lucey 1995). Perception management focuses on reducing perceived waiting time and is based on cognitive psychology and marketing theories. On the other hand, operations management focuses on reducing actual waiting time and is based on management science and operations research theories.

### Perception management: managing perceived waiting time

Maister (1985) proposed that unoccupied time, preprocess waits, uncertain waits, unexplained waits, unfair waits and solo waits are perceived to be longer than occupied time, in-process waits, known waits, explained waits and group waits. Therefore, by manipulating these waiting conditions, managers might be able to influence perceived waiting time.

Another well-known principle is giving more control to customers choosing waiting lines (Haynes 1990). For example, different telephone numbers may be available depending on customers' needs such as orders, customer services and bill inquiry. In this way, customers have more control over their selection of queues, and they tolerate longer waiting times. However, contrary to this, a study by Groth and Gilliland (2006) surveyed 135 customers of two fast food stores – one with a single wait line and the other with multiple lines. They found no difference in actual wait times, but those in the single line system perceived their wait time to be shorter.

In their study on placement of delays, Dubé et al. (1991) found that customers preferred to wait in an integrated format rather than a segregated one. For example, customers preferred

to wait 8 min at once rather than to wait 5 min in one line and 3 min in a second line. Therefore, they suggested that service providers should minimize waiting time before and after service, and should integrate a series of short waiting steps into a longer waiting period.

Management also can add electronic news boards and clocks that show estimated waiting time to reduce perceived waiting time and boredom (Katz et al. 1991). Jones and Peppiatt (1996) found that customers who were idle estimated waiting times longer than people who were occupied, either by watching TV or because they were in a group. Chebat et al. (1993) investigated the effects of musical and visual cues on perceived waiting time. The tempo of music had no effect on perceived waiting time, but the high amounts of visual information reduced perceived waiting time. Chebat et al. (1995) investigated the effects of mood on time perception and acceptance of waiting. They concluded that a customer's happy mood improved the acceptance of waiting but had no impact on time estimations.

Baker and Cameron (1996) emphasized the importance of service environment attributes, such as lighting, temperature, music, colour, furnishings and spatial layout for managing perceived waiting time. They insisted that the higher the level of lighting, the greater the temperature beyond the range of comfort, the warmer the colour, and the higher the level of discomfort of furnishings, the more the negative effects and the longer the perceived waiting times. In a subsequent study, Cameron et al. (2003) examined the effects of music, wait-length evaluation, and mood on customers' overall experience. Although music preference influenced wait-length evaluation and mood, only mood influenced customers' attitude towards the experience.

Improving the aesthetic appearance of the waiting environment can reduce negative affects of waiting time on satisfaction (Pruyn and Smidts 1998). Video displays, wall magazines, mirrors and product samples also distract attention from waiting time.

This section explored how managers can influence perceived waiting time by enhancing waiting environment. While this approach uses cognitive and psychological disciplines to improve customer satisfaction related to perceived waiting time, a second approach uses management science and operations management theories to reduce objective waiting time.

## Operations management: management of actual waiting time

Management science and operations management disciplines frequently apply scheduling, simulation, forecasting and

process design methodologies to reduce actual waiting time. Queuing theory is one of the most important theories used to study actual waiting time. In the following section, queuing theory will be reviewed.

Hornik (1984) stated that individuals have a tendency to overestimate waiting time, after he investigated the relationship between actual waiting time and perceived waiting time. Actual waiting time, which is the objective or clocked waiting time, has been studied using queuing theory from the operations and management science discipline. Queuing theory was developed in the early 1900s by A. K. Erlang to study fluctuating demands in telephone traffic. After World War II, Erlang's work was extended to general business applications, and today it is used extensively in both manufacturing and service industries.

Since waiting time is considered to be a key factor for customer satisfaction, fast food restaurants aggressively use these methods to reduce waiting time. In 1978, Burger King introduced specialty sandwiches. By using a simulation model, they found that a new sandwich would cause a service delay of 8sec, which would cause a \$39 million loss in sales capacity for Burger King. Additionally, Burger King applied simulation modelling to determine the optimal distance between the order station and the drive-through window to minimize waiting time, to project the number of workers needed and to decide their placement in the restaurant (Swart and Donno 1981).

