Reducing the Air Travel Hassle Factor Through Self-Service Check-in Process Improvements

By

Jared Keith Miller

S.B. Chemical Engineering, Massachusetts Institute of Technology, 1998

Submitted to the Department of Civil and Environmental Engineering and the Sloan School of Management in Partial Fulfillment of the Requirements for the Degrees of

Master of Science in Civil and Environmental Engineering
and
Master of Science in Management

In Conjunction with the Leaders for Manufacturing Program at the Massachusetts Institute of Technology
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ABSTRACT

The tragic events of September 11th, 2001, served as a catalyst for drastic change in the airline industry which was already in a financial downturn. Both the airlines and the government began introducing changes to the various aspects of the travel experience. The most impactful changes have been in the area of security, where an entirely new government agency has been created to oversee security at airports. However, additional changes to the travel experience have come from the airlines. This research provides an overview and analysis of one such change that is sweeping the industry.

Self-service check-in devices were first installed by major network airlines in 1995 when Continental Airlines introduced the ETICKET machine. Others have since developed their own self-service products, while Continental has transformed its original machine into the eService product line. These devices empower the traveling customer to perform their own check-in and get through the airport quicker. Additionally, self-service check-in devices represent a cost savings opportunity for the airlines through reduced headcount requirements and ticket distribution fees. While deployment has been rapid both at Continental and other airlines, the development of a process that merges the ticket agents with the new technology has been lacking.

In 2002, Continental Airlines began a cross-functional effort to drastically re-engineer the self-service process. Many of the traits of that process have been implemented to some extent throughout Continental's domestic airports. Through observations of the current self-service process, surveys of both ticket agents and customers, and an in-depth case study comparison of two airports, this research has identified numerous opportunities for improvement of the process. In addition, the research provides recommendations for the next phases of the re-engineering process based on the findings of the observations and surveys. Finally, areas for future research that build off of these findings are presented with the goal of improving the travel experience for the customers and reducing costs for the airlines.

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Thomas Kochan, George M. Bunker Professor of Management
Thesis reader: Cynthia Barnhart, Professor of Civil and Environmental Engineering

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I would also like to extend my thanks to the Global Airline Industry Program at MIT and the Sloan Foundation for their sponsorship of this research. This too is a phenomenal program that has allowed me to become an active member and participate in their research efforts during a very critical time for the airline industry.

My thesis advisors, John Hansman and Tom Kochan, have been a major part of this research from the initial idea to the final thesis product. I appreciate all of their support and guidance through this effort.

I have worked closely with many people at Continental Airlines throughout the course of this project, and they all deserve thanks. I'd like to extend special thanks to Bill Brunger and Mike Campbell for continuing to build on the relationship with MIT and sponsor this internship. Amos Leung, Chris Frawley, and Scott O'Leary all served as mentors throughout the internship and went out of their way to make me feel at home. I am grateful for all of the support I received from these individuals.

I would like to say a special thank you to my entire family for their support through all of my academic endeavors. My parents have always encouraged me to aim high, and I have tried to do just that in everything I pursue. Thanks to my brother Justin and his wife Rebecca for giving me a place to stay on all of my trips between Houston and Boston. I wish the best of luck to my sister Meg and her fiancé Will. I hope they are as happy as my wife Julie and I are in our relationship. I'd also like to thank my wife's parents, Jim and Connie, and younger brother, Ryan for all of their support these past two years.

Most importantly, I dedicate this thesis to my beautiful wife, Julie. I can't thank you enough for all of the love and support you have given me over the past five years. I'm sure you never planned on making five cross-country moves in four years, but together we have managed to make the best of it all. I thank God for bringing you into my life!

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Chapter 1: Introduction

1.1 Purpose of this Research

Due to the events of September 11th, numerous security changes have been mandated at airports throughout the United States. As a result, commercial air travel in the United States has been greatly changed. The previous frustrations during the late 1990's over flight delays and long lines have intensified. The major bottleneck in the system has shifted from the runways and ticket counters to the security checkpoints as the more rigorous screening of passengers and bags has been implemented. The new delays have been referred to as the "hassle factor" of flying in the press. This research focuses on one potential source of hassle, checking-in, and seeks to identify changes that will minimize the impact on the customer.

The passenger experience can be broken down into a few distinct experience groups as demonstrated in Figure 1-1 below. To provide a more in depth analysis, the

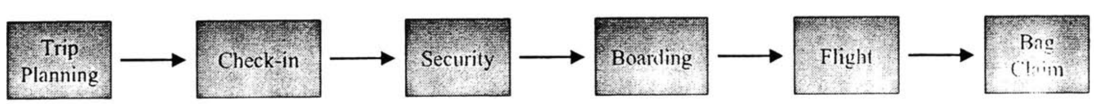

Figure 1-1 Passenger Experience Flow Diagram

research is focused on the check-in portion of the process flow. In order to speed passenger check-in, airlines are deploying technology solutions to the check-in process. The focus of this research is on the deployment of self-service check-in devices, and the design of an agent process to effectively utilize these assets. The end goal is to provide a thorough analysis of the current state of self-service check-in within the airline industry, review an efficient process by which the airline employees can utilize this technology, and show through numerous case examples many of the pitfalls of implementation.

1.2 Thesis Structure

In this chapter, the importance of integrating the technology and the workforce is reviewed. Additionally, the purpose of the research, structure of thesis, description of the LFM Internship is included.

Chapter 2 describes the history of passenger check-in at the airport. This includes conventional check-in, the development of electronic tickets, and self-service check-in. Following this review, the current self-service product offering by Continental will be reviewed along with a brief overview of products offered by other airlines. Finally, information is provided on other technological solutions being used by airlines on the check-in process.

Chapter 3 will provide a thorough analysis of Continental's self-service check-in process in its hub airports of Cleveland (CLE), Houston (IAH), and Newark (EWR). This analysis is based on observational studies conducted during the summer of 2002.

Chapter 4 compares the deployment of self-service technology solutions in the airline industry to that in other industries such as banking and grocery stores. The chapter focuses on the acceptance of the technology by both the workers and the customer. Data collected from customer and agent surveys is provided.

Chapter 5 summarizes the findings from an in-depth station case study conducted in November of 2002. The purpose of this case study was to identify best practices both operationally and organizationally in the eService process in an attempt to gain operational efficiency across the Continental network.

In chapter 6, the challenges of implementing a lean check-in process at Continental Airlines and other domestic carriers are discussed. Finally, the future of the travel experience is described utilizing information from a variety of sources that discuss how security changes and technology advances will continue to evolve the passenger flow at the airport and the overall travel experience.

1.3 Integrating Technology and the Workforce

This research focuses on the use of a new technology to speed the check-in process at the airport. Additionally, there is a strong social component that needs to be considered in the application of this technology. Much literature has been devoted to the integration of technology and the workforce, which is called socio-tech design. In this section: the term socio-tech will be defined; its applications to eService will be discussed; a framework will be presented as well as some examples from literature.

Socio-tech refers to the merging of social aspects and concerns as well as the technology aspects into the design process and work environment. In many change initiatives, technology and social systems are seen as substitutes.[1] In other words, designers typically focus all of their efforts on one dimension. Only after one is complete do they consider addressing the other issue. In reality, technology and social systems are complements. When both are addressed in a design effort, far greater performance can be achieved.

Before attempting to integrate the two together, it is important to understand what is meant by technical systems and social systems. The technical system is comprised of the task to be accomplished, the service process, the physical layout of the area, and the equipment to be used. The social system is comprised of the organizational structure, the job content, and the industrial relations.[2]

Within the self-service check-in project, the technical system focuses on the task of checking-in passengers for their flights. The actual service process is the check-in process which will be reviewed further in Chapter 2. The physical layout at hand is that of the ticket counter which will also be discussed in Chapter 2. Finally, the equipment is the new technology, the self-service machine.

The social system to be considered in the eService project can be described as follows. The primary workers affected are the customer service representatives, more commonly referred to as ticket agents. Their managers are front line supervisors. The ticket agents responsibility is to ensure that all customers who present themselves at the ticket counter are checked-in for their flights along with their baggage. At Continental Airlines, the ticket agents are not unionized.

Integrating the two aspects of the work environment into the change process is neither a natural nor an easy process. The model in Figure 1-2 below provides a framework for thinking about a socio-tech change process.

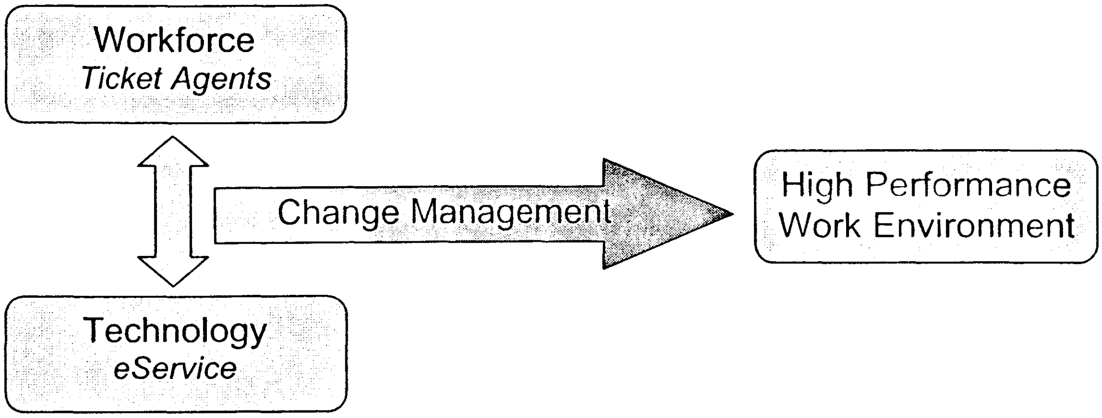

Figure 1-2 Socio-Tech Framework and eService

The change management arrow in the framework pictured above represents the process of continually identifying the issues that are critical to the success of the project. The key is that as opposed to having two separate arrows leading independently from the workforce to the high performance work environment and the technology to the high performance work environment, the workforce and technology simultaneously impact the change process.

While the framework may be simplistic, its implementation is not. There are many questions that need to be addressed as the process begins. Some of these questions have been outlined by Graversen. These may include such issues as timing of the inclusion of either technology or social inputs into the design process or the importance of employee input. Graversen points out that due to the difficulty in integrating the two components, four different design patterns emerge. These can be seen in Figure 1-3 below.

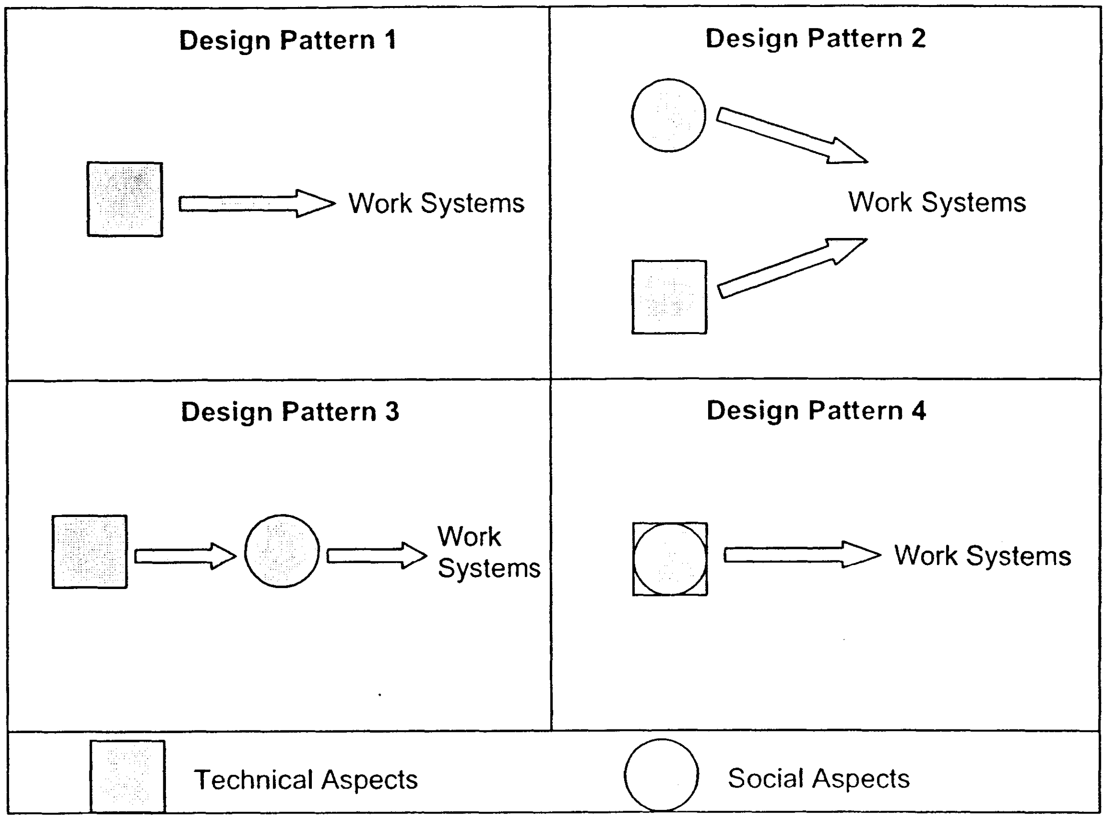

Figure 1-3 Four Work System Designs

Design pattern 1 describes a system in which the technical aspects fully determine the final work system without regard to the social aspects. Design pattern 2 is an environment where the technical and social issues are handled independently, both with their own separate input channels into the work system. Design pattern 3 is a common system in which the technical issues are defined first. The social aspects are contingent upon the technical issues and only then do the social aspects get considered in the work system design. Finally, design pattern 4 is another representation of the Figure 1-2 in which the social and technical aspects are considered together in the work system design.

As will be shown throughout this thesis, the change process at Continental Airlines most closely resembles design pattern 3 in which the technology is the dominant factor upon which all social aspects must be measured for feasibility. That is not to say that the technology itself has been designed and implemented without any regard to the ticket agents, however, it is handled generally after the fact through future form factors of the technology or process improvements.

1.4 The LFM Internship

This thesis was written based on research conducted during a 6.5-month internship at Continental Airlines in Houston, TX. The internship was a part of the Leaders for Manufacturing Program at MIT, but received additional sponsorship from the Global Airline Industry Program at MIT and the Sloan Foundation.

Chapter 2: History of Passenger Check-in at Airports

2.1 Conventional Check-in Process

A conventional check-in process refers to a passenger who checks-in for a flight and is using a paper ticket, therefore requiring ticket agent assistance to check-in. While this check-in process has evolved over the years with the evolution of technology, the basic flow has changed little and is used by most airlines today. Two of the more significant changes that have increased the burden on the passenger are the requirement of security screening in the 1970's and the requirement to show positive identification at the ticket counter in the early 1990's. The figure below outlines the conventional check-in process flow.

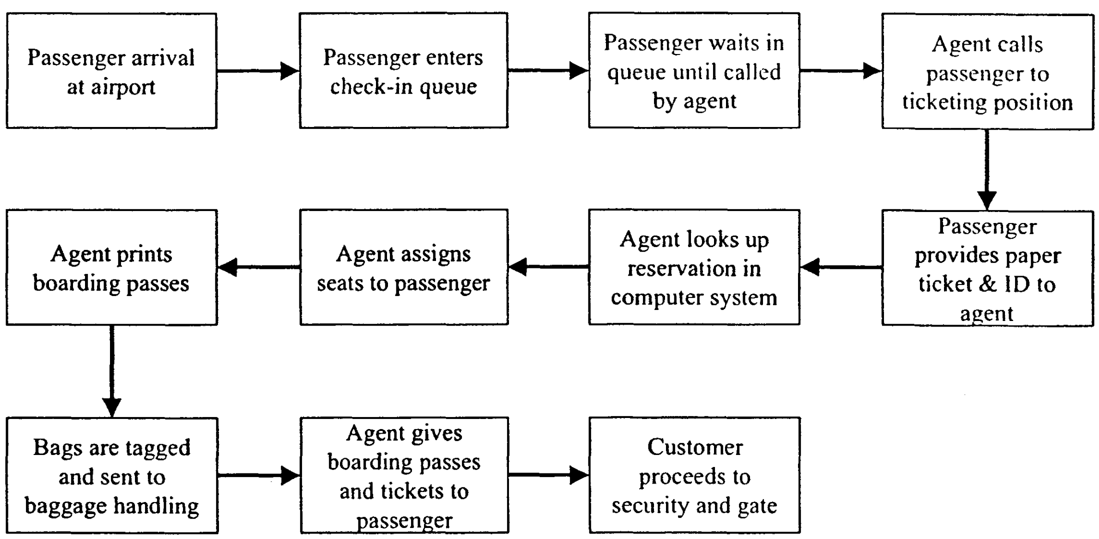

Figure 2-1 Conventional Check-in Process Flow

In this type of check-in environment, the overall throughput of the system can be constrained by a number of factors. The most likely causes of throughput limitation are the productivity of the ticket agents, the staffing levels established by the airline management, or the total ticket counter positions available to the airline.

2.2 Electronic Ticket Development and Deployment

During the early 1990's, the airline industry was struggling to remain profitable. While much of this was due to the Gulf War recession within the entire US economy, increasing fuel and ticket distribution costs strained the airlines' financials. As a result, airlines began looking for cost savings opportunities. One problem plaguing them was that passengers commonly booked reservations through the airline's telephone reservations centers and then went to a local travel agency to finish the transaction with the actual ticketing. By ticketing at the travel agent, the airlines were required to pay a commission on the sale to the agency, whereas if the ticketing had been performed directly, the transaction cost would be much lower.

In an effort to reduce these distribution costs, airlines began offering electronic tickets, now commonly known as eTickets, to customers in early 1995. eTickets are simply an electronic copy of the passengers' itinerary and payment information and eliminate the need to print out a paper ticket. Morris Air, acquired by Southwest Airlines, was the first adopter of eTicket technology. United Airlines was the first major network carrier. Continental Airlines, the second airline to launch eTickets, deployed the technology to domestic markets in April 1995. At the time of product launch, Continental estimated that the initial investment to launch eTickets would be fully recovered within three years and that they would realize more than $13 million in savings in the first 5 years. As predicted, the initial adoption was slow, as this type of ticketing represented a major paradigm shift for the traveling public. At the end of 1995, Continental's eTicket penetration rate, or percent of passengers traveling on eTicket eligible itineraries utilizing eTickets, was 5%. This slow adoption can be attributed to both the functional limitations of eTickets at the time, international travel, interline tickets, and itinerary changes all required paper tickets, as well as the general distrust and lack of confidence in the new technology.

Since its initial deployment, electronic tickets have become the predominant form of ticket distribution in the United States. This is largely due to the gradual acceptance by customers and their realization that eTickets generally result in less hassle. For example, the passengers no longer need to worry about losing a paper ticket and possibly missing their flight as a result. Besides the technology acceptance by the traveling public, functional improvements, such as interline eTicket agreements, have helped speed the transition to today's eTicket dominance in domestic travel. These agreements allow re-accommodation of passengers on carriers other than the one for which their original eTicket was issued in the event of flight cancellation or disruptions. In addition, passengers can now request electronic tickets for itineraries involving more than one carrier. Another significant improvement since 1995 is the ability to offer eTickets on nearly all international itineraries, although the acceptance of eTickets on internationally eligible itineraries remains lower.

Continental Airlines has continued to emphasize the benefits of electronic tickets and has taken many steps to ensure that electronic tickets become the primary and preferred form of ticket distribution for their customers. As one of the initiators of interline agreements, Continental has established bilateral agreements with the following carriers: American Airlines, Delta Airlines, United Airlines, Northwest Airlines, America West, Alaska Airlines, and US Airways. As mentioned earlier, Continental achieved 5% eTicket penetration by the end of 1995. Figure 2-1 below shows the eTicket penetration growth since its initial deployment. As the figure shows, eTickets have become the predominant method of ticket distribution and as a result, Continental, along with many other airlines, mandated a $20 nominal surcharge for paper tickets in 2002 and increased this amount to $25 on January 1, 2003.[3] This has the effect of deterring further paper ticket requests and helps cover the additional costs associated with paper tickets for the airline.

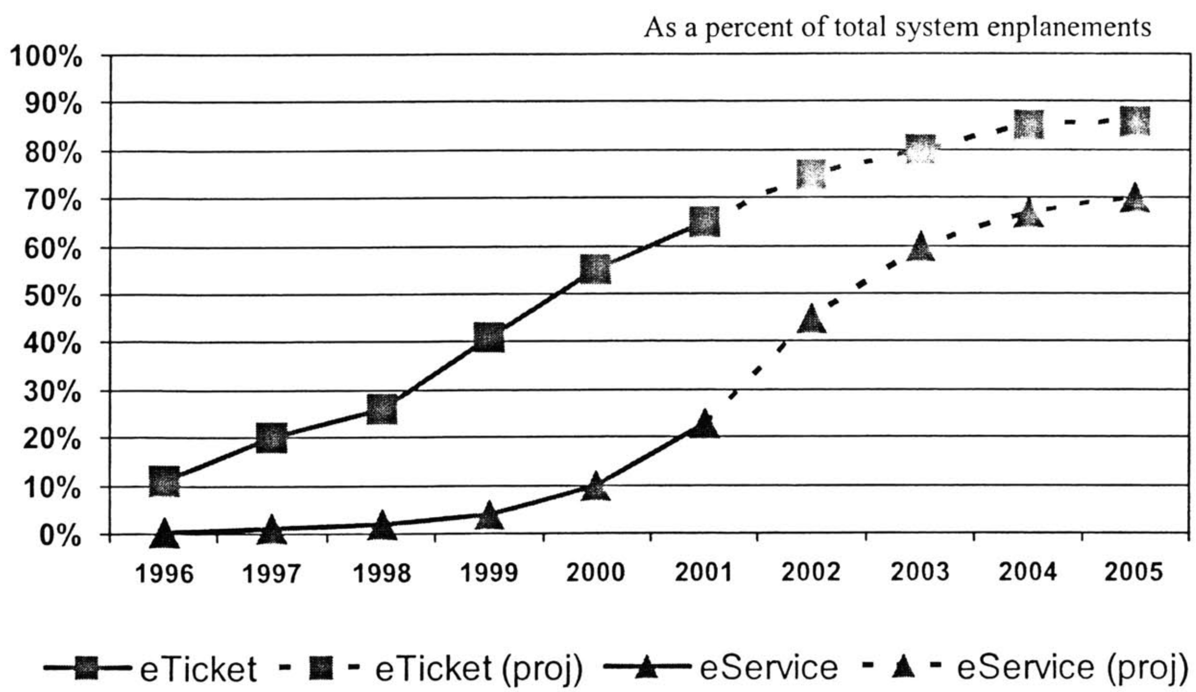

Figure 2-2 eTicket Penetration as a Percent of Total Ticket Sales

2.3 Self-Service Check-in

Self-service check-in in the airline industry refers simply to a check-in process that is performed by the customer. The airline industry was following a number of other industries, such as banking, with the introduction of the ATM, that were allowing many basic transactions to be completed by the customer without any interaction with another person. In Chapter 4, a more detailed review of self-service adoption across other industries will be provided. However, for the airline industry, the primary motivations for self-service deployment are cost reductions through decreased staffing requirements and ticket distribution costs, and throughput maximization by allowing all ticket positions to be open and available for customer use independent of the agent staffing levels.

While the initial rollout of eTicket technology was focused on reducing costs internally, Continental Airlines also saw a much greater opportunity to develop significant competitive advantage through the concurrent deployment of self-service check-in devices. Recognizing that there were substantial cost savings to increasing the eTicket penetration rate quickly, in 1995, Continental became the first major airline to deploy an eTicket machine that enabled self-check-in by the customers.[4] The unit allowed passengers traveling on eTickets to completely check themselves in at the airport without having to wait for an available ticket agent. The intent was to decrease the wait time for eTicket customers, thereby enticing other travelers to select eTickets on their next trip. To further entice the passengers, Continental began offering frequent flier mileage incentives for using the machine.

