BUSINESS-IT ALIGNMENT MATURITY: THE CORRELATION OF PERFORMANCE INDICATORS AND ALIGNMENT MATURITY WITHIN THE COMMERCIAL AIRLINE INDUSTRY

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Abstract

During the period from 1978 to 2009, more than 200 commercial airlines were forced to merge, cease operations, or file for bankruptcy protection. The purpose of this quantitative study is to evaluate the global commercial airline industry from an IT-business alignment perspective and correlate the alignment maturity level of each airline with their respective performance metrics. The performance metrics selected as part of this study include (a) classical accounting and financial metrics, (b) operational metrics which are capable of acting as a proxy for customer satisfaction, and (c) airline characteristic measures. Eleven airlines were examined as part of this study using the constructs which were evaluated as part of previous research using the strategic alignment maturity (SAM) model survey. The SAM assessment instrument consists of five levels of maturity, each evaluated on six criteria. Findings were identified in two performance areas. In the area of financial performance, a statistically significant correlation was identified with the overall strategic alignment maturity level, as well as two of the six IT-business strategic alignment criteria: (a) communication maturity and (b) competency and value maturity. In addition, a statistically significant correlation was identified between an airline's average load factor and its strategic alignment maturity level, as well as four of the six IT-business strategic alignment criteria: (a) competency and value maturity (b) governance maturity, (c) partnership maturity, and (d) scope and architecture maturity. In conclusion, five of the six criteria indicated a positive correlation with either financial performance or average load factor. The lack of a demonstrated correlation between an airline's strategic alignment maturity and fleet size provides an opportunity for recommended future research. Future studies should

consider controlling for fleet sizes within specific ranges. Finally, with 11 airlines representing four countries it is difficult to observe differences which might be present across national boundaries. These differences, if present, could have been a source of error in this study and is therefore recommended as an opportunity for further study.

Dedication

This work is dedicated to three people who have created an indelible impression on my life. I first dedicate this to my daughter, Jennifer, for letting me share in her passion for life and teaching me to appreciate the ever-expanding nature of knowledge. I also dedicate this to my son, Nicholas, for sharing with me his enthusiasm for learning and his exciting perspective of a world with possibilities. Finally, I offer a special dedication to Christine, my wife and my friend. She is the source of my inspiration and my energy. Without her loving devotion, none of this would have been possible.

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CHAPTER 1. INTRODUCTION

Introduction to the Problem

When modern business executives set out to achieve a sustainable competitive advantage they inevitably begin by developing a creative and innovative vision, which is capable of recognizing the potential of Information Technology (IT) within their specific industry and environmental settings (King, Marks, & McCoy, 2002; Porter, 1980). A clear an unambiguous vision can create value for a firm by enabling a dialogue within the organization that can affect its strategic direction (Downs, Durant, & Carr, 2003). A dialogue which encourages effective strategic thinking is a key ingredient for creating any lasting strategy and a sustainable competitive advantage (Mintzberg, 1978). As Mintzberg (1978) argued, there are many examples where a strategy's intended results were never realized. Likewise, there are examples where a strategy's actual results were never intended.

Technical innovation is seen as one of the world's most significant drivers of strategic change within any industry. Information technology, with its ability to change the rules of the competitive game, is extremely influential in these endeavors. The very nature of IT is such that it is interwoven throughout every aspect of the modern business organization (Downs et al., 2003). The role that IT-business strategic alignment plays in the advancement of strategic thinking and innovation has been known and documented for the past three decades; but what is still not completely clear is how to achieve and

sustain this alignment. Equally important is the understanding of how misalignment can impact a firm's performance (Luftman & Brier, 1999).

The business and IT organizations within a firm must find ways to integrate their innovative and creative efforts. As a result of this study the current knowledge related to the maturity of IT and business strategic alignment has been extended. As part of this research the strategic alignment maturity (SAM) model was applied to the global commercial airline industry which, heretofore, had not been exclusively studied. In addition to this macroscopic perspective, this research also evaluates the United States (U.S.) commercial airline industry in terms of the relationship between an airline's SAM level and metrics which are commonly available within the U.S. industry. The global perspective provided some insight into differences that exist from nation to nation, while the microscopic examination of the U.S. commercial airline industry enabled the use of data that does not exist in other countries. These higher fidelity data are collected and made publically available in the U.S. largely due to the significant influence that the U.S. commercial airline industry has on the U.S. gross domestic product (United States Government Accountability Office, 2009).