Similarly, Hueter and Swart (1998) used an integrated set of operations research models in Taco Bell, by applying a forecasting model for predicting customer arrivals, a simulation model for determining optimal labour requirements and an integer programming model for scheduling and allocating employees to minimize labour cost. Hueter and Swart observed when customers would likely leave a waiting line because they perceived the waiting time to be excessive and found that after actual waiting time exceeded 5min, customers' perceived waiting time increased exponentially. They decided that a 3-min average time in a queue was an optimal level of waiting since only 2.5% of customers who wait 3min will leave the line. Lee and Lambert (2007) used customer survey results to determine the acceptable waiting time for customers in a scramble cafeteria. Simulation was utilized to determine the number of employees needed per station to reach the desired waiting time goal. While the desired waiting time, that is 3min, was reached in most stations, the grill station required renovation or menu changes to reach the goal.

Service process design affects the wait that customers experience, so several researchers (Sheu and Babbar 1996; Kolesar and Green 1998) have explored alternate service process designs. Sheu et al. (2003) compared four queuing service designs to determine the best process design. They recommended that system designs be flexible so managers could switch process systems based on parameter values, such as ordering time, preparation time and demand. Using system information based on approximations, Whitt (1999) developed algorithms to predict the waiting time of new customers or customers in line.

Another approach to reduce the objective waiting time is based on using time as a form of price. Ittig (1994, 2002) modelled aggregate customer demand as a function of the average waiting time to determine the number of servers needed to maximize profit. Waiting line segmentation gives options to customers who are willing to pay a premium for faster service (Friedman and Friedman 1997). Using segmentation reduced the average number of customers in a queue and the average time in a queue, and they suggested that segmentation is useful for a very congested system.

However, there may be circumstances where consumers are deterred from leaving the queue, so-called renegeing behaviour, by the length of the queue. Zhou and Soman (2003) found that as the number of people behind in the queue increases, the consumer is less likely to renege, largely because their affective state improves. This derives from making social comparisons with others (in the queue) and regarding those behind them as less fortunate.

In summary, several researchers have focused on how to reduce either perceived waiting time or actual waiting time. These research studies provide good suggestions that management can implement. The interdisciplinary approach of both psychology and operations research gives a better understanding of the relationship among perceived and actual waiting time, customer satisfaction, and service quality. Although research on customer–service provider interactions has been extensive, research on interactions between customers and technological interfaces is less advanced. As self-service technologies continue to expand in the hospitality industry, this area is becoming more critical for research.

## Self-service technologies

As labour costs increased in the 1990s, firms began to look at technology for answers. The solutions found included

self-service methods of ordering and paying. Self-service refers to situations when the customer performs all aspects of a service encounter without help from employees, such as ATMs and automated hotel checkout (Bitner 2001). While customers were becoming more comfortable with technology, research was not available to support customer acceptance (Meuter and Bitner 1998). Meuter et al. (2000) explored service interactions using self-service technologies to determine the sources of satisfaction and dissatisfaction. Using the critical incident method through a web survey, the researchers collected 823 responses of which 56% were positive reactions and 44% were negative ones. Major reasons cited for positive experiences included that the technology was better than the alternative, that it worked successfully and that it helped solve a problem. Negative experiences were due to technology failure, poor design, and process failure. Meuter et al. (2000) recommended that firms identify how customers evaluate self-service technologies in order to design satisfactory technologies. Based on customer decision-making research, Dabholkar (1996) proposed and tested two models of service quality for technology-based self-service systems. Using a scenario approach, Dabholkar surveyed college students about using self-service technology at fast food restaurants. Waiting time showed a highly significant negative effect on intention and a significantly negative effect on expected service quality. These results should warn managers to install enough self-service stations to minimize waiting lines. Recommendations for future studies included the identification of additional situational influences and exploration of various combinations of situational influences. Also, different population groups need to be studied to reflect differences according to gender, age and cultural group.

Consumers rate a service negatively when waiting times are long (Pruyn and Smidts 1998) or there are delays (Taylor 1994, 1995). Dabholkar and Bagozzi (2002) questioned if the same were true for technology-based self-service models. They examined situational influences of perceptions of waiting and crowding in a quick-service scenario-based survey. They hypothesized that if customers perceive a long waiting time, the relationship between perceived ease of use and attitude towards technology-based self-service would be strengthened. Results supported the hypothesis. Dabholkar and Bagozzi (2002) recommended that managers emphasize the ease of use and enjoyment of using technology-based self-service to counteract long waiting lines. However, as waiting time increases, customers will use alternate options, so the authors reiterated

their recommendation that managers need to have sufficient self-service stations to minimize waiting times.