Aside from the cost savings and throughput improvements that come with self-service introduction in airport check-in, an additional benefit is in improved customer service and satisfaction. In Chapter 4.3, the results from customer surveys will show the benefit and satisfaction customers have with self-service check-in. The process a customer follows when traveling on an eTicket and opting to check-in at a self-service machine is outlined in Figure 2-2 below.

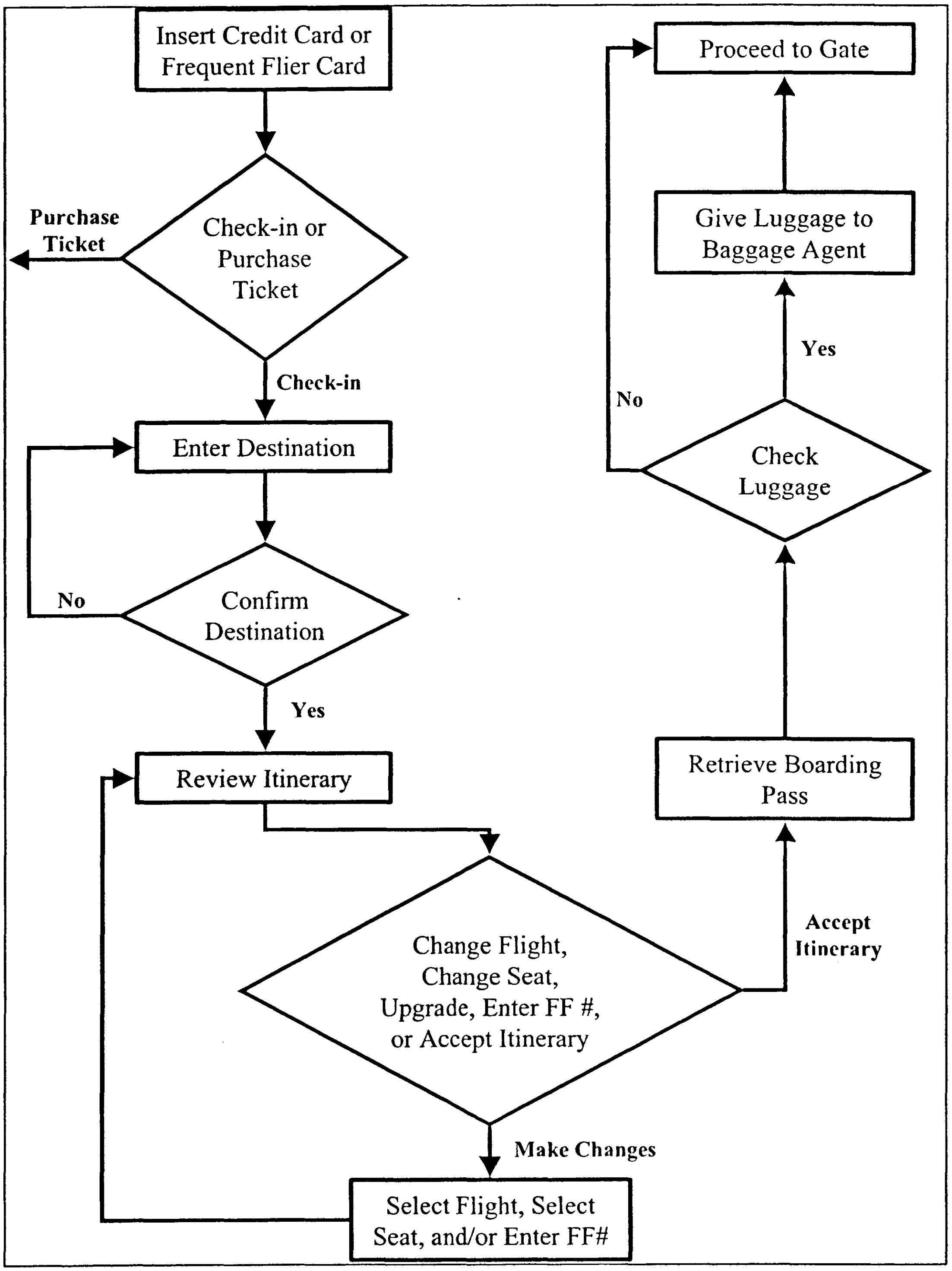

Figure 2-3 Self-Service Process Flow Diagram

As the process flow diagram shows, the customer is given many opportunities to customize their check-in process. If the customer's primary objective is speed, the entire check-in can be done in approximately 30 seconds using one of Continental's eService machines. However, if the customer wants to perform other activities, check-in can take significantly longer than 30 seconds. In Chapter 2.5, the self-service solutions being deployed by other airlines will be compared as well as the features available to the customer.

2.4 Airport of the Future

As Figure 2-1 shows above, Continental Airlines successfully motivated customers to adopt the new technology and not only purchase eTickets, but utilize the self-service check-in machines as well. Through discussions with many of Continental's senior management team, it became clear that self-service check-in is now viewed as the standard way to process passengers, and as a result, the airport ticket lobbies should be redesigned to accommodate for this changing norm. The concept, known internally at Continental as Airport of the Future, that resulted from this thinking was to replace all of the conventional ticket counters with eService machines. However, the Airport of the Future concept was not limited to just a hardware change. This research effort examines the initial efforts to redesign the check-in process, including the redefinition of ticket agent roles and responsibilities, product form factors, and management's efforts to speed the adoption. The deployment of self-service machines at Continental Airlines will be discussed in section 2.4.1. In section 2.4.2, the hardware solutions used in the Airport of the Future will be described. Finally, the agent roles and responsibilities used to efficiently process passengers in this new environment are outlined in section 2.4.3.

2.4.1 History and Deployment at Continental Airlines

In 2000, the first Airport of the Future remodeling occurred in Chicago O'Hare. Since then, the emphasis has been on installing Airport of the Future in the hub airports as well as a few of the larger spoke airports. The table below lists the stations that currently have the Airport of the Future installation as well as the respective number of Airport of the Future eService Centers.

Hubs	eService Centers	Spokes	eService Centers
CLE	30	BOS	14
EWR	74	BWI	12
IAH	74	ORD	10
		RDU	12
		TPA	20

Table 2-1 Airport of the Future Stations and eService Centers

It is important to note that in the case of Houston (IAH) and Newark (EWR), international ticket counter positions were not retrofitted with countertop eService machines due to the current inability to check-in international passengers via eService. Cleveland, the smallest of the three hub airports and the one with the fewest international departures retrofitted all ticket counter positions with the countertop eService machines.

Since installing the first self-service eTicket machine back in 1995, Continental has greatly expanded their system wide deployment of self-service machines. Figure 2-3 below shows the number of eService machines deployed and the number of eService enabled airports as of January 1, 2003 across Continental's network.

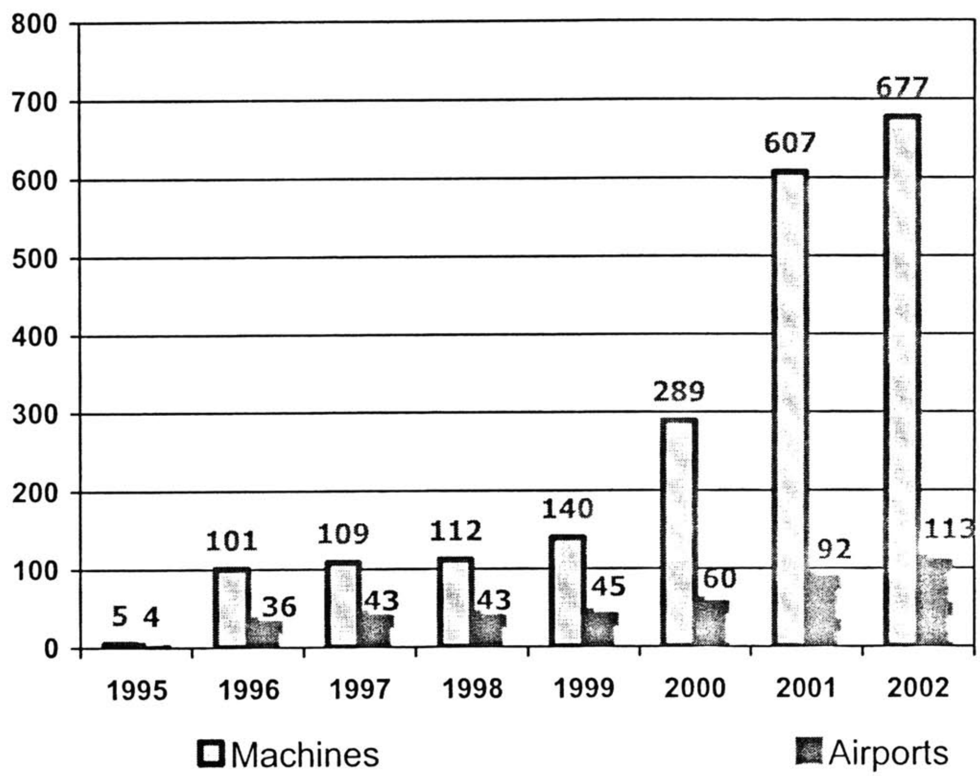

Figure 2-4 Self-Service Deployment and Network Coverage

2.4.2 Form Factor Choices

In order to provide each airport with flexibility in the way they check-in passengers, Continental's eService team has created multiple eService Center form factors. The first self-service machine deployed by Continental was called the ETICKET

Machine and can be seen in the picture below. The eService Centers family of form factors replaced this machine in 1999.

Figure 2-5 Continental Airlines ETICKET Machine

Within the eService Center family, there are currently four different form factors in operation throughout the Continental network. The section below provides photographs of each form factor and a description of how they are incorporated into the check-in operations.

Form Factor #1: Stand-Alone

The stand-alone format, also known as the "slim-jim", is the most prominent form factor deployed in the Continental network. The eService machine is contained within an enclosure that has a small footprint. This allows the stand-alone unit to be placed in a wide-range of locations. Airports, parking garages, Continental off-airport ticket offices, and even downtown business buildings have this format installed. All of these stand-alone units are designated as carry-on only machines meaning that the customer is unable to check bags if utilizing this check-in option. As a result, these machines are now typically placed away from the ticket counter, along walls or columns, and help reduce congestion in the queues. Due to this non-traditional machine placement, agents are rarely available to assist passengers with check-in on a stand-alone machine. Therefore, the majority of the customers using this format are experienced business travelers looking to get through the airport quickly. While most new installations are done away from the ticket counter, the first Slim-Jim installations were done directly in front of the counter. The figure below is a picture of a stand-alone or slim-jim machine.

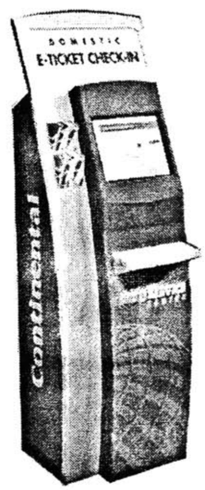

Figure 2-6 Stand-Alone Form Factor eService Machine

Form Factor #2: Tabletop

The tabletop format, also known as "in-queue," is also a very common format used primarily in small and medium stations. The table contains either two or four eService machines and provides counter space for each customer. The tabletop units are placed directly in front of the ticket counter and often in the middle of what used to be the traditional queue area, hence the nickname "in-queue." However, these self-service machines generally do not have any queuing themselves. The tabletop eService units may or may not have baggage-checking abilities turned on. If baggage-check is enabled the customer would have to go through a two-step process. First, the customer checks in on the machine and retrieves their boarding pass. Second, the customer takes his bags to the conventional ticket counter where an agent will tag his bags. Due to the relatively minor impact to the conventional ticket counter, this format is ideal for small and medium size stations. The picture below shows two tabletop units joined together to create eight eService positions, four on each side.

Figure 2-7 Tabletop Form Factor eService Machine

Form Factor #3: Airport of the Future Ticket Counter

As described earlier, the Airport of the Future ticket counter format was being installed in select stations to completely replace the conventional ticket counters with eService enabled ticket counters. This format provides the greatest flexibility to the airports since the format has both two eService Centers facing the customer as well as two agent workstations behind the counter. These agent workstations allow the access to more advanced features as needed and also the ability to efficiently check-in customers during irregular operations when the eService Centers may not be functional. Another benefit of these machines is that the local station management can easily dedicate the machines to varying customer groups such as baggage check, carry-on only, or first class and elite customers. Finally, another major advantage of this format is its familiarity with customers. Many customers may not be accustomed to the stand-alone or tabletop units, but are used to waiting in a line to check-in at the ticket counter itself. The picture below shows the Airport of the Future ticket counter setup in Chicago O'Hare.

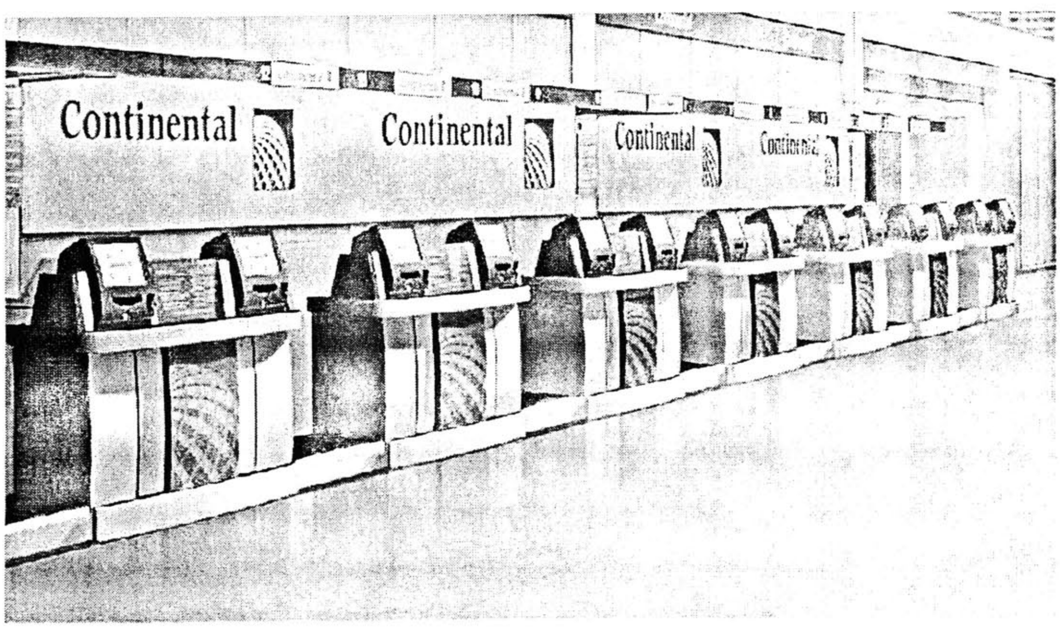

Figure 2-8 Airport of the Future Ticket Counter eService Machine

Form Factor #4: Pedestal eService Machines

The pedestal eService format is the newest addition to the eService center family. This format is actually a combination of the stand-alone and Airport of the Future ticket counter formats. However, each eService Center stands alone with a bag-well in between. While there is a bag tag printer located on the agent side of each eService Center, this format does not contain any agent workstations. Therefore, if a customer has problems on these machines, he will have to move to another agent-equipped position. Most recently, this format has been placed perpendicular to the conventional ticket counter in some airports to accommodate the explosive detections systems being installed as part of the TSA directive. The image below shows the pedestal form factor in Seattle.

Figure 2-9 Pedestal eService Machine

2.4.3 Agent Job Responsibilities

Just as the ticket counter was redesigned to incorporate self-service technology into the airport experience, the ticket agents' job responsibilities must also be redesigned in order to check-in customers in an efficient, customer friendly manner. An important consideration in this redesign is the learning curve of both the customers and the agents. Consequently, four different roles have been created. The figure below shows a schematic of an airport ticket counter and the position of each of the different types of agents.

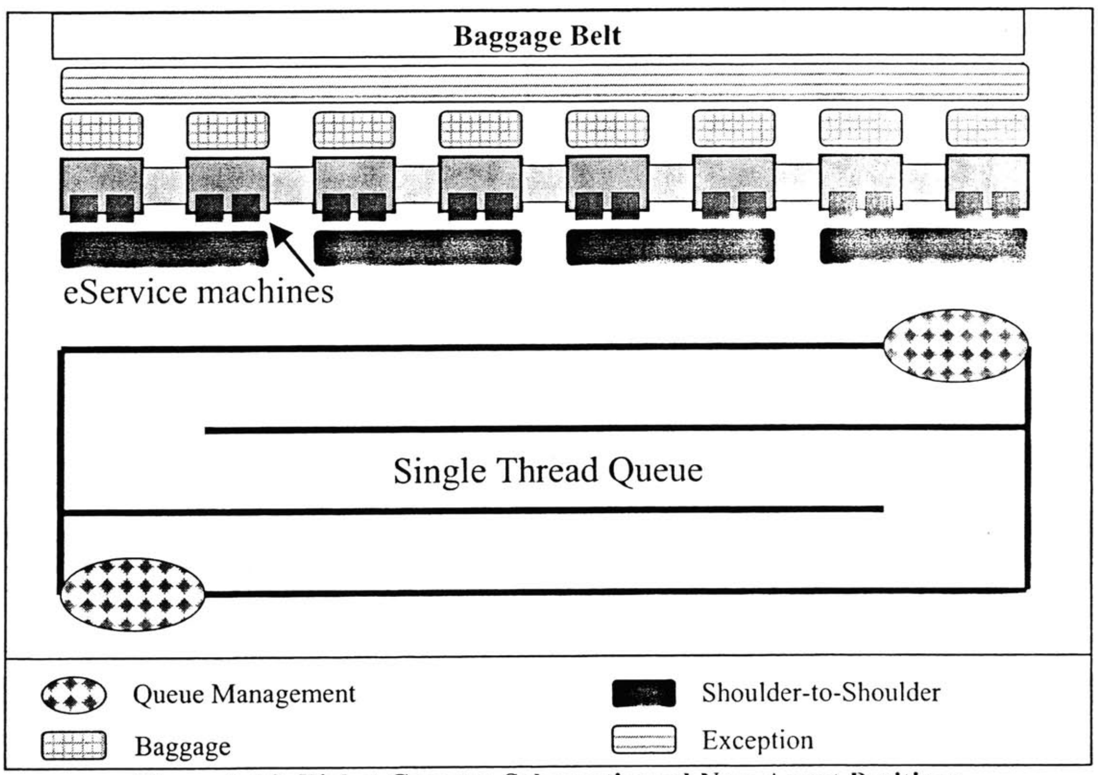

Figure 2-10 Ticket Counter Schematic and New Agent Positions

Queue Management Agent

The role of a queue management agent is to ensure that the customers are directed to the proper check-in queue. These exact number and type of queues depends on the size of the airport and could include First Class and Elite Customers, Domestic eTicket with Baggage Check, Domestic eTicket without Baggage Check, Paper Tickets, and International. The queue management agent is positioned in front of the queue entrances and also helps answer miscellaneous questions for customers in order to prevent unnecessary congestion at the ticket counters. Due to the size of the ticket counters in EWR and IAH, queue management agents are also assigned to the queue exits. When in this position, the agent helps identify unoccupied eService Centers and ensures that customers in the queue flow to these machines.

Shoulder-to-Shoulder Agent

Shoulder-to-shoulder agents are the primary new addition to the self-service environment. These agents stand in front of the ticket counter next to the customers, hence the name shoulder-to-shoulder, and simultaneously assist multiple customers checking themselves in on the machines. As mentioned earlier, one of the major obstacles to overcome is the customer's inexperience, and sometimes fear, with self-service check-in. These agents are critical to speeding the customer learning curve. However, the experience level with self-service varies between customers. Therefore, these agents are tasked with providing the right amount of customer service at just the right time. Finally, the queue management agents in EWR and IAH work very closely with shoulder-to-shoulder agents to identify the unoccupied and available positions.

Baggage Handler

Baggage handling agents are positioned behind the ticket counter and assist passengers checking luggage by tagging their bags and transferring the bag to the bag belt.

Exception Manager

Exception managers rove behind the ticket counter and work with the shoulder-to-shoulder agents to identify any customers that are having difficulty or are unable to check-in on the eService center. These agents must have expert knowledge of the reservation system in order to handle any type of situation. Additionally, exception managers help the other agents recover as needed.

2.5 Other Airline Solutions

Adoption of self-service technology across the major domestic carriers has varied greatly, with some such as Southwest and America West introducing the technology as recent as 2002. Others such as Alaska Airlines joined Continental early in the deployment of these machines and have been extremely innovative. Table 2-2 below compares self-service amongst major airlines and includes the size of their self-service check-in network and the features available to the traveler using their machine.

Network Characteristics	Air Canada	Alaska/Horizon	America West	American	ATA	Continental	Delta	Northwest	Southwest	United	US Airways	Continental Plan by EOY 2003
Total Units	168	385	60	620	30	683	449	629	465	400	241	769
Total Airports	7	74	14	70	7	113	81	144	37	18	46	128
U.S. Airports (50 States)	0	68	14	69	7	113	81	136	37	18	45	125
Non-U.S. Airports	7	6	0	1	0	0	0	8	0	0	1	3
U.S. Network Coverage *	0%	90%	17%	45%	27%	91%	35%	76%	64%	12%	27%	100%
Domestic Check-in	●	●	●	●	●	●	●	●	●	●	●	complete
International Check-in	●	●		O	O	O	O	●		O		Jun-03
Employee Check-in	●	●	●	●	O	●	●	●		●	●	complete
Codeshare / Interline	●	●	●	O		●	O	●		O	●	complete
Elite Upgrade	●	●	●	●		●	●	●		●	●	complete
Flight Status	●	●	●	●		O	●	●		●	●	May-03
Flight Changes	●	●	O	O	●	●	●	●	O	●		complete
Reaccomodation		O	O	O		O	O	●		●		Jul-03
Seat Changes	●	●	●	●	●	●	●	●		●	●	complete
Update Frequent Flyer	●	●	●	●	O	●	●	●	●	●	●	complete
Baggage Check	●	●	●	●	●	●	●	●	●	●	●	complete
Oversale Solicitation		O	O			O		●				Apr-03
Print E-Ticket Receipt	●	●	●	●	●	●	●	●	●	●	●	complete
Purchase Upgrade		●	●	O			●	●		●	●	No plans
Inflight Currency		O	O		O	O		●				Apr-03
Excess Baggage Fees				O	O	O	O	●				May-03
Change Fees		O	O	O	O	O	O	●	O	O		Aug-03
Web Check-in		●	O	●	O	●	●	●	O	O	●	complete
Flight Standby	●	●	O	●		O	●	O	O	●		Apr-03
Ticket Purchase			O	O		●		O	O		●	complete
Employee Ticket Purchase				●	O	●	O		O			complete
Large Group Check-in		O				●						complete
Unaccompanied Minor						O			●			Jul-03
Unticketed Infant Check-in	●		●			O	●			O		May-03
Spanish	O	O	●	O		●			●	O		complete
French	●	O		O		O				O		Jul-03
Other Language	O	O		O		O				O		Jul-03
CUSS Kiosk Participation	●	O		O	●	O	O	O	●	●	●	Apr-03

Table 2-2 Self-Service Check-in Comparison Across Airlines (Feb 2003)

The carriers listed in the table above have all chosen relatively similar form factors for their self-service check-in device design and airport layout. Not surprisingly, the carriers have all chosen to purchase these units from a few different suppliers, resulting in the similar form factors. However, the airlines have opportunities to differentiate their product and service along other dimensions. One is the machine's features and size of the network. This information has already been provided above. A second critical differentiator is the actual implementation of customer service the airlines provide at the airport. There are multiple solutions being used in this area.

Instead of staffing ticket agents in front of the ticket counter or providing an agent at the airport to handle exceptions, as Continental does with the shoulder-to-shoulder agents and exception managers respectively, United Airlines has installed telephones with each of their self-service check-in devices. These phones are connected directly to a support center and are to be used by the customers when they have problems checking-in on the machine. After receiving necessary assistance, the passenger either continues checking-in or exits the area and waits in the conventional check-in queue to check-in with an agent.

