

Disney's Virtual Queues: A Strategic Opportunity To Co-Brand Services?


Robert F. Cope III, Southeastern Louisiana University, USA
Rachelle F. Cope, Southeastern Louisiana University, USA
Harold E. Davis, Southeastern Louisiana University, USA

ABSTRACT

Almost all service experiences require customers to wait in a queue at some point during the service encounter. Although waiting is a natural part of many services, for most customers, waiting is an annoyance. One of the most recent and innovative ways of making the wait invisible is through the application of virtual queues. Disney is a leader in this queuing advancement which allows customers to participate in other activities while they wait for an appointed time at their desired activity. In the past, queuing systems were modeled and studied as a means to minimize the negative aspects of service waits. However, in today's service environment, technology has provided businesses with the ability to create captured audiences through virtual queues. In fact, a powerful opportunity now exists for service firms to strategically co-brand products. In our work, we first explore queuing in the services industry. We then investigate Disney's queuing advancement – FASTPASS™. Strategies for co-branding services are discussed as opportunities to increase sales volumes and profit margins.

Keywords: Service Operations, Queuing, Virtual Queue, FASTPASS™, Co-Branding

INTRODUCTION

 Over the years, the service sector has assumed a paramount position in the United States economy. It far outdistances other economic sectors, both in overall employment and in foreign trade. The change occurred through economic evolution. It is often theorized that along with the rise of the service economy came the "postindustrial society." In this new society, different values and desires from consumers have accompanied the rise of the service sector and have changed the emphasis of management. The trend is showing no signs of slowing as economies continue to develop (Bell, 1973).

Waiting lines are ubiquitous in services, and service operations managers recognize the trade-offs that must take place between the cost of providing good service and the cost of customer waiting time. Managers want queues that are short enough so that customers do not become unhappy and either depart the system without buying (balking) or buy but never return. However, most managers have traditionally been willing to allow some waiting if the waiting is balanced by a significant savings in capacity costs (Haksever et al., 2000)

Many people misunderstand why waiting lines form. It is often assumed that waiting lines form only because there's too much work for employees to do in an aggregate sense. Then again, waiting lines also form when there appears to be more than enough people to handle the tasks in aggregate. This brings us to the two basic rules of waiting lines as determined by Metters et al. (2006):

Rule #1: Waiting lines form even when total workload is less than total capacity.

Rule #2: Waiting lines are not linearly related to capacity.

Waiting line characteristics are not simply numbers that need to be crunched. Waits involve managing two major customer issues, namely, how long people actually wait and how long they think they are waiting. Marketing

and Operations must jointly tackle the problem through quantitative methods as well as the psychology components of waiting. Appropriately setting customer expectations and responding to unspoken customer needs for reassurance can be just as effective as adding expensive capacity (Dickson et al., 2005)

QUEUING SYSTEM BASICS

In quantitative methods terminology, a waiting line is also known as a queue, and the body of knowledge dealing with waiting lines is known as queuing theory. In the early 1900s, A. K. Erlang, a Danish telephone engineer, began a study of the congestion and waiting times occurring in the completion of telephone calls (Russell and Taylor, 1998). Since then, queuing theory has grown far more sophisticated with applications in a wide variety of waiting line situations. Table 1 contains some of the basic definitions associated with queuing systems.

Table 1
Queuing Terminology

Term	Definition
Customers	A customer is a person or thing that wants service from an operation.
Arrival Rate	The arrival rate is the frequency (number per given period of time, denoted by λ) at which customers arrive at a service facility according to a probability distribution (Poisson, etc.).
Servers	A server is a person or thing that performs a specific, requested operation.
Service Rate	The service rate is the frequency (number per given period of time, denoted by μ) at which customers are being served by servers at a service facility. This rate can be constant or probabilistic.
Queue Discipline	A queue discipline represents the order in which customers are served. The most common service rule is first come, first served.
Queue Length	Queues can be of an infinite or finite size or length. An infinite queue can be of any size with no upper limit – the most common. Alternately, a finite queue is limited in size.
Channels	Channels represent the number of parallel servers available for a customer to receive service.
Phases	Phases denote the number of sequential servers a customer must go through to receive service(s).