In 2005, Meuter et al. recognized that research on self-service technologies had focused on individual differences (Parasuraman and Colby 2001), and on attitudinal models to determine intentions (Dabholkar and Bagozzi 2002). To further the literature base, they explored the fundamental factors that influence customers to try new self-service technologies and developed a model to predict self-service technology trial behaviour. Using an Internet-based ordering system, results showed that role clarity, the consumer's understanding of the process, and extrinsic motivation, including price discounts and time savings, were the dominant variables that predicted the use of the self-service ordering system. Thus, increased experience with the Internet increases the probability of a customer's use of self-service technologies, and this experience also improves role clarity, motivation and ability, which increases the probability of use.

These results suggest that future research should determine the predictors of role clarity and the strength of these relationships. Also, the influences on commitment to self-service technologies and the differential influences of role clarity, motivation and ability during the adoption process need to be explored. The impact of using self-service technologies on customer loyalty and profitability is another important research thread. Managers need to understand the implications of the shift away from interpersonal interactions and how they can maintain trust and loyalty within customer relations.

## Summary and conclusions

Time is a very valuable asset for every person, and waiting time may cause unpleasant feelings of customers, and this would ultimately influence the future success of business. Researchers generally agree that waiting influences service quality evaluations and customer satisfaction ratings. Additionally, many variables have been shown to affect the waiting evaluation, including the perceived wait time, the placement of the wait, the environment of the waiting area and the availability of distractions. However, the interactions of these variables should be addressed to determine the strength of each. Many of these studies were completed in laboratories or using scenario-based surveys. To verify the results, they need to be replicated in various real service settings.

The relationships among satisfaction, service quality, affective reaction, perceived waiting time and objective time could

be explored using structural equation modelling to obtain a more complete model. Additionally, simulation models could be developed to conduct cost analysis for customers' waiting time, intention to return, and labour to help managers determine waiting time strategies. Coupled with operations management techniques, research on social psychological aspects of waiting should suggest appropriate solutions for hospitality managers.

The substitution of technology for face-to-face interactions in service encounters has increased opportunities for research. Since customers will continue to expect quality service, researchers need to explore how waiting time and service delays affect customer satisfaction in a variety of self-service environments. Variables such as age, gender, customer readiness, enjoyment, physical environment and safety aspects will need to be evaluated for their relative importance and their impact on the adoption process. As self-service technologies advance, such as pay at table, and food ordering at the gas pump, the pivotal attributes of these technologies need to be addressed to determine how they can be improved. While Meuter et al. (2000) found that role clarity, motivation and customer ability are significant, the main drivers of role clarity should be explored further. The strength of each of the antecedent predictors of consumer readiness, such as perceived risk, previous experience and need for interaction should be determined. Hospitality firms wanting to use self-ordering would benefit by knowing how to attract customers. Then the relative importance of role clarity, motivation and ability on each stage of the adoption process should be explored. These research studies should be designed to validate the existence of the moderating variables and then determine the direction and impact in various settings.

## References

- Baker, J. and Cameron, M. (1996) The effects of the service environment on affect and consumer perception of waiting time: an integrative review and research propositions, *Journal of the Academy of Marketing Science*, 24, 4, 338–349
- Berry, L. L. and Parasuraman, A. (1991) *Marketing Services: Comparing Through Quality*, Free Press: New York
- Bitner, M. J. (1990) Evaluating service encounters: the effects of physical surroundings and employee responses, *Journal of Marketing*, 54, 2, 69–82
- Bitner, M. J. (2001) Service and technology: opportunities and paradoxes, *Management Service Quality*, 11, 6, 375–379