Alaska Airlines has installed its own version of Airport of the Future in their Anchorage (ANC) hub.[5] Their design eliminates the ticket counter completely. Instead, customers enter the terminal and are immediately surrounded by multiple islands of self-service machines, each island containing between two and four Instant Ticket Machines. Additionally, the customers get instructions on the check-in process via a short animation that is played on overhead plasma screen displays. Ticket agents roam throughout the lobby and work in a similar fashion as Continental's shoulder-to-shoulder agents. The customer first stops at a self-service machine and retrieves his boarding pass, then if checking bags, proceeds to an island in the middle of the lobby where bag tagging agents are seated and ready to help check the bags to the final destination. While this may appear similar to Continental's use of the stand-alone units, the primary difference is that all customers use the stand-alone or island self-service machines at Alaska Airlines, regardless of whether or not they are checking baggage.

2.6 Other Technological Check-in Solutions

While self-service machines have infiltrated the airports across the country, other technological check-in solutions have begun emerging in the past few years. The goal of all of these solutions is to provide the traveler with a hassle free experience that can be tailored to suit their individual needs. Two of the technologies currently being used by domestic carriers are wireless check-in and internet check-in. A third technology, proposed following September 11th, 2001, is the use of biometrics.

Wireless check-in allows customers to check-in through either cellular phones or personal digital assistants such as a Palm Pilot. Prior to September 11th, the wireless craze consumed many airlines, such as American Airlines, who announced plans for future wireless check-in. However, following September 11th, few airlines continued their wireless check-in programs. Currently, Alaska Airlines, the pioneer, still offers wireless check-in through a web-enabled device such as a PDA or cell phone.

Internet check-in has begun to be offered by domestic carriers as well in the past two years. Currently, Alaska Airlines, American Airlines, Continental Airlines, Delta Airlines, Northwest Airlines, and US Airways offer this capability. This technology allows the customer to check in from the comfort of their home or office on the day of the flight, select their seats, and print out their boarding pass on their personal printer. Once at the airport, the passenger can check baggage at the ticket counter or proceed to the gate with their self-printed boarding pass, which generally contains a bar code that is scanned by the gate agents when boarding.

Biometrics is a technology that is used to positively identify individuals through validating or matching physical characteristics such as fingerprints and eye scans. Following September 11th, 2001, biometrics was touted as a highly sought-after technology to improve security.[6] Since then, there have been limited trials of the technology such as that in Boston's Logan International Airport in late 2001. However, considering the financial and social implications of biometrics, the airline industry seems reluctant to move forward without a clear mandate from the federal government.

Chapter 3: Challenges of Self-Service Check-in

In order to determine the effect of self-service on the check-in experience, a series of observational studies were conducted during the summer of 2002. The intent of these observations was to collect data on the customer flow through the check-in process, agent position and responsibilities, and self-service machine utilization. In addition, these observations served as an educational process to help understand the challenges of self-service implementation at Continental Airlines.

As will be shown, the data collected demonstrate inconsistencies in the process being used by the airline employees and ultimately lead to large variations in machine utilization, customer wait time, and staffing requirements. The selection of stations to observe was based on a number of factors, the largest being the implementation of Continental's Airport of the Future style ticket counters.

3.1 Observation Methodology

In order to provide a meaningful comparison across airports, the methodology used in collecting the primary data was held constant. At all stations, the following methodology was used.

1. All observations were conducted for domestic eService check-in with baggage check.
2. All observations began during the morning departure banks.
3. Observations were recorded once every three minutes.
4. Data collection included:

a. Agents per position (Queue Manager, Shoulder-to-Shoulder, Baggage Handler)

b. eService machines dedicated to eTicket with baggage check

c. Idle and available eService machines

d. Customers in line

e. Customer arrivals per 3 minute interval

Secondary data were collected as available and as deemed necessary at airports. This additional information provides further insight into the challenges faced at a specific station but does not provide much benefit in cross-station comparisons. The list below provides a sample of the secondary data collected.

1. Customer flow stoppage
2. Customer approach ratio
3. Who performs the eService transaction, agent or customer?

A customer flow stoppage was defined as any time when there were eService machines available for more than one minute while there were customers waiting in line. This is a problem that occurs in many stations, but was only recorded during an observation in Houston.

Customer approach ratio is defined as the fraction of total customers exiting the queue to approach an eService machine that were not prompted to do so by an agent. This metric is useful in quickly determining the approximate experience level of the customers being observed. The closer the ratio is to a value of one, the more experienced the customers are with self-service.

Finally, at some stations, who actually performed the eService transaction was recorded. As will be shown, one of the problems with self-service introduction is that the employees often do not allow the customers the opportunity to perform their own check-in. Instead, the check-in is performed entirely by the agents without any customer-eService Center interaction.

3.2 Airport Observations

Houston George Bush Intercontinental Airport – IAH

The first major point of observation was the agent positioning. During the observations, which occurred on July 9th and 11th, 2002, the agent positioning varied greatly over time. This can be seen in figure 3-1 below.

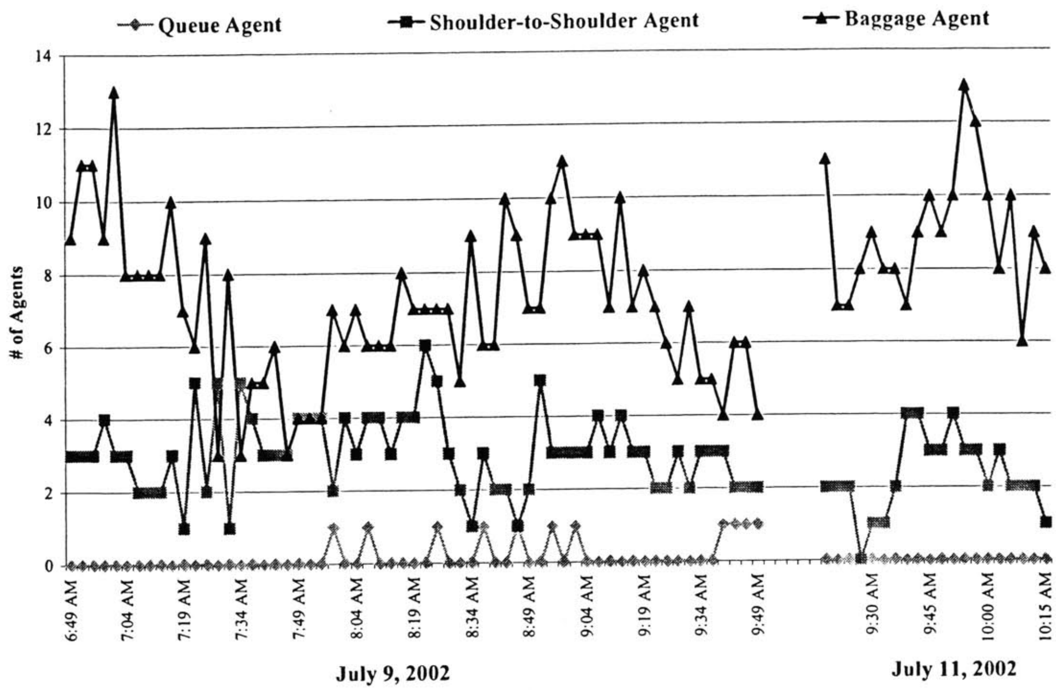

Figure 3-1 IAH – Agent Positioning

To normalize this data, the number of agents per position is compared to the total number of dedicated eService machines. Figure 3-2 below shows the machines per agent for the shoulder-to-shoulder and baggage agent positions. Queue management agents are not included as this statistic is not relevant to their function.

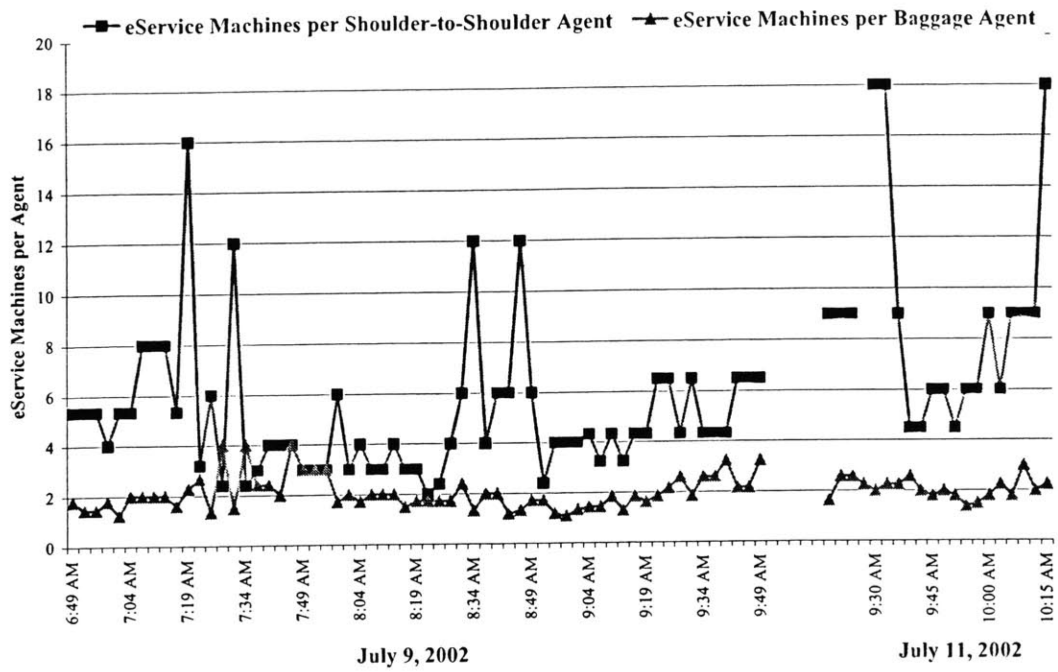

Figure 3-2 IAH – eService Machines per Agent

As can be seen, there is not only inconsistency of the agent positioning within each day, but also between each day. With respect to the average machines per shoulder-to-shoulder agent, on July 9th, the average was 5.08 while on July 11th it was 8.92. The machines per baggage handling agent is much more stable with an average of 2.03 and 2.08 on the two days respectively. Rarely on either day was there a queue management agent present. The dramatic swing in the machines per shoulder-to-shoulder agent is due to the fact that these agents frequently went behind the counter to handle another task.

The second area of observation surrounded the eService center utilization. Without an automated utilization report to aid in the analysis, an approximate utilization measurement was used and could be found by comparing the number of customers waiting in line to the number of available eService machines. This data was only collected on July 11th, 2002 at IAH and can be seen in the Figure 3-3 below.

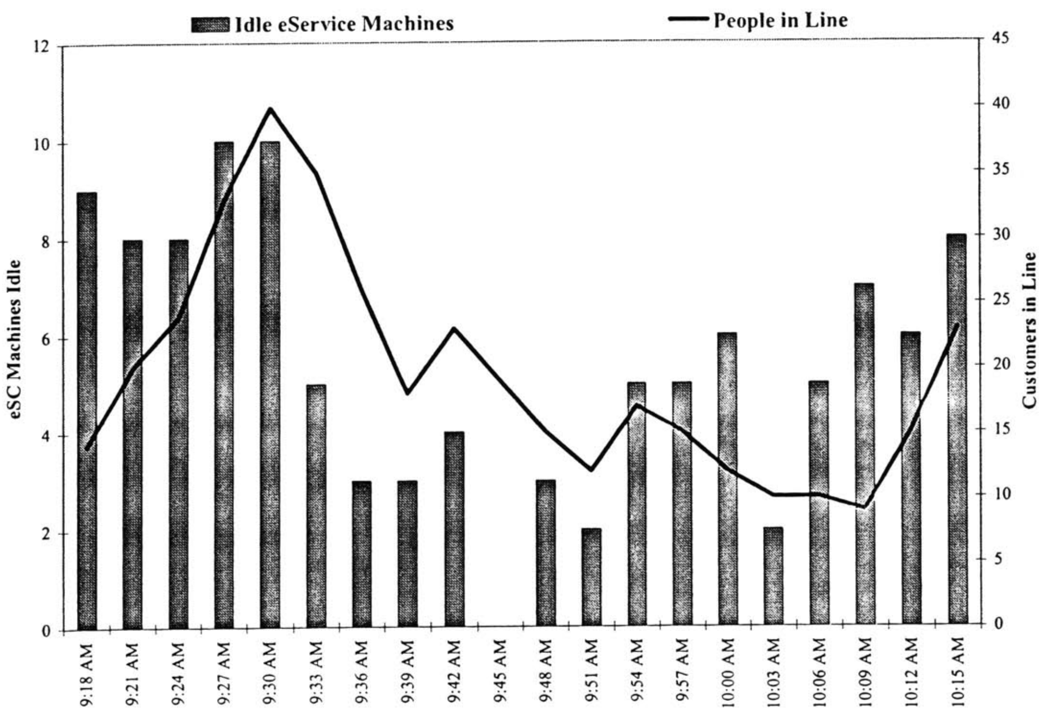

Figure 3-3 IAH – Idle eService Machines and Customers in Line

From the figure above, we can see that there was only one point in time when all eService machines were being utilized. Furthermore, any point where the number of people in line is less than the total machines available represents a missed opportunity for the agents to bring the customers in line to zero. Finally, the few occasions where the customers in line was greater than the idle machines also represents a missed opportunity in that the agents could have helped minimize the total wait time by utilizing every available machine.

There were two motivating factors that led to this under-utilization. First, the lack of a queue management agent contributed to the under-utilization. If an agent had been present, he would have been able to quickly direct the customers to any available machine. Second, the shoulder-to-shoulder agents were focused on providing individualized attention to each customer. Instead of providing help as needed to multiple customers, the agents would stay at one position and help the customer through the entire transaction. This meant that these agents were not aware of idle eService centers and therefore did not call any customers to those machines. As an example, during this time period, the following was observed. A couple that was clearly unfamiliar with eService waited 9.5 minutes before an agent approached them and asked if they needed assistance. During this time, there were 17 people in line, 16 dedicated machines, and 3 shoulder-to-shoulder agents. The shoulder-to-shoulder agent closest to the couple was assisting other customers with the entire transaction and did not monitor the machines around him. Albeit an extreme case, many other instances similar to this were observed.

Finally, the third area of observation in IAH was the customer approach rate and queue management. On July 11th, the customer approach rate was measured. This was done by counting the total customers exiting the queue and determining whether an agent prompted them or if they approached a machine on their own. It was observed that 82% of all customers waited to be called by an agent. Additionally, there were four separate instances of complete customer flow stoppage for greater than one minute despite having an average of six idle eService machines during those times. Again, both of these are issues that can be minimized, if not prevented, had there been a queue management agent present.

Cleveland Hopkins International Airport – CLE

Observations at CLE were performed on July 22, 2002. The two primary findings from this set of observations is that shoulder-to-shoulder agents must provide service to multiple customers at once and that express lane queuing must be actively managed by queue management agents for maximum system efficiency. Additionally, it was noted that alternative machine dedication strategies could improve check-in throughput.

Cleveland's agent positioning was much more consistent than was observed in Houston. Figure 3-4 and Figure 3-5 below show the raw agent positioning over time and the dedicated machines per agent, respectively. During the observations, there were an average of 8.27 machines dedicated to domestic eTicket with baggage check.

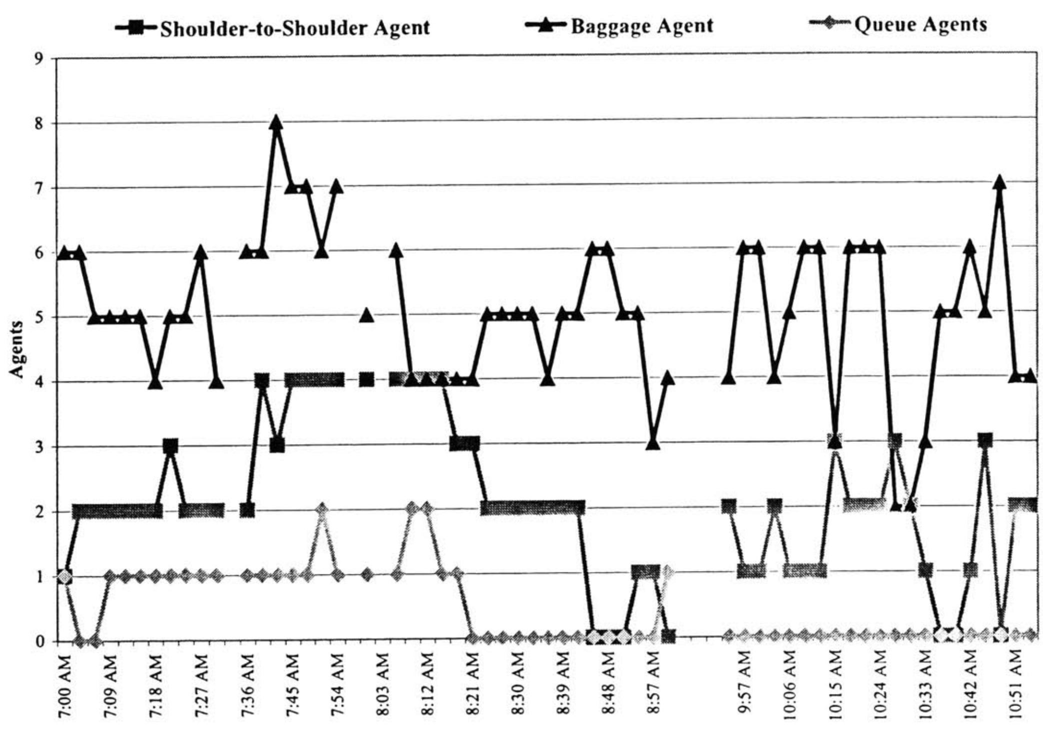

Figure 3-4 CLE – Agent Positioning

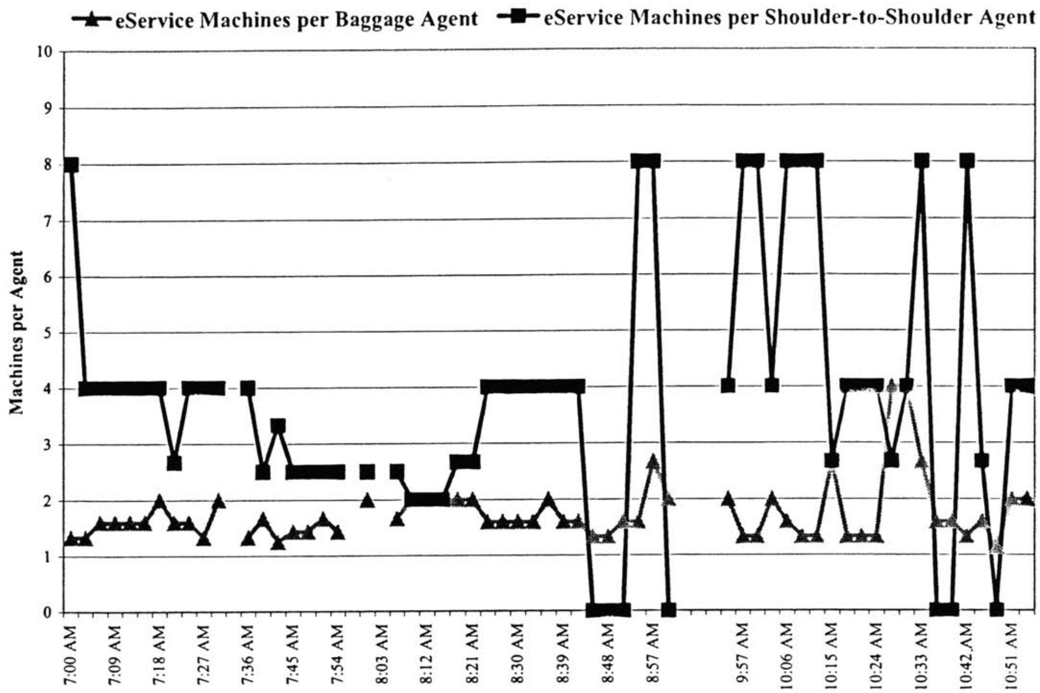

Figure 3-5 CLE – eService Machines per Agent

These figures show that shoulder-to-shoulder agents were present at most times and were responsible for approximately 4 machines each. However, qualitative observations are necessary to tell the complete story. Similar to the findings in Houston, these shoulder-to-shoulder agents rarely moved around in front of the counter to monitor and assist customers at multiple positions. Instead, the agents often stood to the side of one machine and only assisted passengers that came to that position. This results in decreased throughput for the following reasons. Customers who are unfamiliar with eService and are not near an agent must wait for someone to assist them. As was seen in Houston, this can often be a long time. Additionally, the shoulder-to-shoulder agents tended to perform all of the transactions that occurred at their single position. This is a missed opportunity to educate the customer on self-service so that the next time he travels, he will be educated on the process and can perform his own transaction.

Unlike Houston, which used a single thread bankers style queuing system, Cleveland utilized express lane queuing. The figure below shows the layout of the Continental Airport of the Future ticket counter in Cleveland.

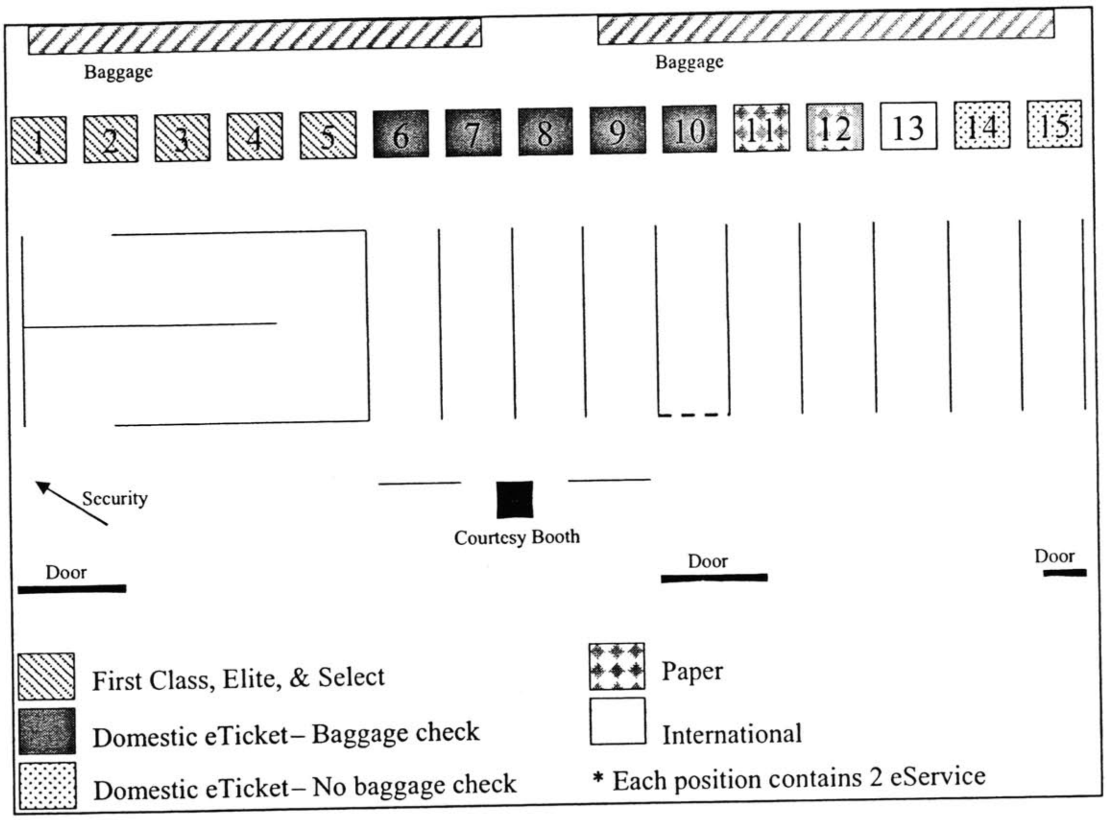

Figure 3-6 CLE – Observed Ticket Counter Layout

As the figure shows, express lane queuing in Cleveland provides two eService machines for every express lane. The customers, while not explicitly stated through signage, were choosing to check-in on the first available of the two machines directly in front of their express lane. Using such a queue style increases machine utilization and system throughput for two reasons. First, the shoulder-to-shoulder agent's and queue management agent's jobs become easier by decreasing the total distance between the available machines and themselves. This should increase their awareness of idle machines or customers needing assistance. Secondly, the customers are more likely to approach the machine without prompting by an agent since they too have greater visibility of idle eService centers.