QUEUING NOTATION

D. G. Kendall developed a notation for classifying waiting line models. His three symbol notation based on arrival rate, service rate and number of channels is denoted as $A/B/k$, where “A” indicates a distribution for the arrivals; “B” indicates a distribution for service; and “k” indicates the number of channels for service (Anderson et al., 2004). In his notation, each letter in the “A” or “B” position helps to describe a certain type of waiting line. The letters commonly used are:

- M: denotes a waiting line with a Poisson probability distribution for the arrivals or an exponential probability distribution for service times,
- D: denotes a waiting line where the arrivals or service times is deterministic or constant, or
- G: denotes a waiting line where the arrivals or service times has a general probability distribution with a known mean and variance.

As an example, a single channel waiting line model with Poisson arrivals and exponential service times is classified as an M/M/1 model.

MANAGING THE PERCEPTION OF WAITS

Instead of managing the arrivals of the queue, there are other ways of managing waits, and that is to manage the perception of the wait itself. Maister (1985) proposed that satisfactory waits, from the customer's standpoint, can create goodwill. However, he also pointed out that unsatisfactory waits can earn firms a bad reputation resulting in little return business. Plenty of research has been performed on wait perception leading to the following statements of influence organized by Dickson, et al. (2005):

1. Unoccupied time feels longer than occupied time.
2. Anxious, sad, and angry waits feel longer than relaxed ones.
3. Waits of uncertain length feel longer than certain ones
4. Unexplained waits feel longer than explained waits.
5. Uncomfortable waits feel longer than comfortable waits.
6. Unfair waits feel longer than fair ones.

DISNEY'S SERVICE ISSUE AND SOLUTIONS

Disney managers have long understood the pressures of waiting time vs. revenue. Faced with the fact that every minute spent waiting in line is a minute that the customer is not generating revenue, they have continuously attempted to optimize revenue by balancing between the costs of capacity and the costs of not having adequate capacity to serve customers as they attempt to enjoy the service experience. A brief chronological listing of their revenue maximizing steps as chronicled by Dickson et al (2005) follows.

The E-Ticket Dilemma

With a multi-phase system, there are many waits that must be coordinated for a customer's service encounter. A good example of this occurred at Disneyland in the 1960's. Pirates of the Caribbean was considered one of Disney's most popular attractions. Thus, it had one of the longest lines. In an effort to reduce the lines at the attraction, Disneyland's management team decided to build a new Haunted Mansion attraction. They felt that the expansion of the park would create added value and shorten the lines at the Pirates attraction. However, they were surprised when the lines at Pirates got even longer after the Haunted Mansion attraction opened. Additionally, the Haunted Mansion's lines were just as long.

In expanding the park to accommodate two premium attractions, Disneyland's planners did not realize that their ticket book system would distort demand for the rides. The ticket books included a predetermined distribution of tickets categorized as A, B, C, D or E rides, where the E-rated rides were the most popular. Original plans for the ticket books were to limit the number of each type of ticket that a guest received, so demand would be spread across the various levels of attractions.

To compensate for the cost of the new Haunted Mansion, park managers decided to raise ticket prices. In doing so, they partially offset the price increase by adding another E-ticket to each ticket book. Initially, park managers did not analyze the consequences of adding the additional E-ticket, which unfortunately flooded demand for E-ticket rides. Park planners had failed to realize that the new Haunted Mansion attraction had a capacity of fewer than thirty thousand guests per day. Therefore, when more ticket books were sold than new attraction capacity, guests looked for other premium uses of their E-ticket – which would be Pirates of the Caribbean.

Demand Side Management: E-rides night

With growing demand caused by large increases in "on-property" hotel rooms in the 1980s and early 1990s, Disney managers sought a new means to better balance available capacity with demand. They studied demand patterns and targeted "on-property" guests with a creative experiment – "Magic Kingdom E-Rides Nights." For a small fee, "on-property" guests could purchase a ticket and stay in the parks and ride the most popular rides

for three hours after regular closing time. The number of tickets sold was restricted in an attempt to manage the queues to very small waits for rides.

Benefits were seen by both day and night customers. Instead of wasting time standing in long lines during the day, “on-property” customers now had the option of using their daytime more productively because they could ride the most popular attractions at night. In addition, regular daytime guests benefited because wait times for the same rides were shorter.

A Service Reservation System at Disney

After previous efforts to reduce wait times and make the perception of waits shorter, Disney managers were still disappointed with customer satisfaction results. In their next attempt, managers embraced the age old tradition of a reservation system. Reservations provide a means for matching a known supply of capacity with unknown demand. Managers were skeptical at first because in a pay-one-price theme park, all guests pay the same admission price to enter the park and expect that they will have equal opportunity to ride/visit all of the attractions. Significant issues addressed by the management team included:

1. Demand analyses indicated that all capacity would have been reserved by 11:00 am, meaning that late (full-paying) arrivals would not get access to the most popular attractions.
2. Weather related events would cause unexpected interruptions in service with no means of relief.
3. The inability to provide constant and predictable capacity for all attractions caused by maintenance.
4. The inability to honor the reservations of no-shows or late arrivals, creating excess capacity.