- Butcher, K. and Heffernan, T. (2006) Social regard: a link between waiting for service and service outcomes, *International Journal of Hospitality Management*, 25, 34–53
- Cameron, M. A., Baker, J., Peterson, M. and Braunsberger, K. (2003) The effects of music, wait-length evaluation, and mood on a low-cost wait experience, *Journal of Business Research*, 56, 6, 421–430
- Chebat, J., Gelinias-Chebat, C. and Filiatrault, P. (1993) Interactive effects of musical and visual cues on time perception: an application to waiting lines in banks, *Perceptual Motor Skills*, 77, 995–1020
- Chebat, J. C. and Filiatrault, P. (1993) The impact of waiting in line on consumers, *International Journal of Bank Marketing*, 11, 2, 35–40
- Chebat, J. C., Gelinias-Chebat, C., Vaninski, A. and Filiatrault, P. (1995) The impact of mood on time perception, memorization, and acceptance of waiting, *Genetic, Social, & General Psychology Monographs*, 121, 4, 411–424
- Clemmer, E. C. and Schneider, B. (1993) Managing customer dissatisfaction with waiting: applying social-psychological theory in a service setting, *Advances in Services Marketing and Management*, 2, 213–229
- Cronin, J. J. and Taylor, S. A. (1992) Measuring service quality: a reexamination and extension, *Journal of Marketing*, 56, 3, 55–68
- Dabholkar, P. A. (1996) Consumer evaluations of new technology-based self-service options: an investigation of alternative models of service quality, *International Journal of Research in Marketing*, 13, 29–51
- Dabholkar, P. A. and Bagozzi, R. P. (2002) An attitudinal model of technology-based self-service: moderating effects of consumer traits and situational factors, *Journal of the Academy of Marketing Science*, 30, 3, 184–201
- Davis, M. M. and Heineke, J. (1998) How disconfirmation, perception and actual waiting times impact customer satisfaction, *International Journal of Service Industry Management*, 9, 1, 64–73
- Davis, M. M. and Vollmann, T. E. (1990) A framework for relating waiting time and customer satisfaction in a service operation, *Journal of Services Marketing*, 4, 1, 61–69
- Dubé, L., Schmitt, B. H. and Leclerc, F. (1991) Consumers' affective response to delays at different phases of a service delivery, *Journal of Applied Social Psychology*, 21, 10, 810–820
- Dubé-Rioux, L., Schmitt, B. H. and Leclerc, F. (1989) Consumers' reactions to waiting: when delays affect the perception of service quality, In Srull, T. K. (Ed.), *Advances*

- in *Consumer Research*, 16, Ann Harbor, MI: Association for Consumer Research, 112–125
- Festinger, L. A. (1957) *A Theory of Cognitive Dissonance*, Stanford University Press: Stanford, CA
- Friedman, H. H. and Friedman, L. W. (1997) Reducing the “wait” in waiting-line systems: waiting line segmentation, *Business Horizons*, 40, 4, 54–58
- Groth, M. and Gilliland, S. W. (2006) Having to wait for service: customer reactions to delays in service delivery, *Applied Psychology: An International Review*, 55, 1, 107–129
- Haynes, P. J. (1990) Hating to wait: managing the final service encounter, *Journal of Service Marketing*, 4, 4, 20–26
- Hornik, J. (1984) Subjective vs. objective time measures: a note on the perception of time in consumer behavior, *Journal of Consumer Research*, 11, 1, 615–618
- Houston, M. B., Bettencourt, L. A. and Wenger, S. (1998) The relationship between waiting in a service queue and evaluations of service quality: a field theory perspective, *Psychology and Marketing*, 15, 8, 735–753
- Hueter, J. and Swart, W. (1998) An integrated labor-management system for Taco Bell, *Interfaces*, 28, 1, 75–91
- Hui, M. K., Thakor, M. V. and Gill, R. (1998) The effect of delay type and service stage on consumers’ reactions to waiting, *Journal of Consumer Research*, 24, 4, 469–479
- Hui, M. K. and Tse, D. K. (1996) What to tell consumers in waits of different lengths: an integrative model of service evaluation, *Journal of Marketing*, 60, 2, 81–90
- Hwang, J. and Lambert, C. U. (2005) Customers’ identification of acceptable waiting times in a multi-stage restaurant system, *Journal of Foodservice Business Research*, 8, 1, 3–16
- Ittig, P. T. (1994) Planning service capacity when demand is sensitive to delay, *Decision Sciences*, 25, 4, 541–559
- Ittig, P. T. (2002) The real cost of making customers wait, *International Journal of Service Industry Management*, 13, 3, 231–241
- Jones, E. E. and Davis, K. E. (1965) From acts to dispositions: the attribution process in person perception, In Berkowitz, L. (Ed.), *Advances in Experimental Social Psychology*, Vol. 2, Academic Press: New York, 219–266
- Jones, P. and Dent, M. (1994) Improving service: managing response time in hospitality operations, *International Journal of Operations and Production Management*, 14, 5, 52–58
- Jones, P. and Peppiatt, E. (1996) Managing perceptions of waiting times in service queues, *International Journal of Service Industry Management*, 7, 5, 47–61