While the machine utilization was quite high, with idle time near zero, as indicated by Figure 3-7, three problems emerged with the operation of the queues, resulting in high levels of customer frustration. First, with only two machines per express lane, the variability in time within the queue is greater than with more than two machines. This results in customers getting frustrated when their queue moves much slower than another and often leads to customers moving from one queue to the next. Second, within a single express lane, two separate lines formed, resulting in essentially one machine per line. For the same reason mentioned earlier, with one machine, the variability of the time in queue is extremely high. Third, the outermost queues, which happened to be closest to the airport's entry doors, had longer lines on average. This is because customers saw these lanes first and generally assumed that due to the presence of a line, this is where they should be. The placement of the queue management agent in front of the express lanes helped to smooth the flow of customers evenly across all lanes. However, when the arrivals exceeded the total capacity of the inner lanes, around 5 each, it was observed that the outer lanes had up to 15 customers.

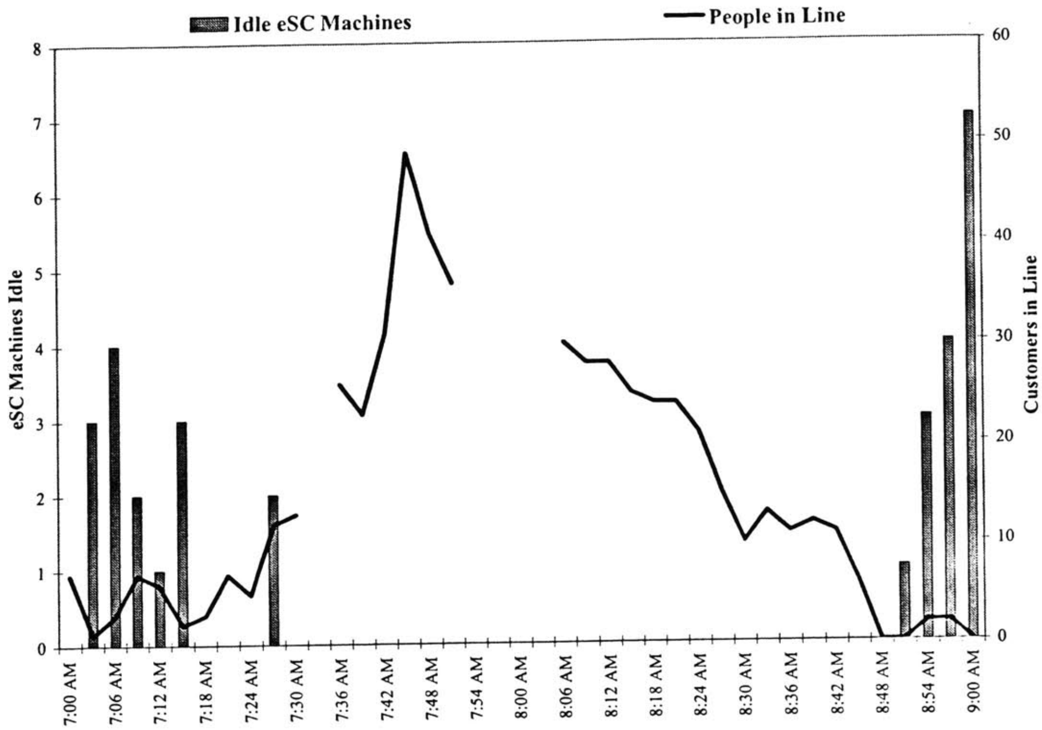

Figure 3-7 CLE – Idle eService Machines and Customers in Line

Finally, alternative machine dedication strategies could improve check-in throughput. During the morning of the observations, the machine dedication and queuing was as shown in Figure 3-6. The first class line used a single-thread bankers queue to serve ten dedicated eService machines while all other check-in categories utilized express lanes. The dedication of the machines at counters 10 through 13 was flexible and changed throughout the morning. Counter 10 was closed to all check-ins and only opened for 25 minutes during peak arrivals. Counter 11 was initially dedicated to paper tickets. However, later in the morning, this counter was closed to all check-ins as well. Counter 13 was switched between international and paper ticket check-ins. Finally, counters 14 and 15 were permanently dedicated to domestic eTicket without baggage check. These positions did not have any agent assistance.

Many of the customers checking in at the domestic eTicket with baggage check did not actually have any baggage to check. However due to the positioning of the domestic eTicket without baggage check counters at the end of the ticket area and away from the security checkpoint, many of these customers ended up standing in line at the baggage check counters. This results in unnecessary congestion at these counters and increased wait time for all customers. In addition, the eTicket without baggage check machines become underutilized. Generally, a vast majority of the customers that do not check baggage are business travelers whose primary goal is to get through the check-in process quickly.

A simple solution is to ensure that the queue management agents properly screen passengers and direct them to the appropriate queue. A more involved, yet complete, solution would be to alter the machine dedication strategy to place the eTicket without baggage check counters next to first class. This would increase the visibility of this check-in option and would allow easy access for these customers to the security area upon check-in completion. Second, instead of closing machines to check-in completely, excess machines could be dedicated to the eTicket without baggage check category. Figure 3-8 below represents an alternative to the dedication strategy observed on July 22, 2002, and should provide greater utilization across all eService machines and higher system throughput.

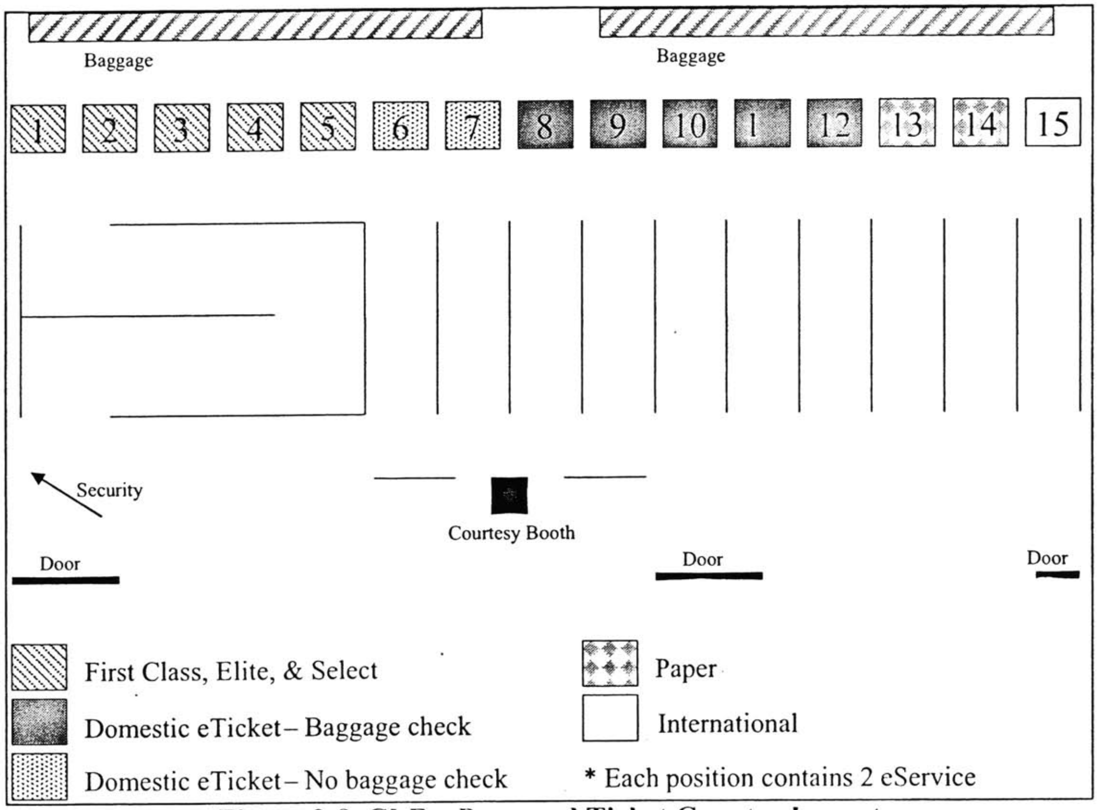

Figure 3-8 CLE – Proposed Ticket Counter Layout

Newark Liberty International Airport – EWR

Observations at EWR were performed on August 7, 2002. As was done in the other hub airports, the agent positioning and resulting machines per agent were observed and calculated. Figures 3-9 and 3-10 below show that similar to both CLE and IAH, the number of baggage handling agents remained relatively constant throughout the observation period with an average of 2 machines per agent. However, shoulder-to-shoulder agents were rarely present, and when present, were responsible for an average of 14.5 machines each. Both intuition and qualitative observations showed that this ratio of 14.5 machines per agent is insufficient to assist all of the passengers. The result is longer transaction times per customer due to the lack of assistance.

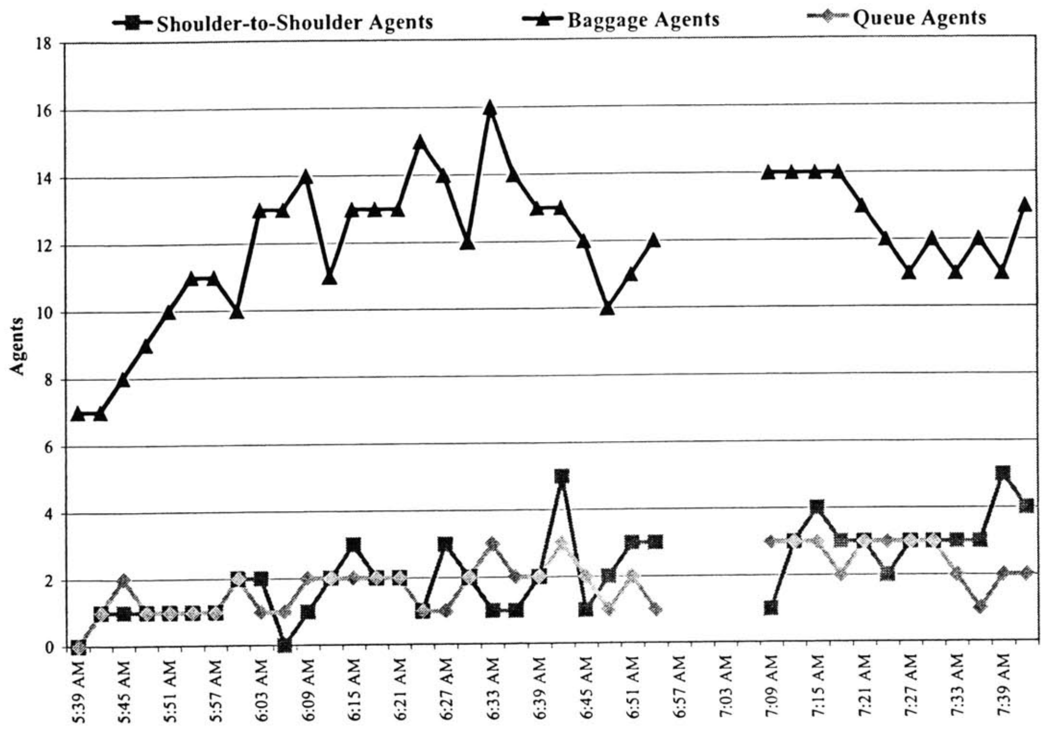

Figure 3-9 EWR – Agent Positioning

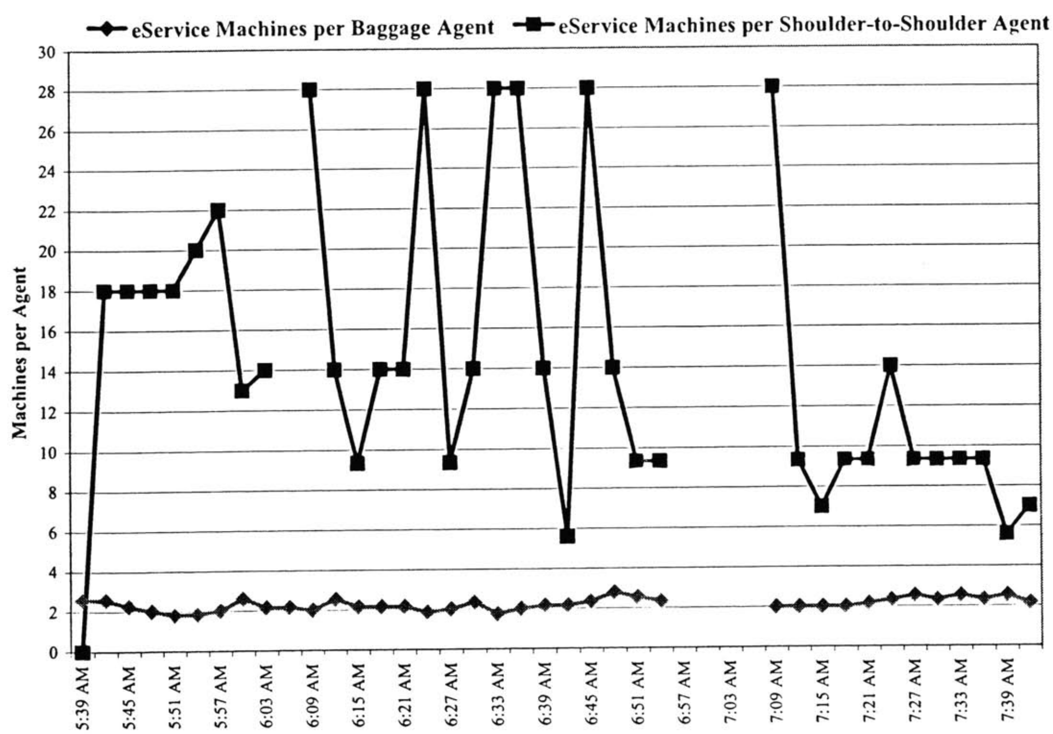

Figure 3-10 EWR – eService Machines per Agent

On the positive side though, the charts also show that EWR utilized an average of 2 queue management agents at a time. One of these agents was positioned at the queue entrance while the other was responsible for managing the queue exit. However, due to the fact that 28 machines were being dedicated to this check-in category, the queue management agent did not have good visibility to all of the machines. This is a perfect example of the teamwork that is necessary to effectively process passengers in this new environment. Had there been a greater presence of shoulder-to-shoulder agents, the employees could have worked together to identify the idle machines and increase machine utilization. The figure below shows the result of this lack of visibility.

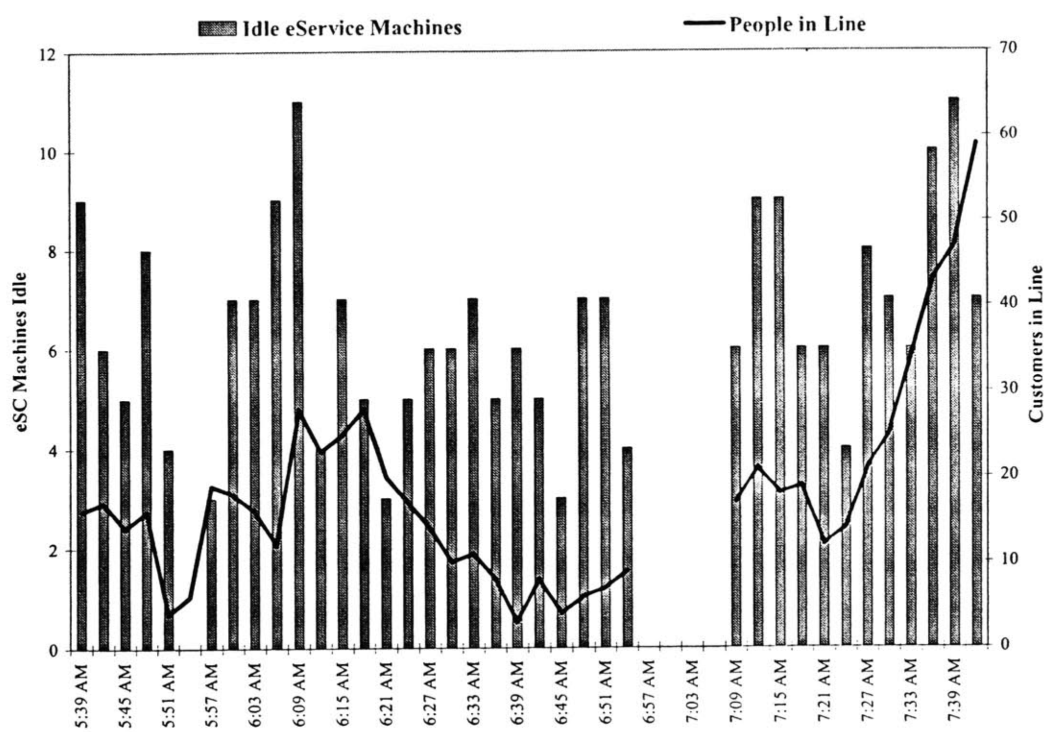

Figure 3-11 EWR – Idle eService Machines and Customers in Line

From this graph, we can see that there are a few instances when the number of people in line is less than the idle machines. This means that presence of a line could have been almost completely eliminated had the agents worked together to ensure all eService machines were being utilized.

In summary, it was observed that the agent positioning varied greatly over time at each airport. Additionally, the implementation of the shoulder-to-shoulder concept was quite different between each hub. A final key observation was the difference between the stations in terms of their utilization of the eService machines. Table 3-1 below provides a comparison between the hubs for the average machines per shoulder-to-shoulder agent, the average number of idle eService machines, and the average number of customers waiting in line.

	Average Machines per Shoulder-to-Shoulder Agent	Average Idle eService Machines	Average Customers in Line
CLE	4.32	0.51	11.3
IAH	5.99	5.45	19.5
EWR	14.56	6.02	20.4

Table 3-1 Hub Comparison – Key Observation Metrics

From this data, it would appear as if the higher ratio of shoulder-to-shoulder agents leads to a decrease in idle eService machines, and therefore, fewer customers waiting in line. This hypothesis would make sense. Due to their presence between the ticket counter and the queue exit, an increased number of shoulder-to-shoulder agents would be able to more quickly identify available machines and call customers to them. This would reduce the number of customers waiting in line and help keep machines occupied at all times.

Chapter 4: Embracing Self-Service Technology

The primary motivations behind self-service introduction are decreased costs and increased system throughput. Additionally, self-service places control in the customer's hands, which is generally preferred by the customers. Evidence from a variety of industries including banking, grocery stores, and airlines have shown that strong alignment between the needs and interests of the customers, employees, and management is necessary for successful implementation. In this chapter, I will provide a historical look at self-service in these other industries. Additionally, I will report data on the extent of the alignment between customers, employees, and management as it relates to the implementation of eService at Continental Airlines.

4.1 Self-Service in Other Industries

While self-service technology was first deployed in the 1990's in the airline industry, the concept of using technological breakthroughs to enable self-service has been around since the 1930's. In 1939, Luther Simjian was granted 20 patents for the first automatic teller machine, or ATM.[7] Simjian's ATM, the Bankmatic, was installed in a pilot phase at what is now Citicorp. However, after 6 months, the ATM was removed due to lack of demand. It took nearly 30 more years for the self-service concept to be revisited. Don Wetzel, a Vice President at Docutel, a company that developed automated baggage-handling systems, invented the first successful ATM in 1969. His ATM was first installed at Chemical Bank in New York and was built into the exterior of the building. Initially, this ATM was simply a cash dispenser due to the fact that at this time, bank accounts were not electronically connected to the ATM. Therefore, users were carefully selected by the bank based on their account status and credit card status.[8]

While the banks were initially very selective in which customers would be permitted to use the new self-service machines, their mindset eventually shifted with the development of the ATM card which linked transactions at the ATM directly to the customer's account. The banks began seeing ATM's as the preferred method to complete customer transactions. The customers too began to more readily accept the machines. Now, ATM's are found inside banks, in drive-through banks, malls, parks, airports, and virtually every public place. This trend is just beginning in the airline industry. Today, airline self-service machines can be found in the airport, parking garages on and off-airport property, subway stations, and downtown office buildings. With the advent of internet and wireless check-in, self-service check-in is capable from almost anywhere. However, while there are some similarities between ATM adoption and airline self-service machine adoption, there is a distinct difference. With self-service in the airline industry, employee assistance is still required for some transactions. ATM's on the other hand do not have teller assistance for any transaction.

A second industry where self-service technology has been deployed is in the retail grocery industry. In the past five years, self-service check-out stations have been installed in grocery stores operated by multiple grocery chains. Customers are generally limited in the number of items that can be purchased per transaction in an effort to provide greater convenience for customers that want to get in and out of the store quickly. The operation of self-service in this industry is quite similar to that in the airline industry. First, checking-in with an agent can actually be quicker than using a self-service machine if there are no changes made to seat assignments or flights. At a grocery store, a clerk can generally scan a customer's items much faster than a customer on the self-service station. Additionally, Continental Airlines current operational model assigns one agent to assist multiple customers with their transaction. At grocery stores, one clerk monitors on average four customer stations. This is done to provide assistance on the scans as needed, check customer ID for alcohol purchases, and to help prevent theft.

Self-service machines are now showing up not just in the airline, banking, and grocery industries, but many others as well. The goal for most self-service check-in machine installations is to provide greater customer convenience and/or reduce costs through decreased headcount. However, while implementing these new self-service check-in machines, it is critical that the companies listen closely to both the front line employees that are directly impacted by the new technology as well as the customers that will ultimately use them. As was discussed in Chapter 1.4, maximum performance can be achieved only when the technology and the workforce are integrated and aligned with a common goal.

4.2 Agent Survey Findings

Following the series of airport observations conducted during the summer of 2002, the second major step of the research began, collecting feedback on self-service from the airline employees. While much informal, qualitative feedback had been collected through personal conversations with the agents during airport visits, it was important to obtain feedback in a standardized way that could be analyzed quantitatively.

Therefore, a survey of twenty questions that focused on a variety of self-service aspects was drafted.

The survey, which can be seen in Appendix 1 along with the survey results, utilizes a response scale of 1 through 5 for each question, with 1 meaning strongly disagree and 5 meaning strongly agree. Additionally, basic demographic information was collected to aid in the analysis. This information included gender, age range, and years as a Continental ticket agent.

Members of Continental's eService department, my thesis advisors, and myself carefully designed the questions. The questions seek to gain insight into the ticket agents' feelings on a broad range of issues pertaining to eService including:

1. eService product
2. eService process
3. eService impact on job security
4. Communication from management
5. Incentives from management
6. Training and agent preparedness
7. Role of teamwork in an eService environment

The questions were designed to address the key hypotheses surrounding the agent acceptance of eService.

The survey was administered to forty agents from five different stations. The stations included IAH, DFW, BOS, and two additional spoke stations that will be discussed in Chapter 5. In order to prevent disruption to the check-in process, the surveys were completed either during the agent's break or during an off-peak time. The survey took between two and five minutes to complete per agent.

A complete summary of the survey results can be seen in Appendix 1. However, the discussion that follows will review some of the more interesting and significant survey findings.

One of the major hurdles to overcome with self-service is that the technology may eventually reduce ticket agent headcount. As a result, many believe that the ticket agents themselves are fearful of adopting the new technology. Two of the questions in the survey were aimed at addressing this belief. Question 2 asked the agents if they agree with the following statement: "I see eService deployment as an enhancement to my job." The response to question 2 can be seen in Figure 4-1 below.