This industry has been subjected to a great many external pressures since deregulation was enacted by the U.S. Congress and signed into law in 1978. The focus of this study involves the perceived correlation between an airline's level of alignment maturity and the level of success each airline has in achieving a variety of performance metrics. By extension, it is argued that an airline will be best able to adapt to the dynamic competitive environment when its IT and business strategies are aligned.

Background of the Study

To understand and appreciate the current condition of the global commercial airline industry it is imperative that its past be understood, or at least acknowledged. This section provides the background necessary to comprehend the nature of the current environment in which the airlines operate. This background focuses on the evolution of the U.S. commercial airline industry, which is seen as being representative of the maturation of the global markets. This section is divided into four subsections: (a) a brief history leading to deregulation, (b) an examination of the complexities of the industry, (c) an examination of recent IT utilization within the industry, and (d) a description of the performance metrics used to evaluate individual airlines.

Brief History

This background begins with a brief description of the history of the airline industry, which is often described as dynamic, convoluted, or even hectic. This overview begins with the first scheduled passenger service by a U.S. commercial airline nearly a century ago (Bilstein, 1992b). The St. Petersburg-Tampa Airboat Line began operations on January 1, 1914 and immediately discovered that there was little profitability in shuttling passengers between cities. Instead, it became apparent that transporting parcels for the U.S. Post Office was the only way to generate the necessary revenue to remain solvent.

The dependence on the U.S. Post Office grew and by 1925 approximately 14 million parcels of mail were being delivered by air (Bilstein, 1992a). Attempts by the U.S. Congress to regulate competition lead to the Contract Air Mail Act of 1925

(Bilstein, 1992a), the Air Commerce Act of 1926 (Davies, 1972), and Airmail Act of 1930 (Heppenheimer, 1995). While the U.S. Post Office was still the driving force behind the financial viability of the airline industry, Heppenheimer (1995) argued that the government's involvement created a highly regulated environment.

From 1930 until 1970, the industry experience both expansion and contraction. One of the most notable events during this period occurred in 1938 with the inception of the Civil Aeronautics Board (CAB; Heppenheimer, 1995). The goal of this agency was to develop air service into a safe and efficient means of transportation. This was accomplished through the control of air fares, schedules, and routes. During this 40-year period the industry launched more than 250 airlines (Davies, 1972). By 1990, fewer then 20 of these airlines remained in operations and those that survived did so by radically changing the way they did business (Bilstein, 1992a). Bilstein (1992a) gave credit for a significant part of the growth during this period to military aviation. The world's conflicts and the challenges to aviation gave birth to significant technological changes. Finally, this time was seen as a period of education for the flying public. The airlines took responsibility for converting the industry from a novelty to a typical element of society through the use of numerous marketing and advertising campaigns (Bilstein, 1992a).

It was President Jimmy Carter's 1977 appointment of Alfred E. Kahn to head the CAB that finally gave a voice to the idea of deregulation. Kahn was the Chairman of the Department of Economics at Cornell University and presided over the CAB during this key period. Kahn (2002) would later write that the increase in congestion, delays, and the disparate fare structure represented the greatest failures of regulation. The prevailing

argument for deregulation was that the industry was mature enough to survive in an open market which was subject to the forces of competition as opposed to economic regulation (Gillen, 2006; Patashnik, 2003). At Kahn's urging, Congress deregulated air cargo in November 1977 and then, on October 24, 1978 Congress passed law 95-504 which would become known as the Airline Deregulation Act of 1978 (Patashnik, 2003; Weidenbaum, 2000). This single act brought to an end more than six decades of government subsidies and intervention in the airline industry.

The era of deregulation saw a no holds-barred competition within the airline industry in both the passenger and cargo markets. The first two years of deregulation saw fares drop and total operating revenues rise for the major carriers (Brady & Cunningham, 2001; Patashnik, 2003). This enthusiasm was short lived and in 1981 the slide in the airline industry began. Patashnik (2003) identified fuel costs, recession, and over-expansion as being the root causes of this downturn. That year also saw a nationwide strike of the Professional Air Traffic Controllers Organization (PATCO) and a record net operating loss of $421 million by the major airlines. This marked the beginning of a steady stream of airlines ceasing operations, declaring Chapter 11 Bankruptcy, or being forced into mergers (Vasigh & Fleming, 2005). Recent years have seen five airlines cease operations (e.g., Aloha Airlines, ATA Airlines, Skybus Airlines, Eos Airlines, and Maxjet Airways). Both Frontier Airlines and Sun Country Airlines filed for Chapter 11 bankruptcy and are struggling to reorganize their operations. Still others have taken the merger and acquisition route (i.e., America West Airlines–US Airways in 2005 and Delta Air Lines–Northwest Airlines in 2008). According to the Air Transportation Association

(2008), an unofficial tally finds that since 1978 more than 200 U.S. carriers have either merged, ceased operations, or filed bankruptcy.