The Virtual Queue Solution: FASTPASS™

In spite of their apprehension, Disney managers proceeded with the design of a reservation system for their attractions. By definition, their virtual queue waiting strategy recognizes that guests can be freed from physically standing in line. By being placed in a virtual queue, guests are then able to engage in other productive and enjoyable activities until their time to be served arrives. The new process eliminated both the actual wait, as well as the perception of having to wait for service.

The system was first tested at Walt Disney World in 1998. Managers assessed the system by surveying guests who used it. Results were positive and indicated that guests spent substantially less time in lines, spent more per capita, and saw significantly more attractions. Needless to say, satisfaction levels skyrocketed.

The system was expanded in 1999 to include five of the most popular park attractions, and was named FASTPASS™. The system has since been expanded to all Disney theme parks worldwide, and is now in use by over 50 million guests per year.

An important feature of the system is that guests have two options when approaching a FASTPASS™ attraction. Namely, they can choose to:

1. obtain a FASTPASS™ ticket and come back at a later, designated time, or
2. wait in a traditional line.

Guests are assisted in making their choice by information regarding estimated waits in both. Thus, they can decide to wait in the traditional line, or take a FASTPASS™ ticket and return at a later time with little or no further wait. These published wait times also serve to self regulate and stabilize the system.

To ensure that guests feel comfortable in using valuable wait time to do other things, FASTPASS™ designers added some flexibility into the system. Once an assigned FASTPASS™ time is generated and provided to a guest, it is good for the 60 minutes beyond that time creating a “window” in which guests can return.

The key feature of the FASTPASS™ system is *choice*. A quick survey of an attraction’s queue allows guests to pick the shorter wait and move on to something else. Disney managers knew that the queues were self regulating, but were perplexed as to why some guests actually chose traditional waits. They soon learned that those who chose traditional waits were most often holding FASTPASS™ tickets for another attraction. *Thus, the system allows them the opportunity to see two attractions during the time they would have previously been able to see only one attraction.* Obvious results were that guests were able to engage in more revenue producing activities, saw more of the popular attractions, and began to partake in other less utilized attractions in their free time.

DISNEY’S REVENUE OPPORTUNITIES

Disney managers understood that every minute spent waiting in line is a minute that the customer is not generating revenue. Therefore, it was critical for them to evaluate any wait from a revenue-maximization point of view to ensure that the organization has provided the optimal balance between the costs of capacity and the costs of not having adequate capacity to service customers as they arrive to enjoy the service experience.

In an effort to show the success of Disney’s FASTPASS™ system, we sampled four E-Ticket attractions to analyze their additional revenue producing capabilities. Table 2 below lists the attractions with their approximate hourly capacities.

Table 2
Approximate Capacity per hour for our Sample
 (Data from www.themeparkinsider.com and www.ultimateorlando.com)

Premium Attraction	Approximate Capacity
Pirates of the Caribbean (MK)	2,500
Haunted Mansion (MK)	3,200
Space Mountain (MK)	3,400
Soarin’ (EPCOT)	1,050
Total	10,150

Demand for these attractions fluctuates daily, weekly, monthly, as well as seasonally. Additionally, there is set-up and tear-down time between services. Thus, Table 3 below provides rated (deterministic) capacities based on load demand factors. It also indicates the number of guests with displaced wait time generated by the virtual queue – where customers are able to experience two attractions during the time they would have previously been able to experience one.

Table 3
Guests with Displaced Wait Time at Rated Capacities for the Sample

Guest Condition	70% Cap.	80% Cap.	90% Cap.	100% Cap.
Captured Guests	7,105.0	8,120.0	9,135.0	10,150.0
Guests w/50% Displaced Wait Time	3,552.5	4,060.0	4,567.5	5,075.0

Based on the displaced wait times of Table 3, Table 4 below estimates the additional hourly revenue Disney managers could expect given pre-determined levels of additional expenditures made by guests.