- Katz, K. L., Larson, B. M. and Larson, R. C. (1991) Prescription for the waiting-in-line blues: entertain, enlighten, and engage, *Sloan Management Review*, 32, 2, 44–53
- Kolesar, P. and Green, L. (1998) Insights on service system design via a normal approximation to Erlang's delay formula, *Production and Operations Management*, 7, 282–293
- Kumar, P., Kalwani, M. U. and Dada, M. (1997) The impact of waiting time guarantees on customers' waiting experiences, *Marketing Science*, 16, 4, 295–314
- Langer, E. J. and Saegert, S. (1977) Crowding and cognitive control, *Journal of Personality and Social Psychology*, 35, 3, 175–182
- Lee, W. and Lambert, C. (2005) The effect of waiting time and affective reactions on customers' evaluation of service quality in a cafeteria, *Journal of Foodservice Business Research*, 8, 2, 19–37
- Lee, K. W. and Lambert, C. U. (2007) Using simulation to manage waiting time in a cafeteria, *Information Technology in Hospitality*, 15, 4, 127–141
- Lewin, K. (1943) Defining the 'field at a given time', *Psychological Review*, 50, 292–310
- Maister, D. (1985). The psychology of waiting lines, In Czepiel, J. A., Solomon, M. and Suprenant, C. (Eds.), *The Service Encounter*, Lexington Books: Lexington, MA, 113–123
- Meuter, M. and Bitner, M. (1998) Self-service technologies: extending service frameworks and identifying issues for research, In Grewal, D. and Pechmann, C. (Eds.), *AMA Winter Educator's Conference Proceedings: Marketing Theory and Applications*, Vol. 9, American Marketing Association: Chicago, 12–19
- Meuter, M. L., Bitner, M. J., Ostrom, A. and Brown, S. (2005) Choosing among alternative service delivery modes: an investigation of customer trial of self-service technologies, *Journal of Marketing*, 69, 2, 61–83
- Meuter, M. L., Ostrom, A. L., Roundtree, R. I. and Bitner, M. (2000) Self-service technologies: understanding customer satisfaction with technology-based service encounters, *Journal of Marketing*, 64, 3, 50–64
- Nie, W. (2000) Waiting: integrating social and psychological perspectives in operations management, *Omega*, 28, 6, 611–629
- Oh, H. and Parks, S. C. (1997) Customer satisfaction and service quality: a critical review of the literature and research implications for the hospitality industry, *The Council on Hotel, Restaurant, and Institutional Education*, 20, 3, 35–64
- Osuna, E. E. (1985) The psychological cost of waiting, *Journal of Mathematical Psychology*, 29, 1, 82–105

- Parasuraman, A. and Colby, C. (2001) *Techno-Ready Marketing: How and Why Your Customers Adopt Technology*, Free Press: New York
- Parasuraman, A., Zeithmal, V. and Berry, L. (1985) A conceptual model of service quality and its implications for future research, *Journal of Marketing*, 49, 4, 41–50
- Pruyn, A. and Smidts, A. (1998) Effects of waiting on the satisfaction with the service: beyond objective time measures, *International Journal of Research in Marketing*, 15, 4, 321–334
- Roslow, S., Nicholls, J. A. F. and Tsalikis, J. (1992) Time and quality: twin keys to customer service satisfaction, *Journal of Applied Business Research*, 8, 2, 80–86
- Sheu, C. and Babbar, D. (1996) A managerial assessment of the waiting-time performance for alternative service process designs, *International Journal of Management Science*, 24, 6, 689–703
- Sheu, C., McHaney, R. and Babbar, S. (2003) Service process design flexibility and customer waiting time, *International Journal of Operations and Production Management*, 23, 8, 901–917
- Swart, W. and Donno, L. (1981) Simulation modeling improves operations, planning, and productivity of fast food restaurants, *Interfaces*, 11, 6, 35–47
- Taylor, S. (1994) Waiting for service: the relationship between delays and evaluations of service, *Journal of Marketing*, 58, 2, 56–69
- Taylor, S. (1995) The effects of filled waiting time and service provider control over the delay on evaluations of service, *Journal of the Academy of Marketing Science*, 23, 1, 38–48
- Taylor, S. and Fullerton, G. (2000) Waiting for service: perceptions management of the wait experience, In Swartz, T. A. and Iacobucci, D. (Eds.), *Handbook of Services Marketing and Management*, Sage: Thousand Oaks, CA, 171–190
- Tom, G. and Lucey, S. (1995) Waiting time delays and customer satisfaction in supermarkets, *The Journal of Service Marketing*, 9, 5, 20–29
- Whitt, W. (1999) Predicting queuing delays, *Management Science*, 45, 6, 870–888
- Zakay, D. (1989) Subjective time and attentional resource allocation: an integrated model of time estimation, In Levin, I. and Zakay, D. (Eds.), *Time and Human Cognition: A Life Span Perspective*, North Holland: Amsterdam, 365–397
- Zhou, R. and Soman, D. (2003) Looking back: exploring the psychology of queuing and the effect of the number of people behind, *Journal of Consumer Research*, 29, 4, 517–530