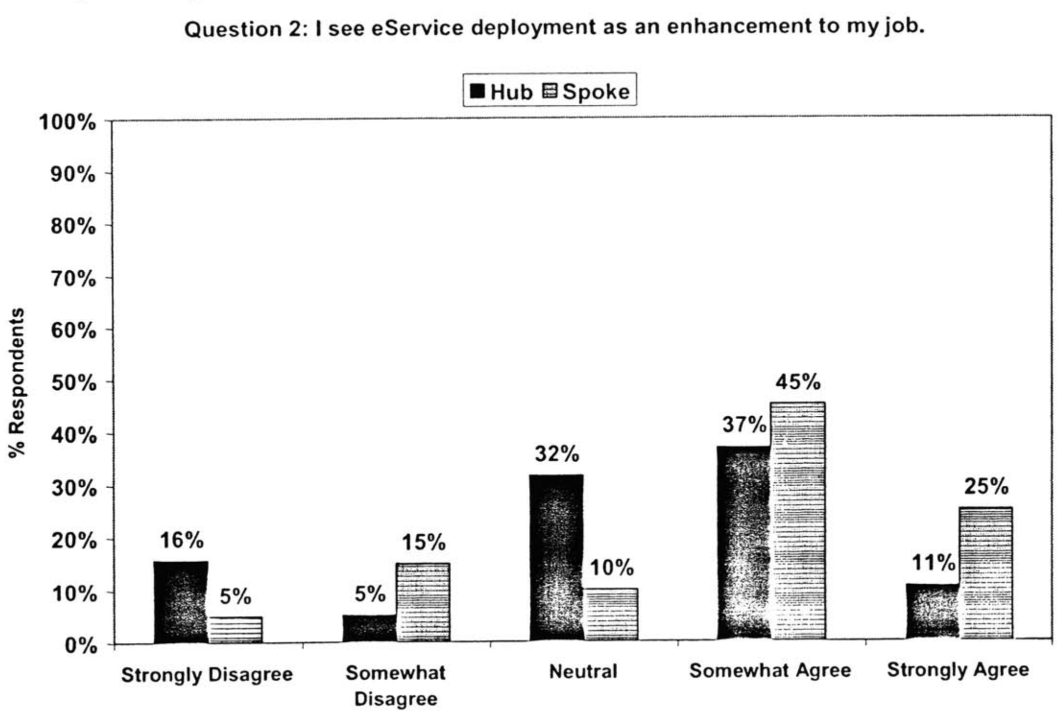

Figure 4-1 Agent Survey – Question 2

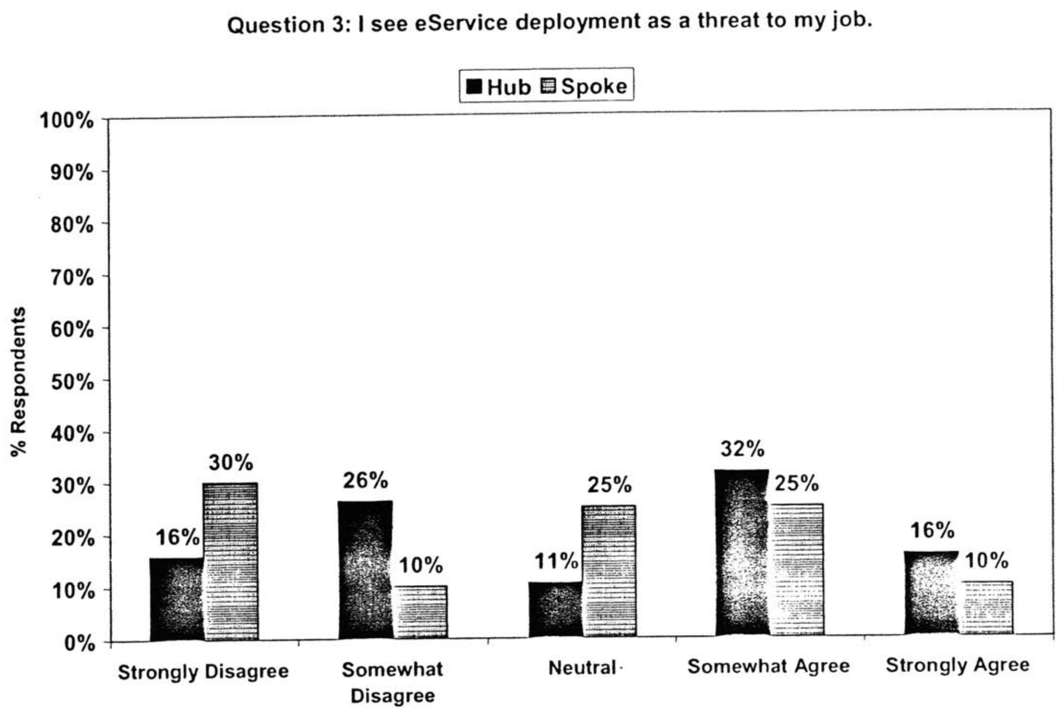

Figure 4-2 Agent Survey – Question 3

As can be seen in Figure 4-1 above, 70% of the spoke agents agreed with the statement as opposed to only 48% of the hub agents. The follow-up question of course was question 3, which asked if they agree with the following statement: "I see eService deployment as a threat to my job." Figure 4-2 shows the results to this question as well. While the response between the hub and spoke agents was more similar on question 3 compared to question 2, there is still a significant difference in response. 48% of hub agents see eService deployment as a threat to their job as opposed to only 35% of the spoke agents.

Through one-on-one conversations with the agents and station management in these hub and spoke airports, a possible explanation for this discrepancy was discovered.

In the spoke airports such as DFW or BOS, the ticket agents perform multiple job functions in addition to ticketing. For example, due to the smaller size of these stations in comparison to the hubs, the ticketing agents also frequently serve as grounds crew to help direct the aircraft, baggage handlers to load and unload baggage from the aircraft, and gate agents to assist passengers in the boarding process. Due to the near constant flow and large volume of passengers in the hubs, division of labor within the workforce is more efficient. With respect to the survey, this difference in job scope definition can explain the agents' responses. The spoke agents see eService deployment as an enhancement since it ultimately frees up more of their time to handle the other aspects of their job. For the same reason, these spoke agents feel less threatened by the technology. The hub agents on the other hand see a machine capable of performing the majority of transactions required by a customer and therefore feel threatened by eService. These findings are consistent with findings by others that the narrower the job skills and scope, the more likely the technological change is to displace these employees.[9]

A second major difference between the hub and spoke agent survey responses is related to the agent's training and understanding of their job responsibilities in the new self-service check-in environment. Question 11 of the survey asked the agents how they feel about the following question: "I have been adequately trained for my role in eService check-in." Question 12 of the survey asked the question: "I understand my job responsibilities when working with eService check-in." Figures 4-3 and 4-4 below show the distribution of response for questions 11 and 12 respectively.

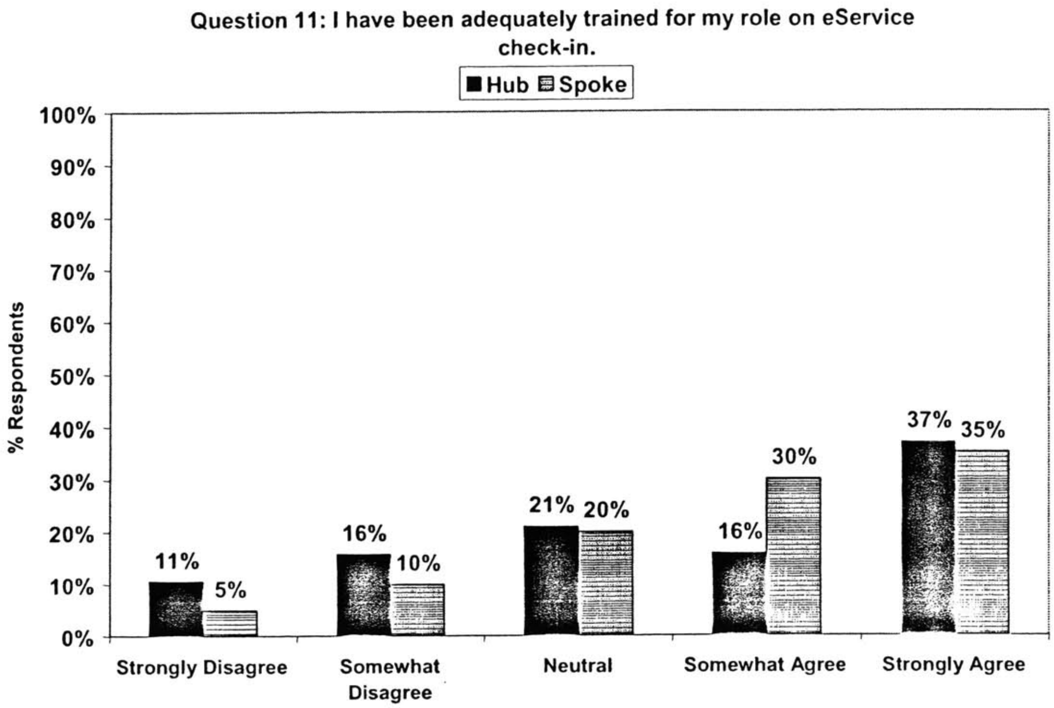

Figure 4-3 Agent Survey – Question 11

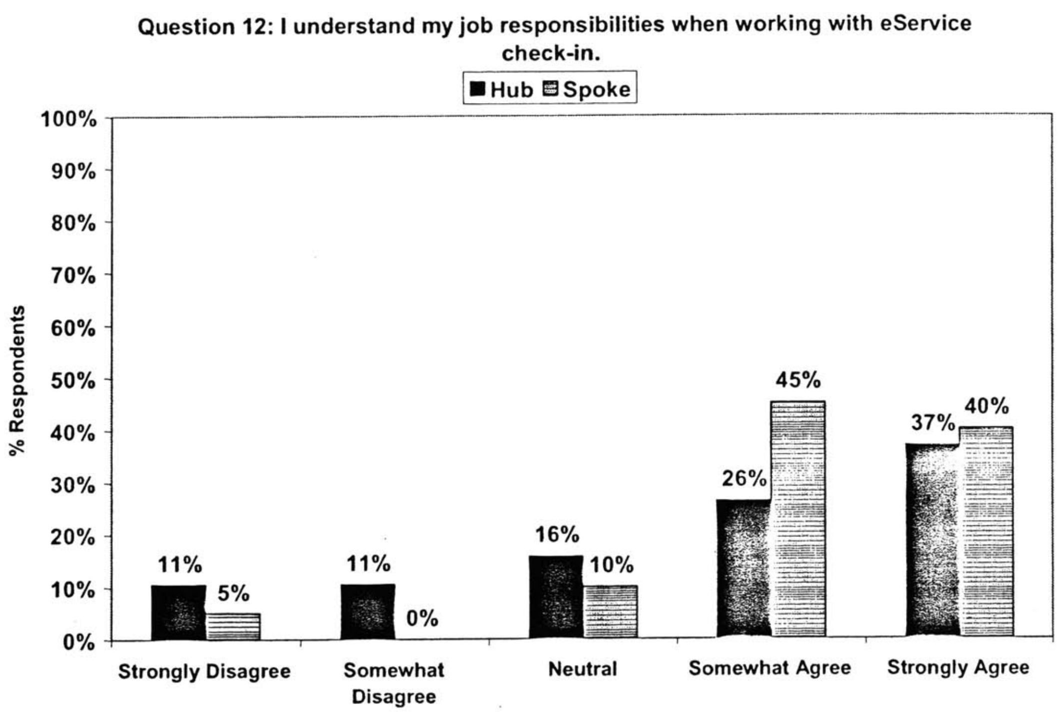

Figure 4-4 Agent Survey – Question 12

As Figure 4-3 shows, 65% of the spoke based agents feel they have been adequately trained for their role in eService as opposed to 53% of the hub based agents. While the difference is small, it is important when combined with the results of question 12. When asked if they understand their job responsibilities, 85% of the spoke agents agreed that they do while only 63% of the hub agents agreed. Once again, the quantitative survey results combined with qualitative one-on-one interview results leads me to believe that this is in large part due to the level of interaction and communication with the station management. In the smaller spoke stations, the supervisors and general managers are often "working the line" with the ticket agents. These agents have learned how to interact with the eService technology by watching their leaders. On the other hand, in the hubs, the agents rely more heavily on formal communication such as memos and training courses to learn a new process.

A third major difference revealed through the eService agent surveys dealt with the employees feeling valued by both station management and Continental's senior management. Figures 4-5 and 4-6 show the hub and spoke agent responses to questions 14 and 15 respectively.

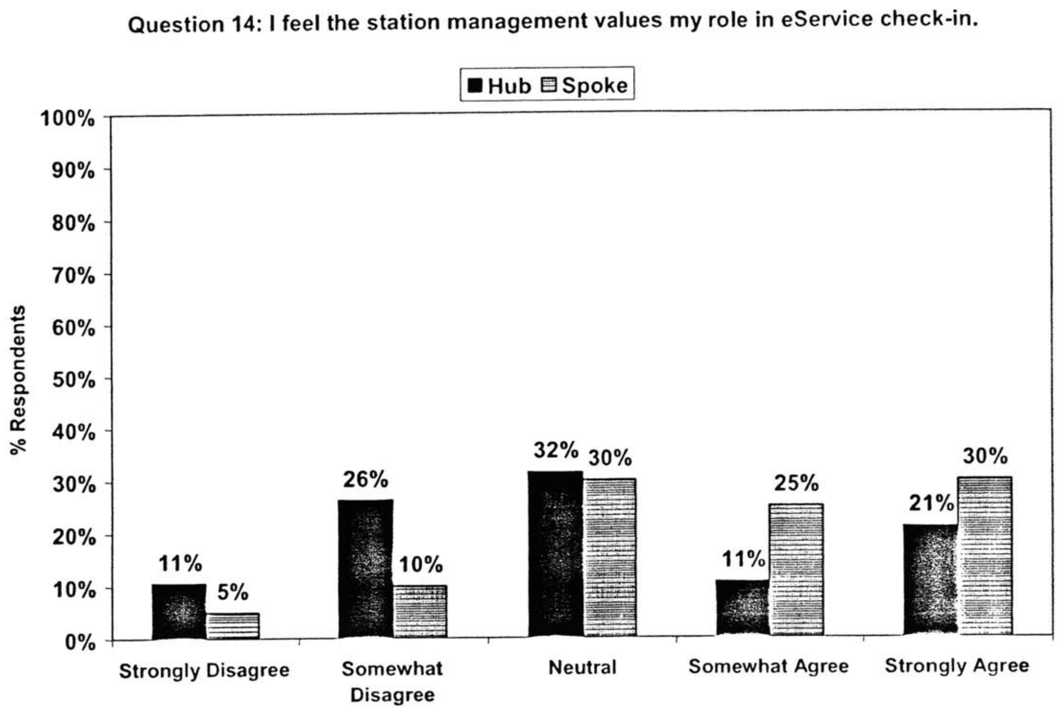

Figure 4-5 Agent Survey – Question 14

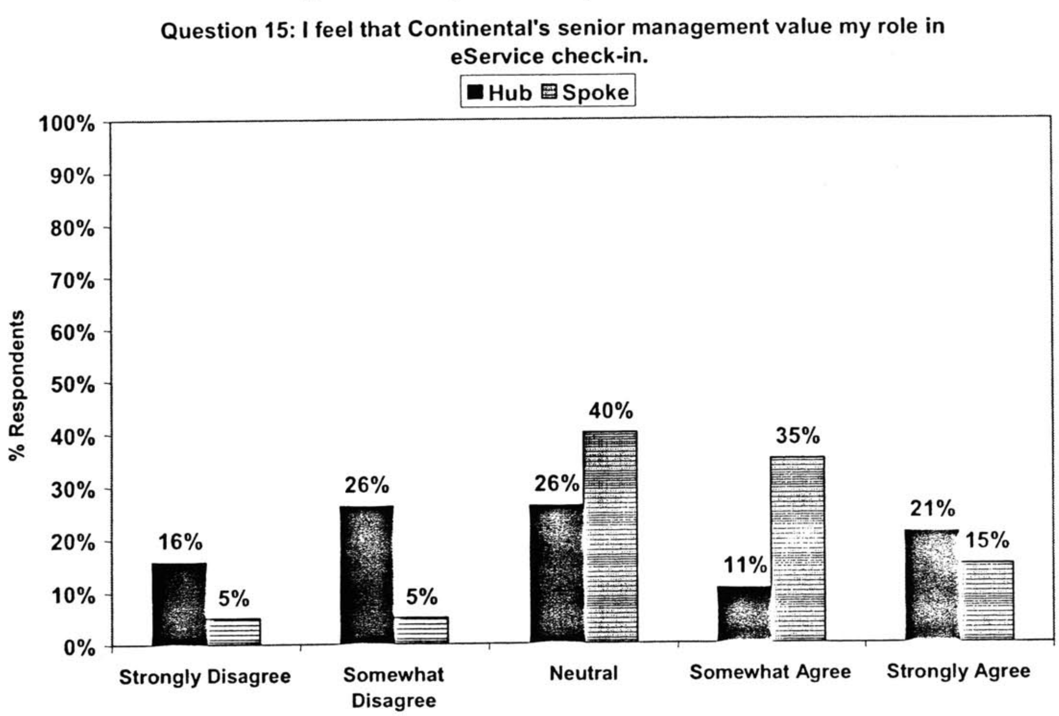

Figure 4-6 Agent Survey – Question 15

The responses to these two questions raise two important issues. First, the difference in response between the hub and spoke agents raises concern about the interaction of hub agents with both station and senior management. In both questions, the hub agents responded less positively; they do not feel that station and senior management value their role in eService check-in. The second issue is that for all of the agents, less than half overall feel valued by management. This is an important point that raises concern about the implementation of eService technology. If the agents do not feel valued and are not given incentives to utilize eService, the return on investment for the new technology will be much lower for Continental Airlines.

As has been shown consistently through the survey results, there is a significant difference in the acceptance of eService between the hub and the spoke agents. It has been shown that the difference in job scope, training opportunity, sense of job security, and sense of value to the organization is not communicated as well at the hubs. In Chapter 1, the socio-tech model was introduced as a means of explaining the importance of integrating the workforce with the technology to achieve greater performance. My conclusion is that this integration is happening much better at the spoke airports than the hubs. As further evidence of this, many of the spoke stations outperform the hubs in terms of eService usage.

4.3 Customer Survey Findings

In order to gauge the customer acceptance and satisfaction with the current self-service offerings in the airline industry, a survey was created and administered. Similar in design to the agent survey discussed earlier, the customer survey contains 15 questions and utilizes a response scale of 1 through 5. The customer survey and results can be seen in Appendix 2. In addition to the question responses, basic demographic information was collected to aid in the analysis. This information included age range, gender, flights per year, and whether or not the customer was an elite member of Continental's OnePass frequent flyer program.

This survey was designed by the same group of individuals as the agent survey. The questions were once again designed to address key hypotheses about the customer perception of eService. The questions seek to gain insight into the following broad areas:

1. Experience with eService
2. eService product and knowledge and use of key features
3. eService process
4. Desire for agent involvement in the process
5. Comparison against other airline self-service products

While it would have been ideal to administer the survey to customers as they entered the ticket lobby to ensure a more random population sampling, the majority of the surveys were administered in either the Continental President's Clubs or at the gate while waiting to board a flight. It was decided jointly with Continental management that the survey should be administered in a non-threatening and customer friendly way. The goal was to gather the feedback while not adding time to their overall travel experience. In total, 129 surveys were completed with representation from Houston (IAH), Dallas-Ft. Worth (DFW), and Cleveland (CLE).

As was mentioned earlier, self-service puts control into the hands of the customer. In the airline industry, this control comes in the form of enabling the customer to select their own seat, request an upgrade, or change flights. Question 3 of the survey asked the customers if they liked using the machines to make these types of changes to their travel plans. As Figure 4-7 shows, an overwhelming majority of the customers either strongly agreed or agreed with the statement.

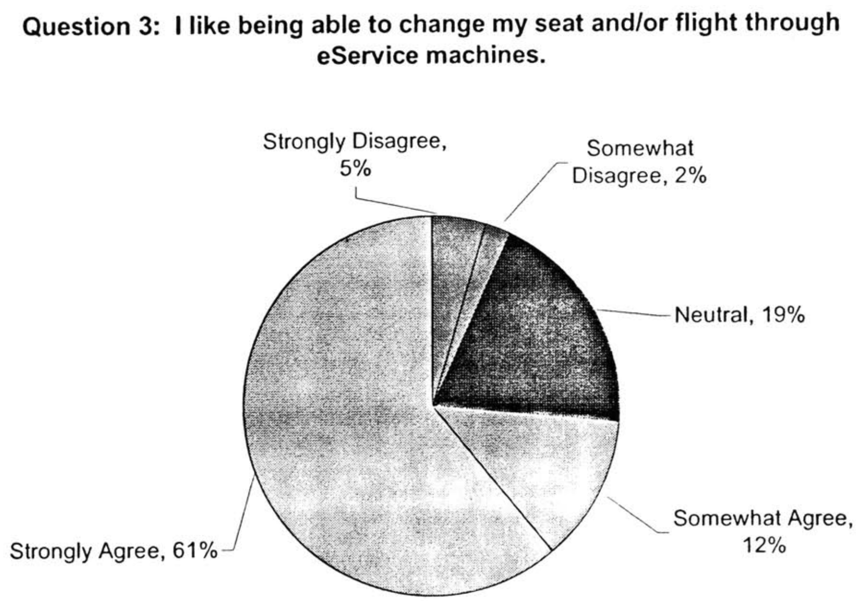

Figure 4-7 Customer Survey – Question 3

The next important question is whether or not the customer actually trusts the information being provided by the eService machines. Question 4 addresses this very question, and the results can be seen in Figure 4-8 below. While 60% of the customers trust this information, nearly 17% do not believe the accuracy. The result of this lack of trust is reluctance on the part of these doubters to use the machines on their next trip. Through interviews with many of the customers, it was discovered that customers often trust the ticket agents less than the machines. Unfortunately, the survey was not designed with such a question.

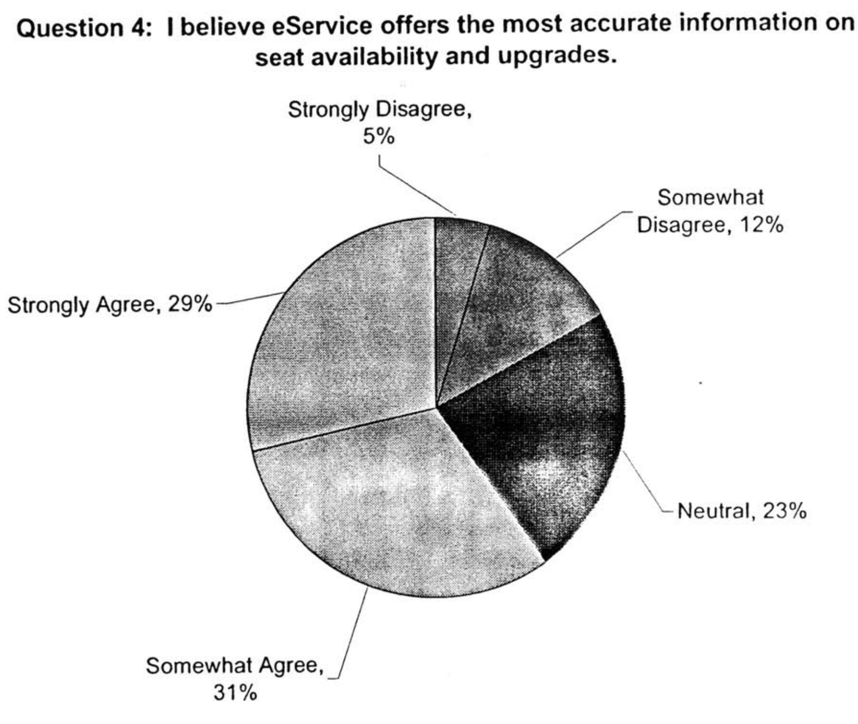

Figure 4-8 Customer Survey – Question 4

As the purpose of this research is to re-engineer the check-in process, a question needed to be asked on whether or not the customers understood the current eService process. Question 5 of the survey asks this question and the results, as shown in Figure 4-9, indicate that nearly 82% of the customers do understand the eService process at Continental. However, the survey was conducted primarily in Houston (IAH) and Cleveland (CLE), both of which are operating under the design of the new process.