Table 4
Deterministic Estimates of Additional Revenue for the Sample based on Rated Capacities

Additional Expenditure	70% Rev.	80% Rev.	90% Rev.	100% Rev.
\$ 5.00	\$ 17,762.50	\$ 20,300.00	\$ 22,837.50	\$ 25,375.00
\$ 10.00	\$ 35,525.00	\$ 40,600.00	\$ 45,675.00	\$ 50,750.00
\$ 15.00	\$ 53,287.50	\$ 60,900.00	\$ 68,512.50	\$ 76,125.00
\$ 20.00	\$ 71,050.00	\$ 81,200.00	\$ 91,350.00	\$ 101,500.00

CO-BRANDING

Co-branding is a useful strategy where a combination of brand names enhances the prestige or perceived value of a product, or when it benefits brand owners and users. The combination of two brands generally provides greater assurance about product quality than a mono-branded product, leading to higher product evaluations, differentiation in competitive environments, and premium prices (Rao et al., 1999). It is also a method used to increase a company's presence in markets where it has little or no market share (Helmig et al. 2007).

Experience shows that two basic co-branding variations exist. They are commonly known as horizontal and vertical co-branding (Desai and Keller, 2002). Brief descriptions of each by Desai and Keller follow.

Vertical Co-Branding: Also known as *Ingredient Branding*, is a form of co-branding that pertains to the vertical integration of existing products within one product by producers of different value chain steps.

Horizontal Co-Branding: This form of co-branding is characterized by the production and distribution of a multi-branded product by producers at the same step in the value chain. Examples include: *Cooperative Branding* – two brands receiving equal treatment borrow on each other's brand equity, and *Complementary Branding* – when two or more products are advertised or marketed together to suggest usage.

The benefits of co-branded products are numerous. From the consumer's perspective, Park et al. (1996) found that a positive attitude toward one brand leads to positive direct effects overall. In addition, they found that a co-branded product consisting of two complementary brands maintains a better attribute profile in consumers' minds than does a co-branded product consisting of two highly favorable, but not complementary brands. Later, Simonin and Ruth (1998) investigated the goals of the firm for co-branding products. Their findings indicated that businesses seek:

1. the ability to enhance the economic success of the co-branded product, and
2. to provide positive spill-over effects for the partner brands.

These goals align with two main effects. First, positive direct effects should lead to positive perceptions, strong evaluations, and trial and repurchase of the co-branded product. Second, positive spill-over effects should alter perceptions and behavior toward the partner brands.

Unlike closely related areas of brand management research, co-branded products still lack strong empirical research findings. Empirical research did not exist before 1995, and since then, only about 25 empirical studies have emerged (Helmig et al., 2007).

STRATEGIC CO-BRANDING IN SERVICES

As most service businesses pair their products based on complementary (horizontal) characteristics, Disney has shown that services paired through common waits can increase service satisfaction as well as revenue. It is here

that we will attempt to show that co-branding services based on queuing characteristics, specifically queues with reservation systems, can improve business performance.

However, Disney’s improvements are one dimensional. In Dickson et al’s work (2005), they failed to note that most of Disney’s queues have constant service times – type M/D/1 or M/D/2. Outside of the entertainment arena, most queues have probabilistic service times, and are more difficult to predict. Due to these circumstances, we suggest strategies for pairing services based on queue type and service times that can be constant and/or probabilistic. The strategies for pairing are indicated in Table 5. In future research, we plan to hypothesize results and support them through simulation.

**Table 5
Queuing Strategies by Service Condition and Queue Type to Increase Utilization**

Service Condition	Single-Channel, Multi-Phase System Strategy	Multi-Channel, Multi-Phase System Strategy
Both Phases have Constant Service Times	A reservation system for the phase with the longest service time, and a traditional queue for the phase with the shorter service time are proposed. If both phases have equal service times, a reservation for both phases would be proposed.	Two reservation systems are proposed for this system regardless of service time length.
1 Phase has Constant Service Time, the other has Probabilistic Service Time	A reservation system for the phase with a constant service time, and a traditional queue for the phase with the probabilistic service time are proposed.	A reservation system for the phase with a constant service time, and a traditional queue for the phase with the probabilistic service time are proposed.
Both Phases have Probabilistic Service Times	No reservation system is proposed.	A partial reservation system is proposed. Reservations should be taken for at least one channel of the phase with the longest service time.

CONCLUSIONS AND FUTURE RESEARCH

Traditionally, “brick and mortar” firms have co-branded products based more on vertical, rather than horizontal characteristics. Service firms, however, tend to package their products in more of a horizontal manner, where queuing characteristics provide a new and significant dimension to the business process. Having studied Disney’s advancements in waiting lines, we understand that customers have new opportunities to “multitask” – namely, purchase or use other services and products while waiting for primary service. Allowing such “multitasking” to take place can yield important benefits for service organizations.