Complexities of the Airline Industry

It is important to recognize that the commercial airline industry is a service industry. The difference between an airline and other service entities can be realized by examining several key points. First, airlines are capital-intensive ventures. The equipment and facilities required to operate an airline are expensive (Air Transport Association [ATA], 2007). Most of these funds are generated through either the capital or credit markets.

In addition to being capital-intensive, the airline industry is also labor-intensive. This is largely due to the outward customer-facing nature of most jobs within this industry. Crewmembers, gate agents, ticket agents, baggage handlers, cleaning staff, and many more each have a customer interface which is important to the success of the company. Technology enhancements have helped improve the efficiency of these workers in many areas, but labor continues to represent more than 35% of all costs of operations. The U.S. airline industry is also one of the most unionized industries in the country. While 7.6% of private sector employees are unionized, more than 40% of all airline workers are unionized (Bureau of Labor Statistics, 2009).

Capital and labor are just two characteristics that make the airline industry unique when compared to other industries. There are many other external and internal forces and constraints which contribute to the complexities in this business. The following

sections discuss in detail these additional forces and constraints. Each has been categorized as either regulatory forces or distribution constraints.

Regulatory forces. The Deregulation Act of 1978 brought an end to government subsidies, but other forms of industry regulation still exist. Commercial air transportation is one of the most highly regulated industries in the world (ATA, 2007). ATA (2007) pointed to several key regulatory aspects to illustrate this point: (a) open skies, (b) antitrust, (c) essential air services, (d) air safety, and (e) security. These forces, or the manner in which they are applied, are unique to the commercial airline industry and are discussed in the subsections which follows.

Open Skies. While deregulation created more competition within the U.S., international operations are generally governed by bilateral and multilateral air-transport service agreements. These international agreements are negotiated by diplomats in the Department of State and the Department of Transportation and are frequently used to affect other more wide ranging negotiations (Button, Costs, & Cruz, 2007). These agreements are specific to the type of operations allowed including (a) number of participating airlines, (b) routes flown, (c) cities serviced, (d) frequency of operations, (e) how prices are determined, and (f) whether passengers can be picked up and transported to a third country (ATA, 2007). Noting the importance of commercial aviation to global economies, the U.S. Government has negotiated 78 *Open Skies* agreements since 1992. Individual airlines attempt to influence these negotiations, but they are required to compete for these limited opportunities by participating in the U.S. Department of Transportation (USDOT) proceedings to demonstrate their worthiness (Button et al., 2007).

Antitrust. Prior to deregulation, the CAB had exclusive regulatory jurisdiction over the airline industry with regard to agreements between airlines. As such, the CAB could grant antitrust immunity for those agreements that were viewed as being in the best interest of the airlines and the flying public. After deregulation exemptions were not allowed, with only one exception (ATA, 2007). The USDOT was given authority to provide antitrust exemption for agreements involving international transportation. While this brought the airline industry more in line with other industries with regard to domestic markets, it excluded international commerce and presented situations where some airlines could benefit from practices that eliminated competition and employed monopolistic practices (Blair, Mar, & Bonham, 2007).

Essential air services. With the demise of the CAB under deregulation, Congress took action to ensure that some of the less traveled routes would not lose commercial air services as a result of carriers abandoning these routes in favor of more lucrative markets (ATA, 2007) and abandoning those less traveled routes. Under the *Essential Air Services Program*, the USDOT managed subsidies to those airlines willing to operating in these financially challenging locations (Flynn & Ratick, 1988). While airlines are required to bid for these slots, the program remains as one of the last vestiges of economic regulatory control.

Air safety. The *Air Commerce Act of 1926* placed the responsibility for air safety in the hands of the CAB. In 1958, that responsibility was subsequently transferred to the Federal Aviation Agency (ATA, 2007). With the creation of the Federal Aviation Administration (FAA) by Congress in 1966, the responsibility for air safety found a more permanent home. The FAA executes this mandate in several ways. Firstly, it is

responsible for the sequencing of takeoffs and landings, as well as maintaining adequate separation in flight. Secondly, it is required to review all design, manufacturing, modifications, and maintenance of aircraft. Finally, the FAA is responsible for standards related to crew training, airline operational requirements, airport command and control, and the conduct of safety-related research and development. All of this comes at a cost which is funded, in part, with the variety of taxes and fees charged to passengers, airlines, and airports.