Continental did not have any historical data on customer satisfaction with the check-in process.

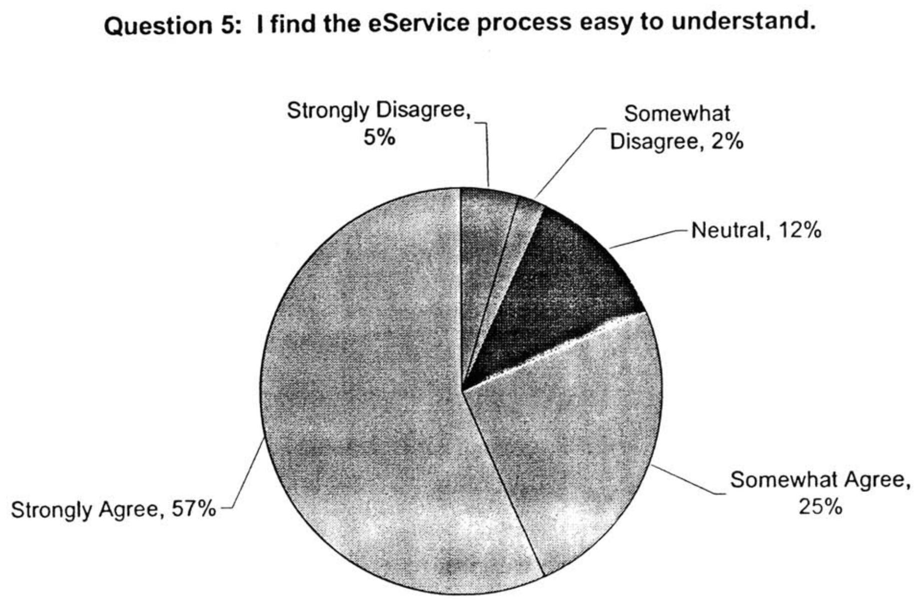

Figure 4-9 Customer Survey – Question 5

A major consideration in the design of the new check-in process is the level of agent involvement in the check-in transaction. The question at hand is the following. Who should perform the transaction? Questions 11 and 12 address this issue by asking if the customer wants to perform the transaction themselves or have an agent do it for them. The results can be seen in Figures 4-10 and 4-11 below. As the data indicates, the customers again overwhelmingly prefer to take control of their travel experience and obtain their boarding passes themselves.

Question 11: I prefer to perform my eService transaction.

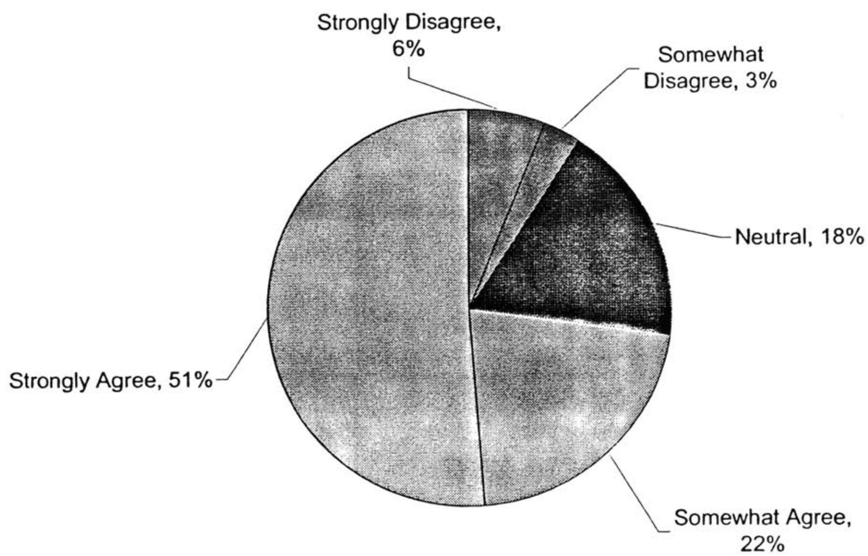

Figure 4-10 Customer Survey – Question 11

Question 12: I want to have an agent perform my eService transaction.

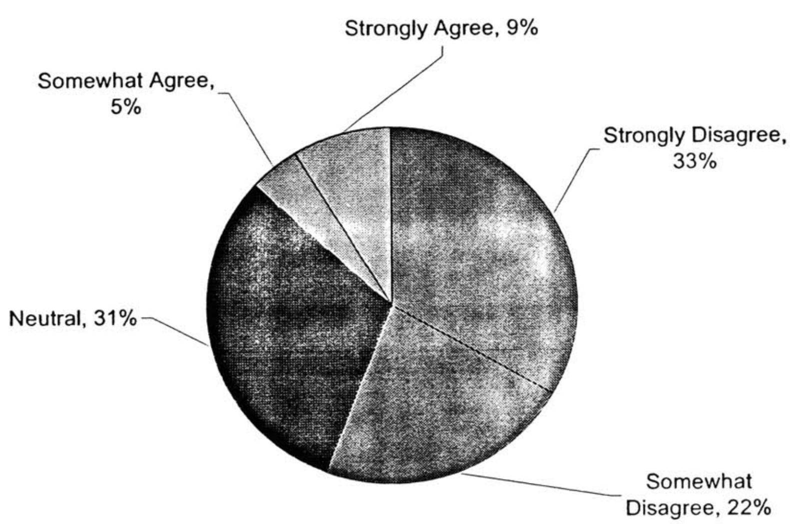

Figure 4-11 Customer Survey – Question 12

To further investigate the theory that the customer wants to control their own transaction, two more important questions were asked. Question 13 of the survey asks the customer if they feel eService check-in is faster than conventional check-in. 82% of the customers polled either agreed or strongly agreed with this statement as can be seen in Figure 4-12. The follow-up question to truly test the theory of control was to ask the customer the following: If eService check-in and conventional check-in both took the same amount of time to check-in, would you prefer eService check-in. If time was the only factor that a customer cared about, the expected response to this question should be neutral. However, as Figure 4-13 shows below, 56% of the respondents would still prefer to use Continental's eService check-in.

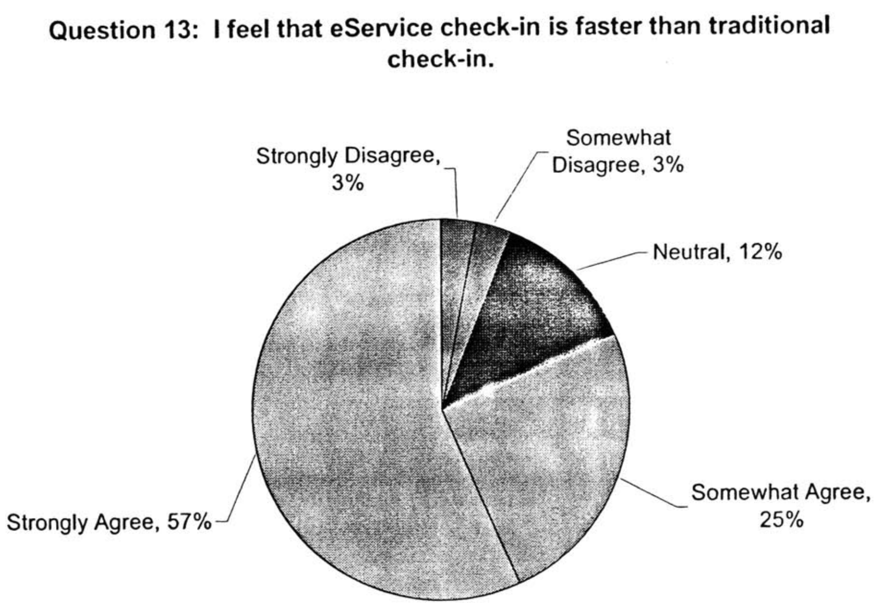

Figure 4-12 Customer Survey – Question 13

Question 14: If both eService and traditional check-in took the same amount of time, I would prefer eService check-in.

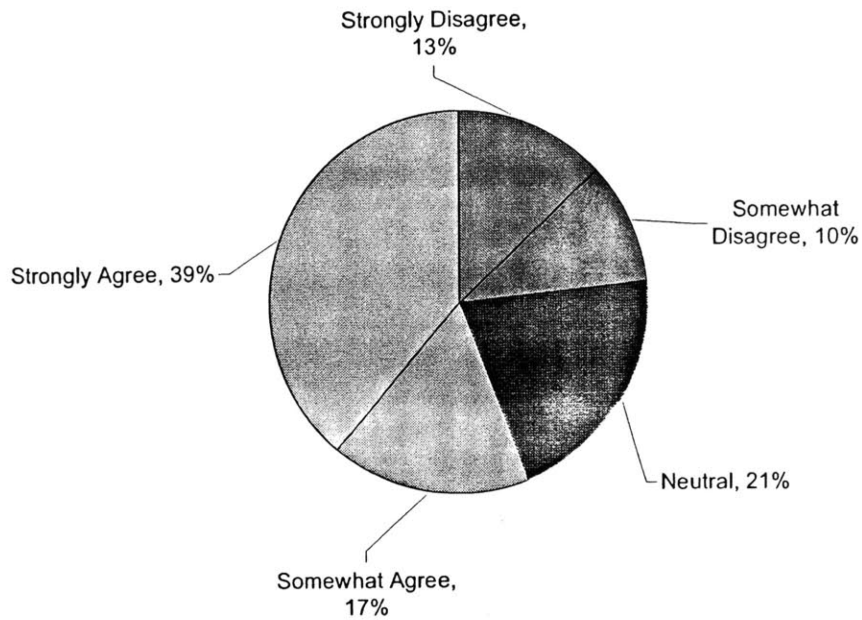

Figure 4-13 Customer Survey – Question 14

As this data has shown, the majority of the customers are adopting the system readily. However, there is still a significant number of customers who want or need agent-assisted service. Another interesting observation is that the customers seem to be much more positive and accepting of the self-service technology at Continental than the agents. In order to understand this further, a more in depth analysis of the employee responses is necessary. This will be done in Chapter 5.

Chapter 5: Case Study: Station Comparison

The series of airport observations conducted during the first half of this research project was designed to characterize the state of the current operations and identify common issues between the stations, as outlined in Chapter 3. Following the series of formal observations, the research focus shifted to the collection of direct feedback from both the Continental ticket agents and the customers utilizing self-service. The survey results reviewed in Chapter 4 show that the customers are responding positively to self-service deployment and generally understand the process. However, the acceptance of this relatively new technology within Continental's own workforce depends to a large extent on the type of station, hub or spoke, at which the employee works.

In order to redesign the check-in process at Continental and deploy the process designed by the cross-functional team, an experiment or trial period of the new process needs to occur. This experiment is the third phase of the research effort. An experimental plan was designed to test a number of characteristics of the new process. These included the impact of queue management agent presence on machine utilization, agent to machine ratio impact on system throughput, and queuing style impact on machine load balancing. The proposed timeframe to conduct these experiments was in November and December of 2002. However, Continental's senior management opted to postpone the trials until 2003, citing the December 31 TSA mandates on airport security as a priority.

While the plans for this experiment have been outlined and passed on to Continental for future implementation, it was agreed that another valuable research focus would be an in-depth station comparison. The intent of the station comparison would be to look at both operational and organizational metrics and determine what impact if any these have on the acceptance of self-service at the stations. This learning could then be combined with the observations, surveys, and eventually the experiment to ensure that all aspects of the re-engineering effort are in place to ensure success. The sections that follow will provide an analysis of the case study conducted.

5.1 Station Selection

The station selection task was focused on the goal of identifying two or more similarly sized airports, yet sufficiently large differences in eService performance. The eService group at Continental publishes a daily report, as well as monthly summaries, that show the eService capture percentage for each station. This information is reported for both an individual daily capture and a month to date capture. Additionally, this report contains information on daily passenger volume which can be used to gauge the size of the stations. Finally, a separate database was used to determine how many eService machines of each form factor each station has. This is an important characteristic as both customer and agent behavior changes depending on the type of eService format being used. Other factors were important as well when deciding which two stations to compare in the case study. Some of the other characteristics compared include the following: flights per day, flight gauge and frequency, origin and destination mix (domestic vs. international), and number of eTicketed vs. paper ticketed passengers.

After a lengthy review of all domestic stations, the field of possible candidate pairs was narrowed to a list of five. These five pairs and their key metrics can be seen in Table 5-1 below. The selection of some stations was not entirely random. For example, one station was a candidate due to the fact that it was the first airport to install and operate with the pedestal form factor. Boston, Chicago, and Los Angeles represented heavy business markets with frequent flight departures, indicating that passenger flow would be relatively constant throughout the day. Boston, New Orleans, Austin, and Washington DC operate what may be called shuttle flights with flights nearly every hour to either Continental's Newark or Houston hubs. Finally, heavy leisure destinations such as Honolulu and Las Vegas would allow for an interesting study of consumer behavior. Additionally, this would certainly be the most enjoyable city pair to study!

	Station Pair	eService Capture	Passengers per Day	eService Machines
1	BOS	80%	1500-1750	14 AOTF, 4 Tabletop
	ORD	93%	1250-1500	14 AOTF, 4 Tabletop, 2 Stand-alone
2	BOS	80%	1500-1750	14 AOTF, 4 Tabletop
	MSY	74%	1500-1750	8 Tabletop, 1 Stand-alone
3	HNL	73%	750-1000	8 Tabletop
	LAS	81%	2250-2500	8 Tabletop
4	SEA	77%	750-1000	5 Pedestal
	PDX	73%	250-500	4 Tabletop
5	Station A	89%	250-500	4 Tabletop
	Station B	77%	250-500	4 Tabletop

Table 5-1 Case Study – Candidate Station Characteristics

Despite the many similarities between candidate city pairs one through four, the decision was made that city pair number five, Station A – Station B, would provide the ideal study given the options. The identity of these stations has been masked to protect the confidentiality of individuals discussed throughout this chapter. This city pair was chosen due to its extreme similarities and its relative size to the other choices. The size of these stations, as measured in average passengers per day, is small enough to allow for detailed operational observations. Additionally, as will be shown, the flight schedules are nearly identical and have ample time in between each flight to enable identification of what flight each passenger is traveling on based on their time of arrival. The time in between flights also allows an opportunity to interview the ticket agents and understand the organizational influence on eService performance. Finally, the eService product offering is identical between the two stations, yet there is a measurable difference in eService capture difference to allow for a meaningful comparison. The results of this study are presented in the next section.

5.2 Results

Station A

Observations were performed at Station A on Wednesday, November 27, 2002. The observations began at 6:00 AM and ended at 12:45 PM. Additionally, due to the limited number of flights per day and the spacing of the flights throughout the day, the observations were divided into three distinct data collection periods to coincide with the arrivals of passengers for the flights.

Continental operates five flights per day from Station A, all serving the Houston hub (IAH). The schedule and aircraft gauge is shown in Table 5-2 below. As this table indicates, Continental schedules Boeing 737 aircraft into Station A, with an average departure capacity of 116 passengers. The other item to note with this schedule is that the flights are spaced sufficiently far apart to easily identify on which flight a customer approaching the ticket counter is departing.

Destination	Dept. Time	Aircraft Gauge	Seats
IAH	6:50 AM	737	100-125
IAH	8:25 AM	737	100-125
IAH	11:14 AM	737	100-125
IAH	1:30 PM	737	100-125
IAH	4:37 PM	737	100-125

Table 5-2 Continental's Flight Schedule – Station A

The information provided in this analysis will include a detailed description of the physical layout of the ticketing area, customer data, agent activities, information on management's approach to eService implementation, and agent survey feedback.

The Continental Airlines ticket counter in Station A can be divided into three distinct check-in locations. First, the First Class and OnePass Elite line is located at one end. This is a single lane queue with signage to indicate First Class and OnePass Elite. On the opposite end of the Continental counter is the queue for conventional check-in and ticket purchases. Again, signage at the queue entrance indicates the type. Finally, in between these two queues is the eService check-in location. Stanchions are used to separate this zone from the other queues, and there are multiple signs to identify it as self-service check-in. The four eService units in Station A are of the tabletop format. It is important to note that there is not a dedicated bag check location for customers who use the eService machines and need to check bags.

Given that the observations at Station A were performed the day before Thanksgiving, one of the busiest travel day of the year, the mix of passengers was somewhat abnormal. There was a much greater percentage of leisure customers on this day than usual. The arrival of passengers to the ticket counters on November 27, 2002 can be seen in the figure below. As the observations were only conducted through the 1:30 P.M. departure, only the first four flights are shown. The bars indicate the flight departures.

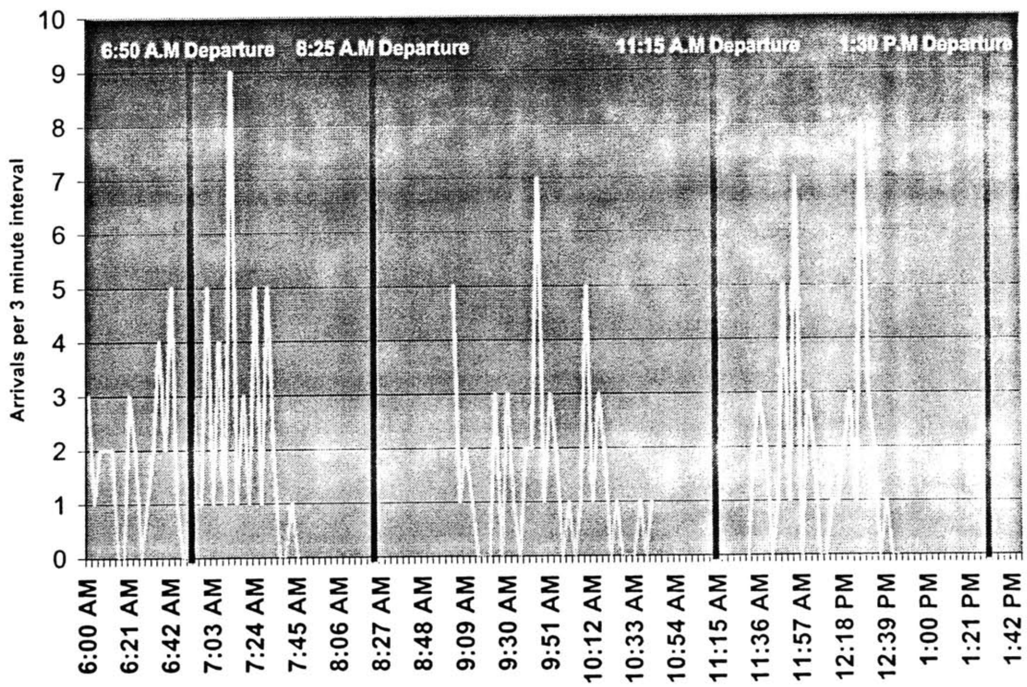

Figure 5-1 Customer Arrivals to Check-in on 11/27/2002 – Station A

In order to help speed the eService transaction for customers, the agents in Station A printed out a passenger manifest for each flight at the beginning of each day. This list included the passenger name as well as their confirmation number, which the agent could use to start the check-in process on the eService machine for the customer. However, in most cases, the agent would prompt the passengers to start the machine themselves with either a credit card or driver's license containing a magnetic stripe. Of the transactions observed on November 27th, 19.0% were performed entirely by the agent, leaving 81.0% which were performed by the customer. This was in large part due to the activities and positioning of the agents.

Both the number of agents at the ticket counter and the positioning of the agents within the zones varied throughout the day. During peak customer arrivals, the station maintained at least one agent in front of the counter in the eService zone. Depending on volume, there were either one or two additional agents behind the counter to process paper ticket or international customers, handle exceptions, or assist with tagging bags. The figure below shows the positioning of the agents over time. It shows that while there were occurrences of having no agents working in front of the conventional counter, these occurrences generally followed immediately after the departure of a flight, indicating low customer arrivals.

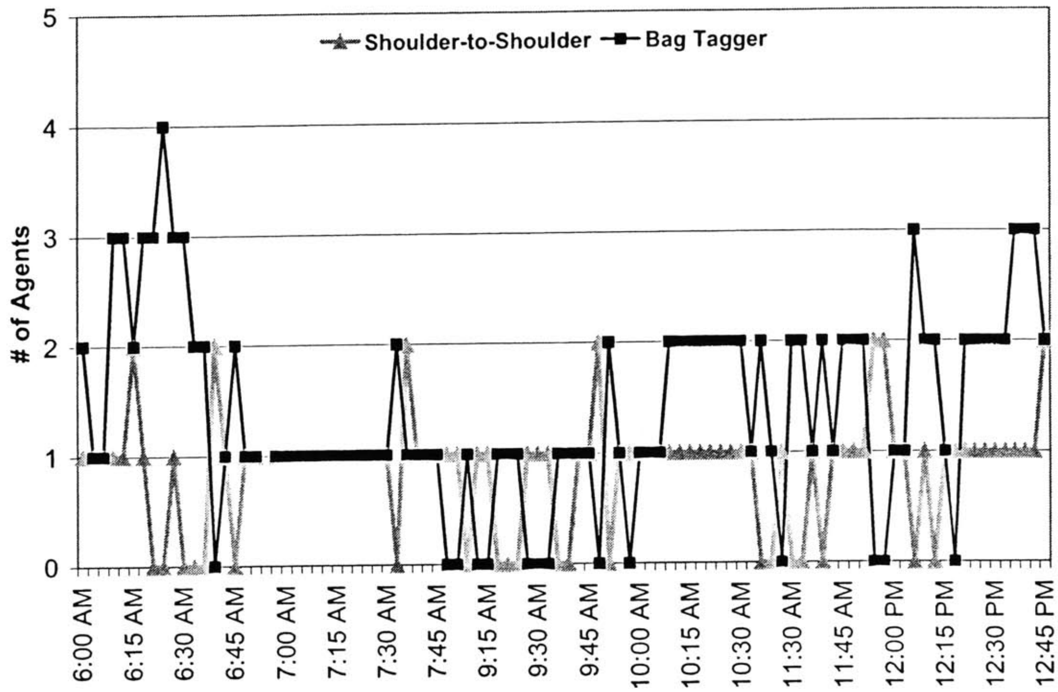

Figure 5-2 Agent Positioning – Station A

Customers who check bags and utilize the eService check-in in Station A must go through a two-step process. First, they perform the check-in transaction on the machine. Second, the bags must be tagged by an agent and transferred to the bag belt behind the conventional ticket counter. However, to minimize the inconvenience to customers, the station management encourages the agents to leave the customer at the eService machine, retrieve the bag tags from the printer located on the conventional ticket counter, return to the customer, tag the bags, and carry them to the bag belt themselves. This process was followed the majority of the time and allowed the customer to stay in one place for the entire check-in process. There are two significant downsides to this however. First, the eService machine remains occupied by the customer and prevents another customer from starting their transaction. Second, by shuttling bags between the eService machine and the ticket counter, very little time is left to actually assist customers with their eService transaction.

One of the agent positions used in larger stations is the queue manager. However, due to the small size of the Station A station, signage is used to indicate the queue area. The agents working eService though would frequently go through the line to bring eTicketed customers to the machines to begin their check-in.

By directing eTicketed customers in line to the eService machines, the line length remained relatively short. The following figures represent the number of customers in line during the observation periods as well as the number of idle eService machines. Whenever there are customers in line with idle eService machines, the total check-in time per customer increases due to unnecessary wait time in line. At the same time, the eService machine utilization decreases. Figures 5-3, 5-4, and 5-5 show that of the 95 separate observations of customers waiting in line, only 14, or 14.8%, would remain if the customers were efficiently channeled to the available eService machines. This would eliminate almost all lines at the check-in counter in Station A.