We have pointed out in this research proposal how virtual queues enable customers the freedom to do more than one thing at a time. In future research, stochastic simulation modeling is planned to determine system improvements (queue lengths and wait times) and benefits for the strategies presented here. The use of such information will certainly be valuable for service industry managers and entrepreneurs who are looking for methods to co-brand services while increasing service satisfaction levels and profits.

AUTHOR INFORMATION

Dr. Robert Cope is an Associate Professor of Management at Southeastern Louisiana University in Hammond, Louisiana. He received a Ph.D. in Business Administration in 1998 from Louisiana State University with a concentration in Information Systems and Decision Sciences. He currently teaches undergraduate courses in Management Science and Project Management, as well as graduate courses in Information Technology Project Management and Information Systems Analysis and Design. Research interests include resource optimization techniques, project management, statistical modeling and the design of information technology. Other special

interests include mathematical programming and statistical analysis of electric power generation, transmission, and distribution systems.

Dr. Rachelle F. Cope is a Professor of Management at Southeastern Louisiana University in Hammond, Louisiana. She received a Ph.D. in Business Administration in 1996 from Louisiana State University with a concentration in Information Systems and Decision Sciences. She currently teaches undergraduate courses in Management Information Systems, Data Management for Business and Management Information Systems Development. Her research interests include software reliability improvement warranties, dynamic storage reallocation, linear Diophantine analysis, knowledge management and organizational citizenship behavior.

Dr. Harold E. Davis is an Associate Professor of Accounting at Southeastern Louisiana University in Hammond, Louisiana. He received his DBA degree from Louisiana Tech University in 2002 and currently teaches undergraduate courses in Financial Accounting and Accounting Information Systems, as well as a graduate course in Advanced Accounting Information Systems. His research interests include the effects of emerging technology on business processes, computer fraud and abuse, and how to incorporate various emerging technologies such as podcasting into educational pedagogy.

REFERENCES

1. Anderson, D., D. Sweeney and T. Williams (2004). *Quantitative Methods for Business*, 9th edition, Thomson South-Western, Mason, Ohio.
2. Bell, D. (1973). *The Coming of Post-Industrial Society: A Venture in Social Forecasting*. Basic Books, Inc., New York City, New York.
3. Desai, K. and K. Keller (2002). "The Effects of Ingredient Branding Strategies on Host Brand Extendibility," *Journal of Marketing*, Vol. 66, Jan., pp. 73-93.
4. Dickson, D., R. Ford and B. Laval (2005). "Managing Real and Virtual Waits in Hospitality and Service Organizations," *Cornell Hotel and Restaurant Administration Quarterly*, Vol. 46, No. 1, pp 52-68.
5. Haksever, C., B. Render, R. Russell and R. Murdick (2000). *Service Management and Operations*, 2nd edition, Prentice Hall, Upper Saddle River, New Jersey.
6. Helmig, B., J. Huber and P. Leeflang (2007). *Co-Branding: The State of the Art*, Université De Fribourg Suisse, Working Paper Series in Marketing, WP MAR No. 1.
7. Maister, D. (1985). "The Psychology of Waiting Lines," in *The Service Encounter: Managing Employee-Customer Interaction in Service Businesses*, edited by J. A. Czepiel, M.R. Solomon and C. F. Suprenant, Lexington Books, Lexington, Massachusetts.
8. Metters, R., K. King-Metters, M. Pullman and S. Walton (2006). *Successful Service Operations Management*, 2nd edition, Thomson South-Western, Mason, Ohio.
9. Park, C., S. Jun and A. Shocker (1996). "Composite Branding Alliances: An Investigation of Extension and Feedback Effects," *Journal of Marketing Research*, Vol. 33, Nov., pp. 453-466.
10. Rao, A., L. Qu and R. Rueckert (1999). "Signaling Unobservable Product Quality Through a Brand Ally," *Journal of Marketing Research*, Vol. 36, May, pp. 258-268.
11. Russell R., B. Taylor III (1998). *Operations Management: Focusing on Quality and Competitiveness*, 2nd edition, Prentice Hall, Upper Saddle River, New Jersey.
12. Simonin, B. and J. Ruth (1998). "Is a Company Known by the Company it Keeps? Assessing the Spillover Effects of Brand Alliances on Consumer Brand Attitudes," *Journal of Marketing Research*, Vol. 35, Feb., pp. 30-42.