Security. The screening of passengers, baggage, and carry-on luggage became common place in 1973 after a series of high profile aircraft hijackings. This screening was carried out by the airlines and airports and consisted of X-ray machines and metal detectors (ATA, 2007). During the 1980s the threat changed to sabotage and acts of aggression by terrorists (Martonosi & Barnett, 2006). The security environment changed to deal with this new threat by locking down ramps, adding guards, and increasing inspections of all kinds. The early 1990s saw this threat to the air travelers and the aviation industry escalate again following the bombing of the New York City World Trade Center and the Alfred P. Murrah Federal Building in downtown Oklahoma City, Oklahoma. In 1997 the White House Commission on Aviation Safety and Security recommended the installation of sophisticated explosive material detection equipment, Computer-Assisted Passenger Pre-Screening Systems (CAPPS), and Positive Passenger Bag Matching (PPBM) Programs (Berrick, 2008).

Even with all of these targeted programs, the industry was not prepared for the events of September 11, 2001 when four U.S. commercial airliners were taken over by terrorists and used as weapons against the public. The events of that day resulted in the

U.S. Congress enacting the Aviation and Transportation Security Act (ATSA) which consolidated all screening activities under the Transportation Security Administration (ATA, 2007). Airlines were required to modify ticketing and boarding procedures, initiate secondary screening capabilities in the gate areas, and harden vulnerable areas of the aircraft. The airline industry also found itself much more actively involved in numerous IT initiatives to support new border control mandates (Berrick, 2008).

Few people doubt the value of these programs or their laudable objectives, but the cost to the airline industry has been significant (ATA, 2007). Air travel has become less convenient causing air travelers to find other means of travel or different ways of doing business. The monetary cost to implement these programs has made it difficult for marginally profitable airlines to continue operations. The ATA (2007) argued that the efficiency with which airline personnel once conducted business has been onerously impaired by the access restrictions associated with many of these security programs.

Distribution constraints. Distribution channels for service-type industries take on a form which is quite different from that of a typical manufacturing firm. Service industries, like the airline industry, must rely on innovative and creative methods to get their product in front of the customer. This section examines six constraints which are imposed on air transportation that limit or alter the methods available for distribution: (a) global distribution systems, (b) code-sharing, (c) strategic alliances, (d) scheduling, (e) fleet planning, and (f) airport capacity.

Global distribution systems. One of the primary methods of distribution for the airlines is its computer reservation system (CRS). The dynamics of routes, flexibility of pricing, and the sheer number of passengers using the airlines worldwide requires a

highly flexible method of managing the distribution of the air transportation service (ATA, 2007). In an effort to defray the cost associated with these systems, some airlines with sophisticated CRS applications began to sell partnerships into these programs to other airlines. In the 1990s there was a move among these same airlines to divest themselves of those elements of the business that were not within their core competence and the reservation systems were sold off to independent operators. These systems are collectively known as the Global Distribution System (GDS).

In an effort to support innovation and allow market forces to drive this service, the USDOT enacted policies to ensure equal access and reliability for all airlines (ATA, 2007). As a result, airlines began to find ways to leverage their knowledge of these systems to acquire preferential listings. The advent of after-sale fees and charges was a good example. If these fees were included in the base fare for one airline but not for another, then one airline's offering might appear more expensive. This gaming of the system surfaced in a number of areas and resulted in a more confusing distribution system.

Code-sharing. Code-sharing is an agreement between two or more airlines to share specific portions of their individual distribution channel (ATA, 2007). These agreements offer several specific benefits to each of the parties: (a) a broader array of services can be offered to the airline's customers, (b) the ability to issue tickets on flights operated by the partners, and (c) the opportunity to market expanded networks at minimal risk and expense (Chialin & Yu, 2007). While these code-sharing agreements occur both domestically and internationally, Chialin and Yu (2007) demonstrated how code-sharing

agreements could have the alternative affect of circumventing the regulatory policies which control international carriers.

Strategic alliances. Airlines sometimes find it advantageous to expand existing code-sharing agreements to create cooperative teaming agreements. These teaming arrangements are referred to as alliances and frequently involve many airlines. The three largest alliances are *Oneworld*, *Star Alliance*, and *SkyTeam*, which collectively represent more than 50 airlines (Kalligiannis, Iatrou, & Mason, 2006). While airlines within an alliance may compete against each other in some markets, the value of an alliance can be compelling. Alliances generally (a) link frequent flier programs, (b) provide common airport terminals, (c) create common lounge areas within airports, (d) offer coordinated flight schedules, (e) expand the network of serviced cities, and (f) reduce operating costs through the sharing of staff, facilities, and other ancillary services (Chathoth, 2004; Wang, & Evans, 2002).