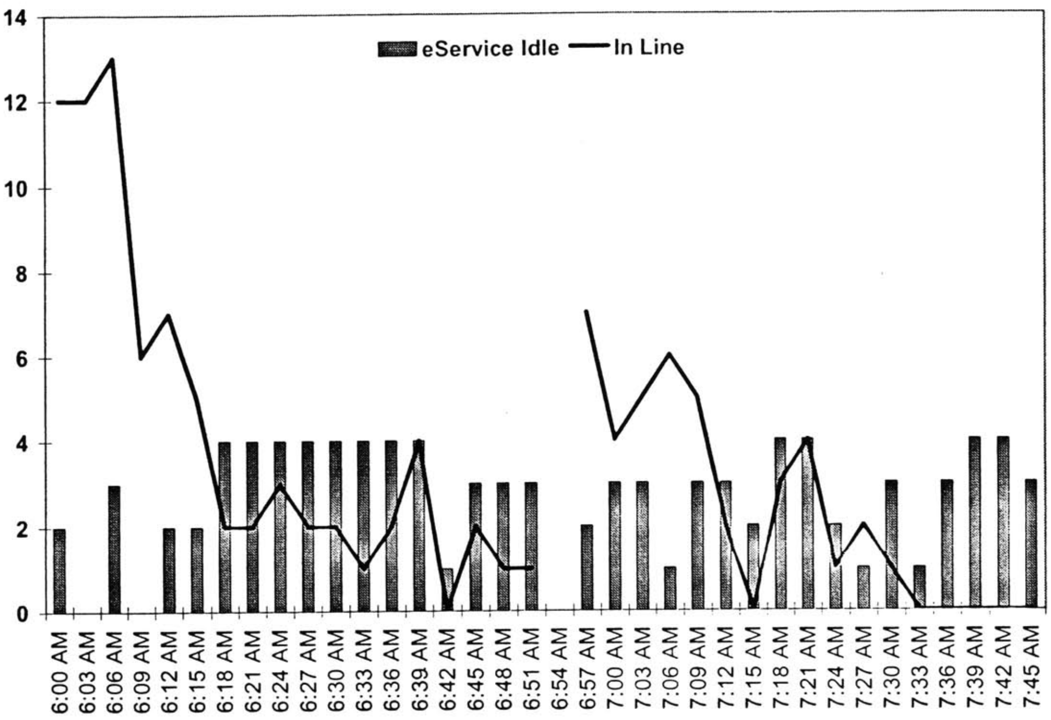

Figure 5-3 Idle eService vs. Customers in Line 6:00 AM – 7:45 AM (Station A)

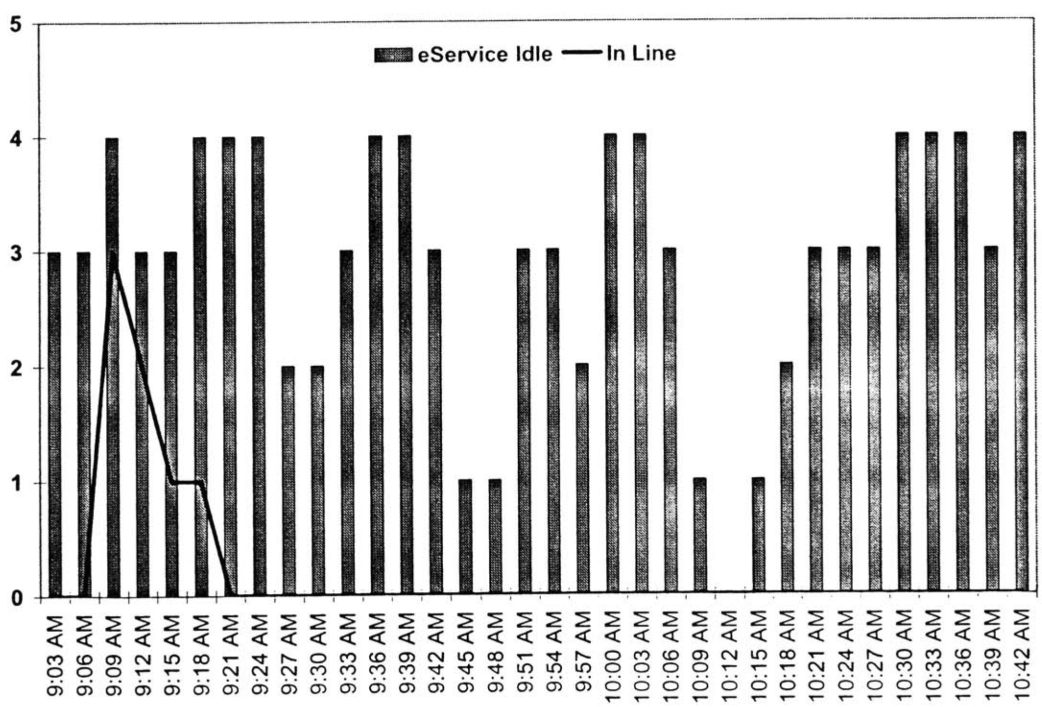

Figure 5-4 Idle eService vs. Customers in Line 9:03 AM – 10:42 AM (Station A)

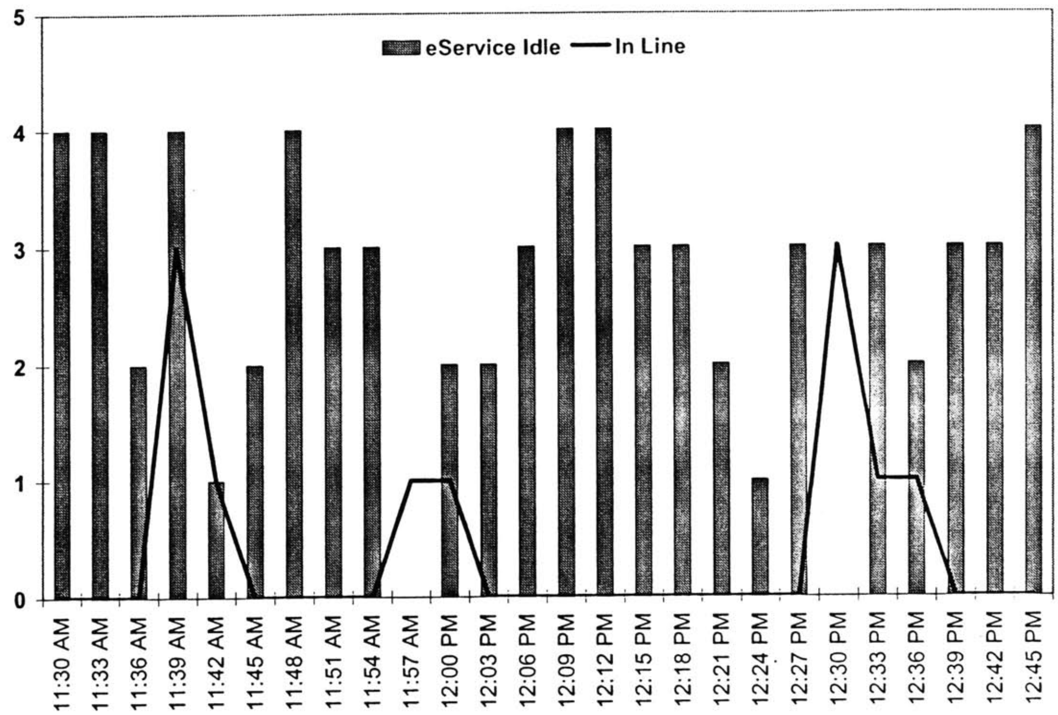

Figure 5-5 Idle eService vs. Customers in Line 11:30 AM – 12:45 PM (Station A)

Through discussions with the station manager and supervisor, it was learned that specific monthly targets are not revealed to the ticket agents. Instead, the daily eService capture rate is posted on a bulletin board. Additionally, the station's capture rank relative to other stations in the Continental system is posted. Posters are used as motivation as well by offering praise for great performances and competitive incentives by comparing their capture to that of Station B, which has become somewhat of a rival. To further motivate the use of eService, the station management has created various challenges. If the station achieves a certain eService capture for three days in a row, the supervisors will have an ice cream or pizza party for the employees.

According to the station management, the ticket agents in Station A are embracing eService and feel that it provides an improved level of customer service. However, the employees offered different feedback in both informal conversations and through the eService Agent Survey. Through informal conversations with the agents, it was clear that the general feeling was that eService was being forced onto them by the management at Station A. According to the survey though, the agents responded positively to eService deployment at Continental Airlines. The averaged survey results for Station A can be seen in Appendix 3. As these results indicate, the employees are happy with eService introduction and don't see eService as a threat to their jobs, but rather an enhancement. The agents strongly agree that they understand their job responsibilities with eService check-in, somewhat agree that they have been adequately trained in this area, and are neutral when asked if station management and senior management value their role in eService check-in. The most negative feedback was related to communication and specifically their input on eService. The agents disagreed that they had a way to offer feedback and suggestions about eService. To make matters worse, they did not feel as though their feedback was valued when it was received.

Station B

Observations were performed at Station B on Tuesday, November 26, 2002. The observations began at 6:30 AM and ended at 4:00 PM. Additionally, due to the limited number of flights per day and the spacing of the flights throughout the day, the observations were divided into four distinct data collection periods to coincide with the arrivals of passengers for the flights.

Continental operates seven flights per day from Station B, with five serving the Houston hub (IAH) and 2 regional jet flights operated by ExpressJet serving the Newark hub (EWR). The daily schedule and aircraft gauge is shown in the table below. As Table 5-3 below shows, Continental operates Boeing 737 and Embraer ERJ between IAH and Station B and only ERJ aircraft on the Station B to EWR route. With a total scheduled daily capacity of 606 seats and seven flights, the average number of seats per departure is 87.

Destination	Dept. Time	Aircraft Gauge	Seats
IAH	6:50 AM	737	100-125
IAH	8:30 AM	737	100-125
IAH	11:15 AM	737	100-125
IAH	1:30 PM	ERJ	50
IAH	4:30 PM	737	100-125
EWR	12:15 PM	ERJ	50
EWR	7:20 PM	ERJ	50

Table 5-3 Continental's Flight Schedule – Station B

The information provided in this analysis will include a detailed description of the physical layout of the ticketing area, customer data, agent activities, information on management's approach to eService implementation, and agent survey feedback.

The Continental Airlines ticket counter in Station B has two separate types of positions, eService and conventional. There is a single lane queue leading up to the conventional counters. There is no separate queue for First Class or OnePass Elite. The four tabletop eService machines are positioned in front of the conventional counters.

Before continuing with a discussion of the observations, it is important to note that the observations were collected two days prior to Thanksgiving. This has two primary effects on the data. First, the passenger volume was higher than normal. Second, the majority of the passengers are leisure travelers and may not be as experienced with self-service check-in. The figure below shows the customer arrival curves for the four different time periods of observations. The bars indicate flight departures.

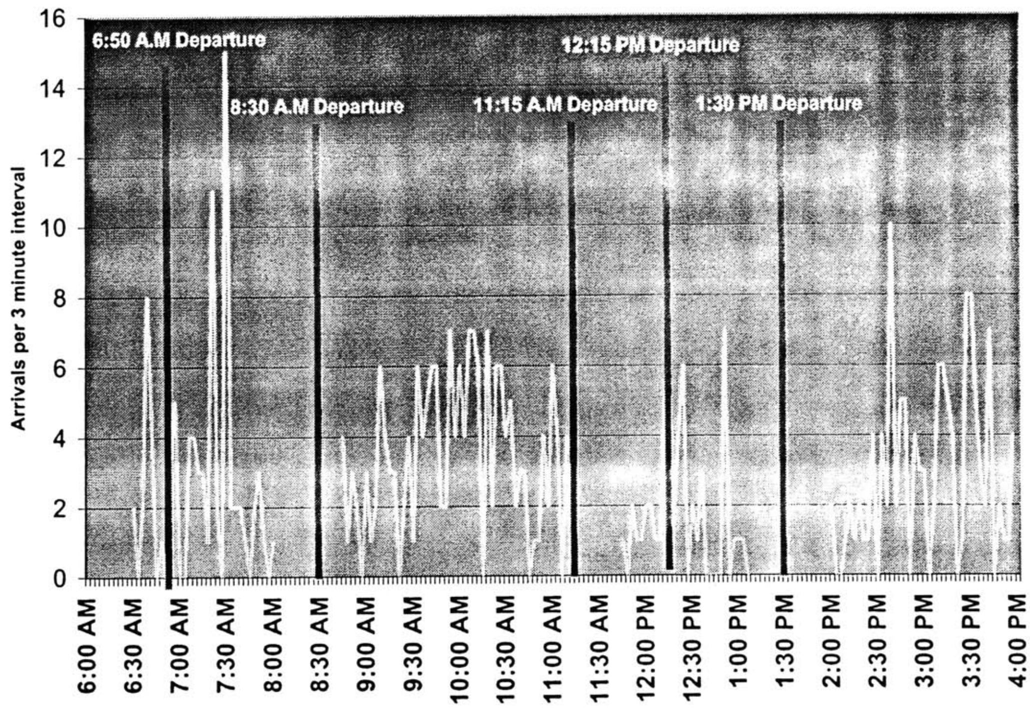

Figure 5-6 Customer Arrivals to Check-in on 11/26/2002 – Station B

Due to the limited number of flights, the agents in Station B are able to print out lists of all customer and confirmation numbers at the beginning of the day. This allows the agents to quickly find a confirmation number for all eTicketed customers and begin the check-in for them on the eService machine. The majority of the passengers entered the conventional check-in queue and waited in line despite having idle and available eService machines. When an agent behind the counter finished serving a customer, the agent would call the next customer in line to the conventional position. Once at the counter, the agent would ask for the customer's name, walk across the bag well to the eService machines leaving the customer at the conventional counter, and proceed to check the customer in on the eService machine. Once the boarding passes were printed, the agent returned to his or her position behind the counter and continued the check-in by tagging bags and giving the boarding passes to the customer. While this did not happen for every passenger an agent performed 56.6% of the eService transactions observed with only 43.4% performed by the customer. The majority of the check-ins performed by the customers was performed with little or no prompting from the agents, indicating that they had likely used self-service check-in before.

The positioning of the agents in Station B varied greatly throughout the day and between each observation point. As Figure 5-7 below indicates, the number of agents working in front of the counter varied by one almost every observation point. This was due to the activity described earlier in which the agent working behind the counter left the customer at the conventional position, check him in on the eService machine, and finally returned to the back of the counter to complete the check-in by tagging bags to be checked. Another important item to note is that the total number of agents working the ticket counter was inconsistent and varied greatly between observation points. This can be partially explained by the fact that the employees in smaller stations such as Station B perform many of the ground handling tasks in addition to check-in activities.

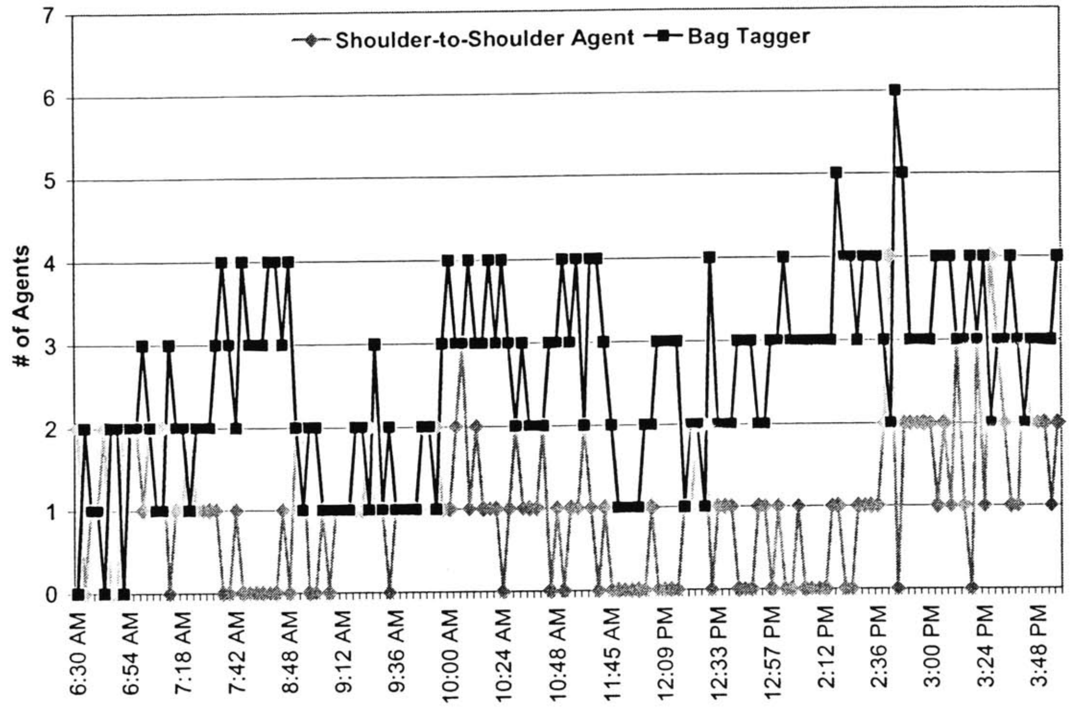

Figure 5-7 Agent Positioning – Station B

Due to the smaller size of Station B and the low volume of passenger arrivals, Station B does not use a queue manager as larger stations do. Instead, signage is placed at the entrance to the queues and the eService zone to help direct the customers. When an agent was present at the eService machines, he or she often helps direct the customers into the queue, but rarely sent them directly to the eService machine.

By directing eTicketed customers in line to the eService machines, the line length remained relatively short. The following figures represent the number of customers in line during the observation periods as well as the number of idle eService machines. Whenever there are customers in line with idle eService machines, the total check-in time per customer increased due to unnecessary wait time in line. At the same time, the eService machine utilization decreased. The figures below show that of the 37 separate observed occurrences of customers waiting in line, only 12 would remain if the customers were efficiently channeled to the available eService machines. This would eliminate almost all lines at the check-in counter in Station B.

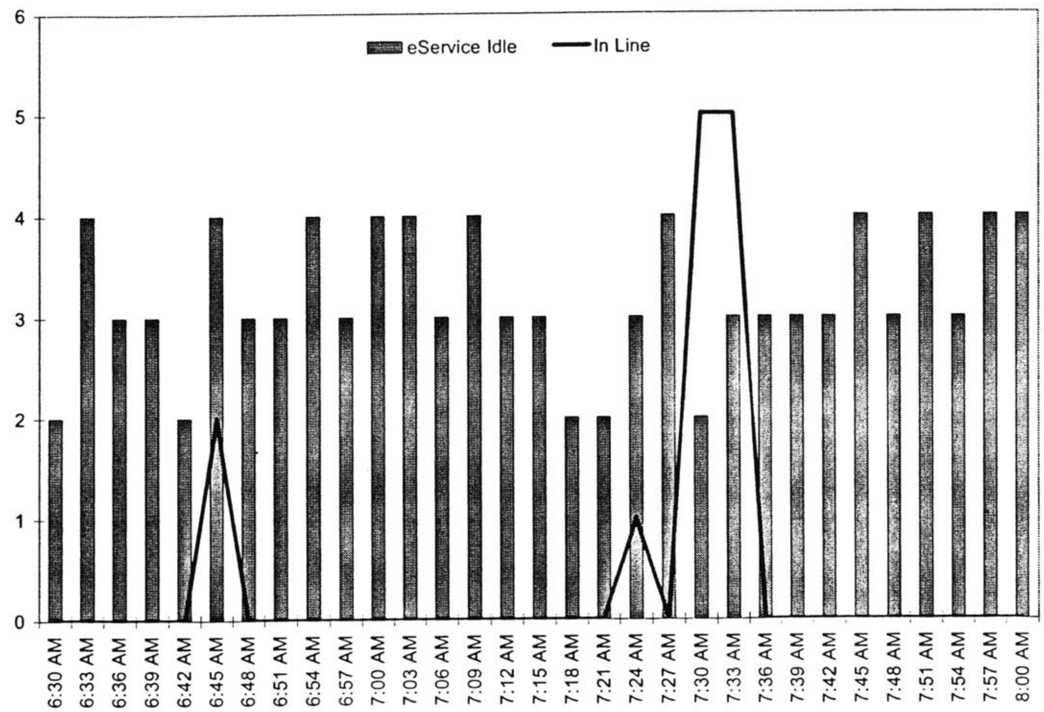

Figure 5-8 Idle eService vs. Customers in Line 6:30 AM – 8:00 AM (Station B)

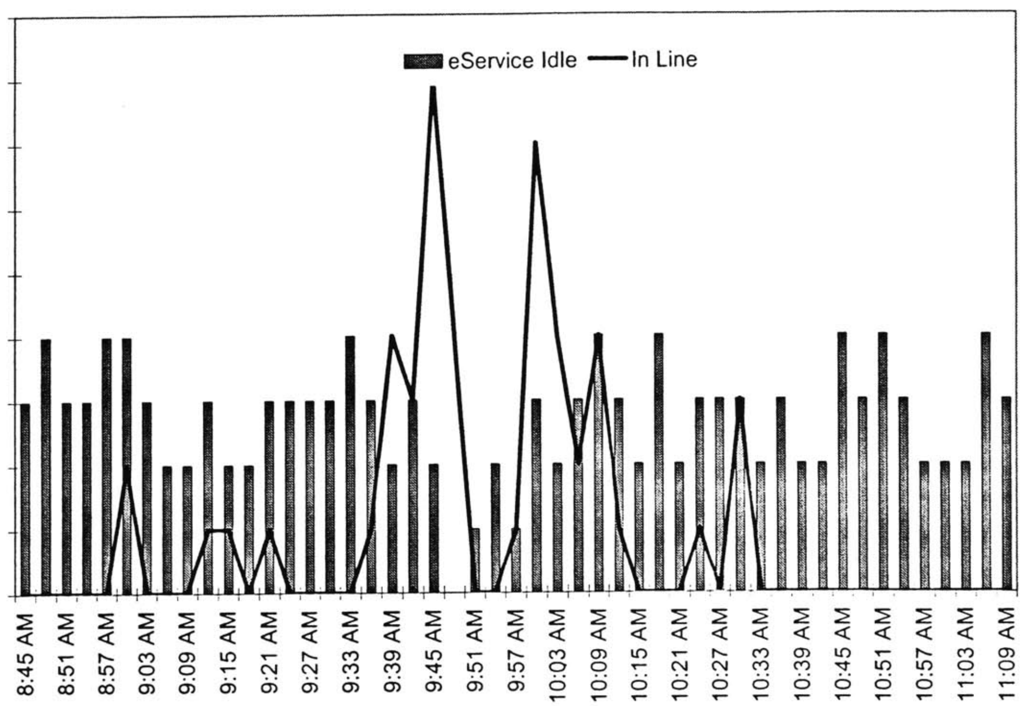

Figure 5-9 Idle eService vs. Customers in Line 8:45 AM – 11:09 AM (Station B)

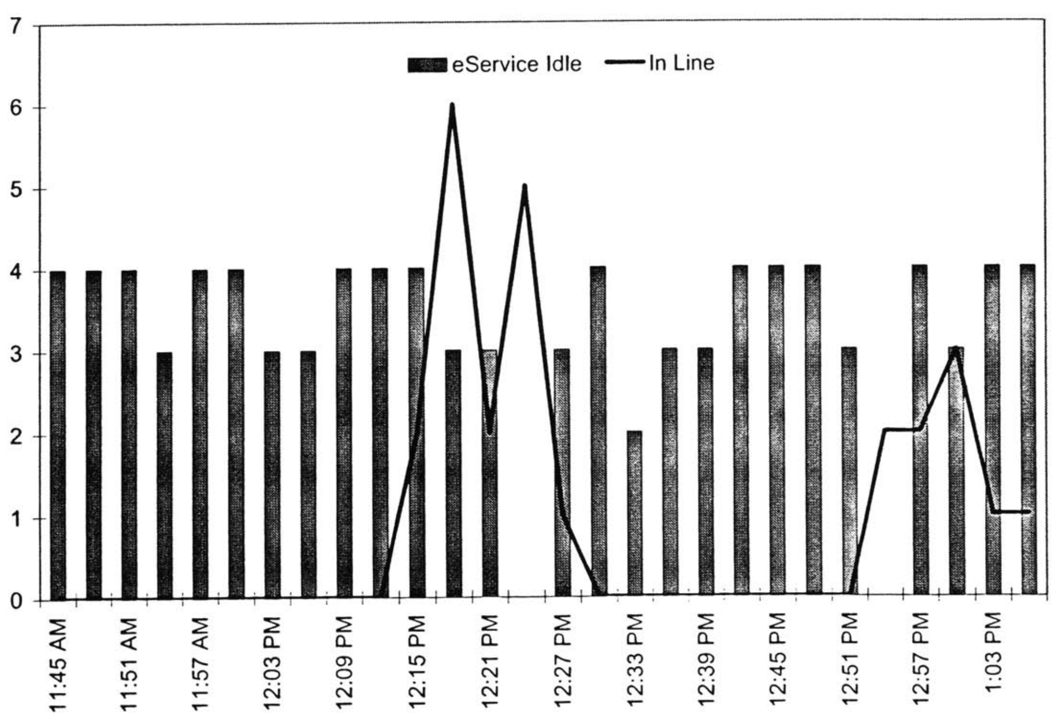

Figure 5-10 Idle eService vs. Customers in Line 11:30 AM – 12:45 PM (Station B)