Scheduling. Commercial air transport is a service industry. The distribution channels used to provide this service to the customer are complex and quite different from any other industry. Scheduling is just one of the elements that make up this distribution system. Deregulation gave the airlines the right to enter and exit any domestic market (ATA, 2007). Market opportunities dictate not only the cities to be serviced but the frequency of service and the time of day during which that service is offered. As the ATA (2007) noted, these decisions are complex and involve factors such as (a) number and type of aircraft required, (b) crew availability, (c) maintenance support requirements, (d) airport restrictions, and (e) customer expectations.

Fleet planning. There are many stakeholders within an airline who have an interest in the makeup of the airline's fleet. Selecting the right airframe type and number of aircraft is of significant interest to maintenance, engineering, finance, marketing, flight operations, training, ground handling, scheduling, reservations, security, and crew labor unions (ATA, 2007; Listes & Dekker, 2005). The ATA (2007) pointed to four primary factors that drive the decisions associated with fleet planning. The first involves an understanding of the carrier's financial health. The ability to secure financing, through either the equity or credit markets, will determine if the airline will purchase or lease the aircraft. This financial health will also dictate the size and age of the fleet.

An airline's marketing strategy is the second factor that influences fleet planning. Depending on whether a carrier is looking to expand into other markets or simply maintain its current position, its approach to fleet planning will differ (ATA, 2007). In either scenario the airline must try to anticipate changes in the economy and existing markets in order to position the fleet for the future. Couple this with the fact that an aircraft purchase can sometimes take more than four years to complete and it quickly becomes clear why fleet planning is fraught with uncertainty (Listes & Dekker, 2005).

The last two factors driving fleet planning involve external governance factors. According to the U.S. Department of Energy's Energy Information Administration (2009), the price of a gallon of U.S. Gulf Coast kerosene-type jet fuel on the spot market has varied over the last 20 years from its low of $28.20 per gallon in December 1998 to a high of $481.41 per gallon in September 2008. These same statistics show that the average price through the first 3 quarters of 2009 was approximately $160.00 per gallon which is 225% higher than it was in 2002. With this type of volatility in the fuel market

it is no surprise that fuel efficiency has become a renewed focus for airline operators and an important factor in fleet planning. If the cost of fuel was the only factor, the decision to acquire newer aircraft with greater fuel efficiencies would be easy. But other factors such as the cost of financing, maintenance costs, crew training costs, and costs to refine reservation systems all add to the difficulty of these decisions.

Similarly, the public's concern over aircraft noise and engine emissions plays a role in fleet planning. The U.S. Congress directed the FAA to enforce a ban on the use of Stage 1 jet aircraft (e.g., Boeing 707 and Douglas DC-8) starting January 1, 1985 and to phase out Stage 2 aircraft (e.g., Boeing 727 and Douglas DC-9) starting in 2000 (Burleson, 2001). Standards which limit turbojet and turbofan aircraft engine emission of smoke, unburned hydrocarbons, carbon monoxide, and oxides of nitrogen are maintained by the United Nations International Civil Aviation Organization (ICOA; International Civil Aviation Organization, 2005). While the FAA is responsible for enforcement, the U.S. Environmental Protection Agency (United States Environmental Protection Agency, 2009) works directly with the FAA and ICAO to develop international aircraft emission standards. As these standards become more and more restrictive, older aircraft need to be replaced for airlines to remain in business.

Airport capacity. Airports are a critical component in the distribution channel for all airlines and they must compete with each other for capacity. There are two variables associated with an airport's total capacity—landside capacity and airside capacity (ATA, 2007). As the name implies, landside capacity refers to the number of passengers per year that an airport's infrastructure can support. This includes roads, parking lots, terminal space, and other amenities. The airside capacity is a direct measure of the

number of flights that an airport can handle. The FAA computes and publishes an Engineered Performance Standard (EPS) for each airport (Whalen, Carlton, Heyer, & Richard, 2008). This measure is influenced by the size and number of runways, taxiways, gates, ramp areas, and other airborne operational limitations.