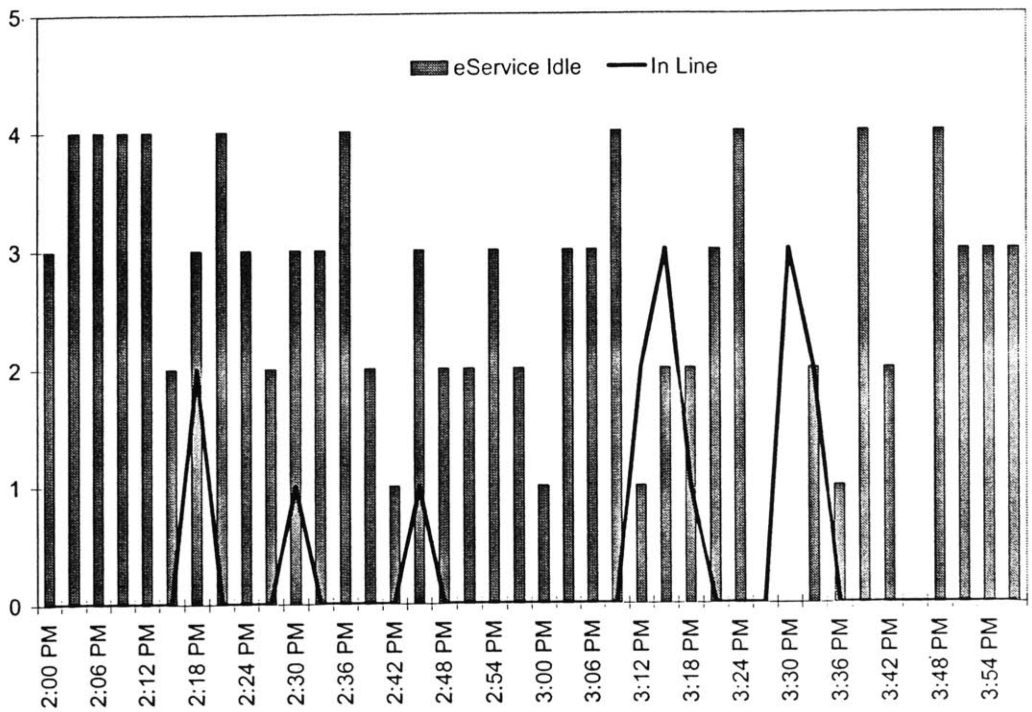

Figure 5-11 Idle eService vs. Customers in Line 2:00 PM – 3:57 PM (Station B)

eService goals are posted daily by the general manager along with other station goals (on time and baggage performance) for the employees to review. The supervisors and lead agent provide a briefing to the general manager each day, and if the performance falls below 70% eService capture, they are required to conduct a post-mortem. This post-mortem is conducted by reviewing every individual boarding card and determining why any eTicketed customers were checked-in conventionally. The agents are often involved in order to provide details on a specific customer check-in. While these types of post-mortem reviews may be seen as negative motivation, positive incentives are also used to encourage eService usage and achievement of all station goals. Once a month, the management cooks a meal for all of the employees if all station goals are achieved.

When the self-service machines were first introduced in Station B, the employees were not comfortable working in front of the ticket counter with the customers. However, according to the general manager, their buy-in was eventually achieved through two things. First, the corporate vision of creating a differentiated product with improved customer service was presented along with some locally developed training on how to work with the machines. Second, a more abrupt change forced the agents to accept and work with eService. Two of the five conventional ticket counter computer terminals were closed down and made unavailable to the agents. As a result of this change, the agents were forced into working with the eService machines in order to continue to process customers efficiently.

The eService Agent Survey was administered to six agents during the observations. The results of the survey can be seen in Appendix 3. In summary though, the agents are happy with the deployment of eService and see it as an enhancement to their job rather than a threat to their employment. The agents responded neutrally when asked if they prefer to let the customer perform the transaction. Additionally, they felt as though both station management and Continental's senior management value their role in eService check-in. However, they do not feel that their feedback is valued and makes a difference.

5.3 Key Learnings

The case study comparison between Station A and Station B provided an opportunity to collect detailed observations of both the operational discrepancies between stations in eService implementation as well as the organizational factors that may be contributing to these differences. Three key learnings can be extracted from this case study. They are the following:

1. Station management must be "on board" prior to implementation.
2. Training must be uniformly provided to all front line employees.
3. Common incentive programs should be utilized across all stations.

1. Station management must be "on board" prior to implementation.

During the case study, surveys were given to ticket agents and station management. In addition, employees were interviewed to collect more qualitative responses on eService process implementation. At both airports, the station managers and supervisors were interviewed. As was shown in Chapter 5.2, the operational implementation of eService varied greatly between the two airports. When asked why Continental employees performed the majority of transactions in Station B, the station manager responded by saying that customers do not want to check themselves in for the flight, and it takes longer if they do. This is a striking example of the importance of having local management bought into a process prior to implementation. When this doesn't happen, severe inconsistencies in product offering appear between stations, often to the detriment of the product. A formal education of the management team must occur before the process is rolled out to the field.

2. Training must be uniformly provided to all front line employees.

Similar to the first learning, once station management is bought into the process, the front-line employees must receive training. The misinterpretation of self-service goals by station management is perpetuated by the employees when there is no formal training process in place. In order to avoid each station adopting their own definition of self-service, a training curriculum developed and administered by the Continental training department must be put in place. Ideally, seed ticket agents could be used to help teach the process to stations while training additional seed agents at the same time. This group of seed agents would be responsible for training the entire workforce on the process.

3. Common incentive programs should be utilized across all stations.

One of the key learnings as a result of this case study was that the communication to employees on eService performance is quite different between stations. While the majority of employees at all stations understand that there is a corporate wide goal to increase eService usage, many still do not know what the goal is. Additionally, the incentives to meet this mystery goal are sometimes positive, sometimes negative. In Station A, when employees fail to capture an eTicketed customer through eService, a formal post-mortem is conducted on the details of why a conventional check-in occurred. On the other hand, when the station meets some eService goal for three days in a row, a small celebration, ice cream or pizza party, is held. In Station B, the station management cooks a meal for all employees if all of the monthly station goals are met. Interviews conducted at other stations in 2002 revealed even more localized incentive plans.

Through the training curriculum described earlier, the employees should be educated on the goals of the program. Additionally, system-wide incentives should be established to further encourage the use of the eService machines as prescribed by the training. Without formal incentives and careful monitoring, it is quite likely that the stations will once again begin to modify and adopt their own version of the process.

While these represent three of the most important learnings from the case study comparison of Station A and Station B, there remain other operational and organizational learning to be captured and applied to the next phase of the eService process development.

Chapter 6: Implementing a Lean Check-in Process

This research represents the first step in designing a lean check-in process for both the airline and the customer. Until this point, the airlines, including Continental, have been focusing the majority of their efforts on increasing the size of their self-service networks and the functionality of the devices themselves. However, the customers have adopted the technology and are now looking for even more efficient ways of getting through the check-in portion of their travel experience.

At Continental Airlines, the key stakeholders are already involved in the re-engineering process. Senior managers from the following groups are regularly adding input to the development efforts:

1. Training
2. Field Services (Airports)
3. Staffing
4. Technology
5. eService & Distribution Planning

The next phase of the re-engineering process will be to conduct a pilot of the proposed system. This pilot should include training, standard operating procedures for the agents, and incentive programs to encourage the adoption. Additionally, the team members from the groups listed above need to begin educating the entire workforce on the vision of eService at Continental Airlines. As has already been experienced though, there have been and will continue to be implementation challenges with this new process.

6.1 Implementation Challenges

While implementing the new process, there are four key groups of stakeholders that must be considered. These groups are the customers, ticket agents, management, and airport authorities. Without the buy-in from each one of these groups, the success of the project is diminished. The socio-tech model introduced in Chapter 1 implies that a closer integration of the workforce and the technology can yield greater end performance. The data presented already has shown that this integration has not been completely neglected in the implementation of eService at Continental Airlines. However, further communication and teamwork is necessary to achieve the desired results.

As was discussed in Chapter 4.3, customer surveys were conducted to gather feedback on both the current eService product and process at Continental Airlines. Collection of feedback should become an ongoing process to ensure that changes to eService continue to meet or exceed the customer's expectations. Additionally, the new design should take into account the varying levels of experience with eService so that all customers continue to receive just the right amount of service at just the right time. A final challenge that must be overcome is that the customers no longer need to wait for an agent to assist them. More effort should be placed on educating the customers of the self-service concept, just as the agents themselves are being educated. This education is being assisted by the introduction of self-service check-in devices at other major carriers.

The second stakeholder group in terms of implementation challenges is the ticket agents. It has already been shown that many of these agents view self-service as a threat to their jobs, and any attempts to put more power in the customers hands will be met with resistance. In addition, the entire concept of self-service results in a redefinition of their job responsibilities and scope. Similar to the customers, the collection of feedback from the ticket agents should become an ongoing process. One efficient way to do this would be to create an eService improvement team comprised of agents from stations across the system. This team would serve as the voice of the ticket agents in the design process and would help ensure buy-in once the process is finalized.

Implementation challenges also exist with the management at Continental Airlines. The primary implementation challenge for management is to create a set of metrics that accurately measure the eService process as designed. These metrics should be both automated and easily comprehendible by all levels of the organization. An additional challenge for management is the coordination amongst all of the stakeholders. For the process to be successful, many groups of people and organizations must realize the benefits and agree to support the effort. Management must ensure that the communication occurs regularly to all of these groups.

Finally, the airport authorities themselves are critical to the acceptance of the new eService process. During the observations, it was learned that each airport may have different restrictions on the airlines in terms of how they can utilize the leased ticket lobby real estate. These restrictions include the placement and design of queuing systems, signage, and self-service check-in machines. Additionally, the airports have been undergoing dramatic changes since September 11th with the incorporation of the new security devices. In some airports, bulky explosive detection systems are being placed in the ticket lobbies. Therefore, it is important that these design limitations be taken into account early in the process to avoid costly mistakes by having to go through the design effort again. While the goal is to provide a completely standardized experience between all stations, these design limitations may result in the need for some flexibility on a station-by-station basis to the point of developing templates based on common configurations.

The success of this process relies on the buy-in of these stakeholder groups discussed above. This research has helped outline the operational and organizational issues facing the design effort. Through careful consideration of these stakeholders' needs and frequent communication with these groups, the process can be implemented successfully.

6.2 The Future of the Travel Experience

The travel experience has been forever changed as a result of the terrorist attacks of September 11th, 2001. Prior to September 11th, there was a trend in the industry towards providing the customers with more information. This was demonstrated through both the Passenger Bill of Rights as well as the use of technology by the airlines to empower the customers. One example of this technology is the plasma screen displays utilized by Delta Airlines in their boarding areas. These screens provide real time flight information to the customers including exact boarding times by row number, weather updates in destination city, standby list status, meal information, and aircraft information. Another example of technology increasing the access to information for the customers is self-service. As this research has shown, self-service empowers the customers to conduct their own transactions and gain real-time information to many aspects of their travel experience. This trend of customer empowerment and use of technology will continue in the airline industry. It is foreseeable in the near future that self-service check-in machines will become common not just in the ticket lobby, but also throughout the terminal. These self-service check-in machines will not just allow check-in capability, but will also offer the opportunity to purchase coupons to be used in place of cash for in-flight services. Additionally, they may allow the customer access to information in a similar method as Delta's information displays in the boarding areas. Whatever the use of technology may be, the financial situation of the airlines will result in an even greater focus on customer service and operational efficiency. Fortunately, technology solutions such as self-service enable both of these goals to be met simultaneously.

Appendix 1: Agent Survey and Results

This survey is being conducted in an effort to assess the overall satisfaction and/or concerns over the self-service machines and processes being deployed by Continental Airlines. All information provided will be kept anonymous. Please do not write your name on the survey. Completion of this survey is completely optional. Your participation is greatly appreciated and will help keep Continental a great place to work!

Demographic Questions

Age Range	18-25	26-35	35-45	46+	**Gender**	Male	Female
Years as an ASA?	0-5	6-10	11-15	15+			

	Survey Questions – Please Circle one response per question	Strongly Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Strongly Agree
1	I am happy with the introduction of eService machines at Continental.	1	2	3	4	5
2	I see eService deployment as an enhancement to my job.	1	2	3	4	5
3	I see eService deployment as a threat to my job.	1	2	3	4	5
4	I enjoy working in front of the counter with customers.	1	2	3	4	5
5	I prefer to work behind the counter.	1	2	3	4	5
6	Most customers respond positively to eService.	1	2	3	4	5
7	I prefer to let the customer perform their own eService check-in.	1	2	3	4	5
8	I enjoy assisting customers with their transaction on the eService machine.	1	2	3	4	5
9	I am uncomfortable forcing the customers to use eService.	1	2	3	4	5
10	There is a lot of teamwork among employees when working on eService.	1	2	3	4	5
11	I have been adequately trained for my role in eService check-in.	1	2	3	4	5
12	I understand my job responsibilities when working with eService check-in.	1	2	3	4	5
13	I see the value of my work in eService check-in.	1	2	3	4	5
14	I feel the station management values my role in eService check-in.	1	2	3	4	5
15	I feel that Continental's sr. management value my role in eService check-in.	1	2	3	4	5
16	I feel that I have a way to offer feedback and suggestions on eService.	1	2	3	4	5
17	I feel that my feedback on eService is valued and makes a difference.	1	2	3	4	5
18	eService check-in is faster than manual check-in.	1	2	3	4	5
19	eService is good for Continental's image.	1	2	3	4	5
20	eService gives Continental a competitive advantage.	1	2	3	4	5

Agent Survey Results – All Responses

		Strongly Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Strongly Agree
1	I am happy with the introduction of eService machines at Continental.	5.0%	5.0%	25.0%	32.5%	32.5%
2	I see eService deployment as an enhancement to my job.	10.0%	10.0%	20.0%	40.0%	20.0%
3	I see eService deployment as a threat to my job.	25.0%	17.5%	17.5%	27.5%	12.5%
4	I enjoy working in front of the counter with customers.	12.5%	10.0%	17.5%	27.5%	32.5%
5	I prefer to work behind the counter.	7.5%	12.5%	10.0%	12.5%	57.5%
6	Most customers respond positively to eService.	2.5%	25.0%	22.5%	35.0%	15.0%
7	I prefer to let the customer perform their own eService check-in.	2.5%	5.0%	30.0%	32.5%	30.0%
8	I enjoy assisting customers with their transaction on the eService machine.	2.5%	5.0%	15.0%	45.0%	32.5%
9	I am uncomfortable forcing the customers to use eService.	10.0%	7.5%	17.5%	20.0%	45.0%
10	There is a lot of teamwork among employees when working on eService.	12.5%	10.0%	25.0%	27.5%	25.0%
11	I have been adequately trained for my role in eService check-in.	7.5%	12.5%	20.0%	22.5%	37.5%
12	I understand my job responsibilities when working with eService check-in.	7.5%	5.0%	12.5%	35.0%	40.0%
13	I see the value of my work in eService check-in.	7.5%	10.0%	32.5%	37.5%	12.5%
14	I feel the station management values my role in eService check-in.	7.5%	17.5%	30.0%	17.5%	27.5%
15	I feel that Continental's sr. management value my role in eService check-in.	10.0%	15.0%	32.5%	25.0%	17.5%
16	I feel that I have a way to offer feedback and suggestions on eService.	15.0%	20.0%	25.0%	27.5%	12.5%
17	I feel that my feedback on eService is valued and makes a difference.	17.5%	17.5%	32.5%	22.5%	10.0%
18	eService check-in is faster than manual check-in.	22.5%	20.0%	10.0%	30.0%	17.5%
19	eService is good for Continental's image.	2.5%	15.0%	30.0%	32.5%	20.0%
20	eService gives Continental a competitive advantage.	2.5%	5.0%	25.0%	35.0%	32.5%

Agent Survey – Demographic Results

Age Range	N	%
18-25	8	20.0%
26-35	8	20.0%
36-45	9	22.5%
46+	8	20.0%
No Response	7	17.5%

Gender	N	%
Male	11	27.5%
Female	21	52.5%
No Response	8	20.0%

Experience as an ASA	N	%
0-5 years	17	42.5%
6-15 years	9	22.5%
15+ years	6	15.0%
No Response	8	20.0%

Total surveys completed = 40

Appendix 2: Customer Survey and Results

This survey is being conducted in an effort to assess the overall customer satisfaction with Continental's eService center product. We greatly appreciate your time.

Demographic Questions

Age	18-30	31-40	41-50	50+	**How many flights do you take per year?**	0-3	4-6	7-9	10+
Gender	Male	Female			**If you are a OnePass member, what is your Elite status?**	None	Silver	Gold	Platinum

	Survey Questions – Please Circle one response per question	Strongly Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Strongly Agree
1	I consider myself to be an experienced eService user.	1	2	3	4	5
2	I like using Continental's eService check-in.	1	2	3	4	5
3	I like being able to change my seat and/or flight through eService machines.	1	2	3	4	5
4	I believe eService offers the most accurate information on seat availability and upgrades.	1	2	3	4	5
5	I find the eService process easy to understand.	1	2	3	4	5
6	Checking bags with eService is an easy process.	1	2	3	4	5
7	I do not mind using my credit card to start the eService transaction.	1	2	3	4	5
8	When traveling on an eTicket, I always have my confirmation number with me.	1	2	3	4	5
9	I prefer using eService check-in.	1	2	3	4	5
10	I use the eService machine voluntarily.	1	2	3	4	5
11	I prefer to perform my eService transaction.	1	2	3	4	5
12	I want to have an agent perform my eService transaction.	1	2	3	4	5
13	I feel that eService check-in is faster than conventional check-in.	1	2	3	4	5
14	If both eService and conventional check-in took the same amount of time, I would prefer to use eService check-in.	1	2	3	4	5
15	I think Continental's eService product is superior to self-service options offered by other airlines.	1	2	3	4	5

Customer Survey Results – All Responses

		Strongly Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Strongly Agree
1	I consider myself to be an experienced eService user.	3.1%	2.3%	14.0%	26.4%	54.3%
2	I like using Continental's eService check-in.	7.0%	2.3%	7.0%	17.1%	66.7%
3	I like being able to change my seat and/or flight through eService machines.	4.7%	2.3%	19.4%	12.4%	61.2%
4	I believe eService offers the most accurate information on seat availability and upgrades.	4.7%	12.4%	23.3%	31.0%	28.7%
5	I find the eService process easy to understand.	4.7%	2.3%	11.6%	24.8%	56.6%
6	Checking bags with eService is an easy process.	5.4%	4.7%	30.2%	22.5%	37.2%
7	I do not mind using my credit card to start the eService transaction.	10.1%	8.5%	21.7%	20.9%	38.8%
8	When traveling on an eTicket, I always have my confirmation number with me.	21.7%	17.1%	10.9%	17.8%	32.6%
9	I prefer using eService check-in.	8.5%	3.9%	16.3%	21.7%	49.6%
10	I use the eService machine voluntarily.	7.8%	3.1%	9.3%	20.2%	59.7%
11	I prefer to perform my eService transaction.	6.2%	3.1%	17.8%	21.7%	51.2%
12	I want to have an agent perform my eService transaction.	33.3%	22.5%	31.0%	4.7%	8.5%
13	I feel that eService check-in is faster than conventional check-in.	3.1%	3.1%	12.4%	24.8%	56.6%
14	If both eService and conventional check-in took the same amount of time, I would prefer to use eService check-in.	13.2%	10.1%	20.9%	17.1%	38.8%
15	I think Continental's eService product is superior to self-service options offered by other airlines.	1.6%	7.8%	47.3%	24.8%	18.6%

Customer Survey -- Demographic Results

Age Range	N	%
18-30	12	9.3%
31-40	25	19.4%
41-50	39	30.2%
51+	42	32.6%
No Response	11	8.5%

Gender	N	%
Male	88	68.2%
Female	24	18.6%
No Response	17	13.2%

OnePass Elite Status	N	%
None	30	23.4%
Silver	29	22.7%
Gold	32	25.0%
Platinum	30	23.4%
No Response	7	5.5%

Flights per Year	N	%
0-3	4	3.1%
4-6	12	9.3%
7-9	8	6.2%
10+	98	76.0%
No Response	7	5.4%

Total surveys completed = 129

Appendix 3: Case Study Stations - Agent Survey Results

Average survey responses

		Station A	Station B
1	I am happy with the introduction of eService machines at Continental.	4.2	4.0
2	I see eService deployment as an enhancement to my job.	3.8	4.0
3	I see eService deployment as a threat to my job.	2.7	2.5
4	I enjoy working in front of the counter with customers.	4.2	4.2
5	I prefer to work behind the counter.	4.2	3.5
6	Most customers respond positively to eService.	4.0	3.2
7	I prefer to let the customer perform their own eService check-in.	4.3	3.5
8	I enjoy assisting customers with their transaction on the eService machine.	4.2	4.2
9	I am uncomfortable forcing the customers to use eService.	3.5	3.0
10	There is a lot of teamwork among employees when working on eService.	3.5	3.2
11	I have been adequately trained for my role in eService check-in.	3.8	3.8
12	I understand my job responsibilities when working with eService check-in.	4.5	3.7
13	I see the value of my work in eService check-in.	3.3	3.5
14	I feel the station management values my role in eService check-in.	3.5	4.2
15	I feel that Continental's sr. management value my role in eService check-in.	3.3	4.0
16	I feel that I have a way to offer feedback and suggestions on eService.	2.3	3.2
17	I feel that my feedback on eService is valued and makes a difference.	3.0	2.8
18	eService check-in is faster than manual check-in.	4.2	2.8
19	eService is good for Continental's image.	3.8	4.0
20	eService gives Continental a competitive advantage.	4.0	4.3

Survey Response Key	
Strongly Disagree	1
Somewhat Disagree	2
Neutral	3
Somewhat Agree	4
Strongly Agree	5

Total surveys completed = 12 (6 at each station)

Bibliography

[1] Ralls, Scott. Integrating Technology with Workers in the New American Workplace. Washington D.C.: U.S. Department of Labor. 1994.

[2] Graversen, Gert. "Social Factors in the Introduction of New Technology: A Scandinavian Case Study." New Technology. Greg Bamber and Russell Lansbury. London, UK: Unwin Hyman Ltd., 1989. 159-180.

[3] Continental Airlines website. (http://www.continental.com)

[4] "More Airlines set up do-it-yourself check-in machines." USA Today. June 18, 2002.

[5] Markovich, Matt. "Taking Hassle Out of Airport Check-in." Tech Live. September 6, 2002.

[6] Harrell, John. "Airline kiosks and biometrics: a year later." KioskMarketPlace.com. September 11, 2002.

[7] MIT Inventor of the Week website. (http://web.mit.edu/invent/iow/simjian.html)

[8] Bellis, Mary. "The History of Automatic Teller Machines or ATM." (http://inventors.about.com/library/inventors/blatm.htm)

[9] Weber, Arnold and Shultz, George. Strategies for Displaced Workers. Westport, CT: Greenwood Press, 1966.