Enhancing the capacity of an existing airport is generally met with considerable resistance from local communities, who view these types of expansion as an environmental intrusion (ATA, 2007). Building new airports in less densely populated areas is another option, but more expensive and less convenient for passengers (Whalen et al., 2008). The airlines have a vested interest in working within the current infrastructure since they contribute significantly to the funding of the airport. The ATA (2007) described two types of cost recovery plans that airports use—residual agreements and compensatory agreements. Both require the signatory airlines to accept the financial risk by guaranteeing the airport sufficient funds to cover its operating costs. The difference is the way the payments are computed.

Summary. Regulation/de-regulation, public safety governance, constant demand for capital, political rancor over the allocation of services, and constantly changing technologies are some of the many internal and external factors that make the airline industry an extremely unstable environment in which to operate (Goll, Johnson, & Rasheed, 2006). Both external and internal threats are constantly attacking the status quo. Deregulation was intended to remove the economic barriers for new entrants into the airline industry (i.e., cost of licensing, discriminatory route structure assignments, and fares which were ill-aligned with market demands; Patashnik, 2003). While it was successful in achieving these objectives, it spawned other more significant barriers.

These new restraints on business not only affected new entrants but also made it difficult for existing airlines to survive. Some of these included terminal facilities and gate availability, access to capital, inter-airline alliances and frequent flier programs, proprietary reservation systems, access to advertisement and communication media in specific markets, rapid market growth with a flood of low-cost competitors, complex fare structures, and travel agent progressive commissions and corporate discounts which both still exist in some sectors of the market (Brady & Cunningham, 2001; Clougherty, 2006; Pratt, Schultz & Schultz, 2006).

Some of these new barriers were a direct result of deregulation, while others were brought on by the airlines attempting to react to and leverage the new environment. Add to this the erratic price of fuel and recent economic recessions and it becomes obvious why the airline industry is as tumultuous as it is. Under deregulation, airlines needed to have the resources necessary to adapt their business models to a changing environment (Goll et al., 2006). Only those that were able to adjust to this new market structure would be able to survive (Gillen, 2006). Unfortunately, they found themselves with a very narrow set of solutions for the great many forces now found in their environment.

In the early deregulated period, airlines possessed a relatively simple set of competitive actions and strategies (Patashnik, 2003). Decades of regulation had stifled much of the creative energies that founded the airlines. Patashnik (2003) argued that the relative success experienced by these airlines during regulation had narrowed the range of competitive options at their disposal. Management cognition had been shaped in a manner that reduced creative incentives associated with competitive alternatives (Clougherty, 2006; Gillen, 2006; Goll et al., 2006). Vasigh and Fleming (2005)

described this form of competitive simplicity as the creation of managerial overconfidence resulting in a profound degradation to an organization's ability to effectively meet market challenges. This characterization is critical to understanding the underlying cause for the dynamic and sometimes chaotic environment that ensued early in the deregulated period.

In the decades immediately following deregulation, the airlines were ill-equipped to handle the turbulent competitive environment they faced. Their overspecialization with regard to market contingencies was at the root of their problems (Goll et al., 2006; Vasigh & Fleming, 2005). Three primary challenges to successful business operations included (a) a lack of flexibility, (b) organizational structures which limited rapid response to market conditions, and (c) a lack of quality control over operations, technical systems, and performance of the work force (Forbes & Domm, 2004; Vasigh & Fleming, 2005). Vasigh and Fleming (2005) added that complacency during the regulatory period left most mature airlines struggling to compete in this new environment.

A study by Khandwalla and Mehta (2004) summarized the general thinking regarding the creation of superior corporate creativity in an environment similar to that experienced by the airlines. They posited that organizations which are subjected to environments with intensifying pressures must strive to develop two specific characteristics: (a) innovation-friendly business strategies and (b) effective modes of managing innovations. It is suggested that these two elements have driven the success of the surviving airlines (Gillen, 2006). Through this study, a more detailed examination of these endeavors is conducted to examine how closely IT and business are aligned in this innovative process.

Recent IT Utilization

The past decade has seen the airline industry focusing on several key areas of innovation. These areas include (a) security, (b) customer service, (c) maintenance, (d) marketing, and (e) operations (Kelemen, 2002; Moorman, 2004; Rosencrance, 2005). The central theme running through these areas is the desire to maximizing customer relationships while optimizing earnings. One of the key, underlying technologies was the use of Internet Protocol (IP) technologies to leverage the public Internet in support of operations and to drive costs down. This was frequently accomplished through the implementation of end-to-end services that connected desktops directly to the source of information and the integration of airport operations with the rest of the airline infrastructure (Moorman, 2004).

Security-related technologies became more important in the wake of global political tensions and government regulations. Secure traveler and boarder control programs were identified as two initiatives which addressed the need for security and allowed the airlines to reduce the intrusive nature of these regulations for their most valued frequent customers (Kelemen, 2002). Positive Passenger Bag Matching (PPBM) was another security initiative that fulfills regulatory mandates but also improves performance within the airline operations. This program allowed the airlines to actively manage passenger baggage which was frequently seen as a source of friction between management and the passengers (Kelemen, 2002; Moorman, 2004).

Advances in technology have also been responsible for improvements in customer service (Baker, 2007; Kelemen, 2002; Nash, 2009). On-line check-in combined with self-service kiosks within the airports and hotels has led to a reduction in lines at the

ticket counters (Baker, 2007). While the airlines may not be able to do much about the lines at the security screening areas, they do have control over those lines at other points in the process. Baker (2007) noted how the integration of an old technology, bar-codes, with the airline's boarding passes helped reduce the time it takes to embark passengers for flights. He also pointed to many airlines that have introduced sophisticated passenger loading scheme algorithms to add additional efficiencies to this process. Each of these innovations provided the added benefit of reducing the time it takes to turn an aircraft around for the next flight thus increasing the number of flight hours that a piece of equipment could support.

Many other IT initiatives have also added to an improved customer experience, such as electronic visas, in-flight e-mail, in-flight television, airport management of services (i.e., gate notices, arrivals, and departures), in-flight Wi-Fi, and the integration of on-line reservation systems with frequent flier accounts making it easier to redeem frequent flier points (Baker, 2007; Kelemen, 2002; Nash, 2009). None of these initiatives were seen as new technologies. Instead, the airlines were able to find new ways to utilize proven technologies by providing a variety of channels for the distribution of their services (Nash, 2009).

The introduction of technology into the maintenance, repair, and overhaul (MRO) functions provided significant reduction in cost for the airlines (Rosencrance, 2005). Rosencrance (2005) noted that these technology improvements have reduced the amount of time that an aircraft is down for scheduled maintenance, improved the quality of maintenance, and provided added value to the unscheduled maintenance that frequently causes delays or cancellations. The use of 802.11b/g wireless networks in hangers

allowed maintenance workers to have instance access to manuals and other aircraft records. The use of ruggedized laptops to hold similar maintenance libraries on the ramps and in the gates was able to reduce the time it takes to turn an aircraft for the next flight. Additionally, the use of automated parts tracking and data-linking engine and airframe data from an aircraft in flight have each added to the ability of ground crew to better prepare for an aircraft's arrival. Finally, the use of IT within MRO operations has increased the number of airlines that are outsourcing this maintenance function. IT innovation in this area allowed airlines to stay connected with the day-to-day maintenance efforts of their subcontractor and integrates this information with the airline's own applications, schedules, and databases (Moorman, 2006).

The marketing functions, within the airlines, have also seen an infusion of technology (Rosencrance, 2005). The objective of marketing is to achieve the highest load factor possible (i.e., occupancy level). The Internet has been used extensively in this endeavor. Rosencrance (2005) described some common examples of the Internet's impact including enhanced schedule/fare search engines, direct marketing via e-mail, and the use of Twitter™ to alert interested customers of sales.

Information technology has had the greatest influence on airline operations (Moorman, 2004; Rosencrance, 2005; Sipior & Ward, 2007). The integration of applications that support day-of-operations information is at the core of most of these improvements. The most notable enhancements include executive dashboards, system status displays for management, dispatch communications applications, weather situation and forecasts, flight planning, and crew scheduling (Moorman, 2004; Rosencrance, 2005). The one area that stands out in this collection is the air-to-ground and ground-to-

ground movement of data and information. These channels facilitate the use of other knowledge based applications and decision making tools within an airline operations (Sipior and Ward, 2007).

Operational Performance Metrics

As part of this study, reference is made to the data provided by the USDOT. In 1967, the U.S. Congress established the USDOT as a Cabinet department within the U.S. Federal Government. Its mission, as stated on the USDOT website, is to "serve the United States by ensuring a fast, safe, efficient, accessible and convenient transportation system that meets our vital national interests and enhances the quality of life of the American people, today and into the future" (United States Department of Transportation [USDOT], 2010). This agency is administered by the U.S. Secretary of Transportation and is comprised of 12 different divisions. These divisions are responsible for highways, airways, railroads, seaways, pipelines, and other elements of the U.S. transportation network. The division of the USDOT which is of interest in this study is the Federal Aviation Administration (FAA). The USDOT is responsible for gathering and reporting metrics and statistics in support of their overall mission.

A major airline, or Group III carrier, is defined by the USDOT (USDOT, 2009) as an air carrier with annual operating revenues exceeding 1-billion U.S. dollars (USD 1B). Those carriers with annual operating revenues between 100-million U.S. dollars (USD 100M) and USD 1B are referred to as national carriers, or Group II airlines. Group I airlines, also referred to as large regional carriers, are those with annual operating revenues ranging between USD 20M and USD 100M.

The *Air Travel Consumer Report* (USDOT, 2009) is a monthly report published by the Department of Transportation's Office of Aviation Enforcement and Proceedings (OAEP). This report summarizes the performance data collected from those airlines with annual revenues, which represent at least 1% of the total revenue generated by domestic scheduled-service passenger carriers. Reporting by these airlines is mandated by Federal regulation 14 CFR Part 234. Four sections of this report are important to this study: (a) flight delays, (b) mishandled baggage, (c) over-bookings, and (d) consumer complaints.

Flight delays and cancellations. On time performance and flight cancellation metric data can be extracted from the flight delays section of the *Air Travel Consumer Report* (USDOT, 2009). The data provided in this report is based on data filed by airlines each month with the Department of Transportation's Bureau of Transportation Statistics, Office of Airline Information. A flight is considered to have departed on-time if it left the airport gate no more than 15 minutes after the scheduled time as published in the carriers' Computerized Reservation System (CRS). Similarly, flights are considered to have arrived on-time if the aircraft touches down at the destination airport no more than 15 minutes after the scheduled time as published in the carriers' CRS.

Mishandled bags. The mishandled baggage metric data is a measure of the number of mishandled-baggage reports filed by passengers that flew a specific carrier. These data are summarized in a separate section within the *Air Travel Consumer Report* (USDOT, 2009). Mishandled-baggage reports include lost, damaged, delayed, or pilfered baggage. These reports are filed with the airline that originally accepted the baggage.

Over-bookings. Over-booking metric data measures the number of passengers that were denied boarding due to an over-sale condition, even though they held confirmed

reservations. These data do not include those passengers who were affected by cancelled, delayed, or diverted flights. The data provided in this section of the *Air Travel Consumer Report* (USDOT, 2009) provides a breakdown by carrier of those passengers who were denied boarding involuntarily as well as those who, in exchange for compensation, voluntarily gave up their seat on an oversold flight. In addition to those passengers who received compensation, this report also identifies those passengers who did not qualify for compensation as a result of one of the exceptions in the over-sales rule: (a) passenger accommodated on another flight scheduled to arrive within one hour of the original flight, (b) passenger fails to comply with ticketing, check-in or reconfirmation procedures, (c) aircraft of smaller capacity is substituted, or (d) passenger is denied boarding due to safety-related weight restrictions on an aircraft with 60 or fewer seats. It should be noted that these data do not include shuttle services on which reservations are not offered.

Consumer complaints. The final section of the *Air Travel Consumer Report* (USDOT, 2009), which is important for this study, is the section which summarizes aviation consumer complaints. These complaints are filed with the USDOT in writing, by telephone, via e-mail, or in person. The USDOT does not attempt to validate any of the complaints prior to reporting them. Reports which are safety related are referred to the Federal Aviation Administration and are not included in these data.

Statement of the Problem

The problem to be addressed within this study is illustrated by the more than 200 commercial air carriers that have been forced to merge, cease operations, or file for bankruptcy protection since 1978 (ATA, 2008). While some of these airlines failed as a

result of some very unique circumstances (Goll et al., 2006), these ATA (2008) statistics underscore the importance of some basic financial and operational performance metrics. This problem is further exacerbated by a notable lack of empirical data necessary to evaluate and ultimately correct this condition. An examination of the correlation between IT-business strategic alignment maturity and the achievement of these metrics could prove valuable to the industry as it moves forward in this deregulated, turbulent environment. This study could offer the necessary insight for IT and business executives, within the airline industry, to understand the influence that IT-business strategic alignment maturity levels have on the ability to achieve financial and operational performance goals.

Purpose of the Study

The purpose of this quantitative study is to evaluate the global commercial airline industry from an IT-business alignment perspective and correlate the alignment maturity level of each airline with their respective performance metrics. There are six IT-business alignment criteria that are used to determine each airline's strategic alignment maturity level. The maturity levels associated with the U.S. commercial airlines is evaluated to identify possible correlations and trends with operational performance metrics, which have been amassed by the USDOT. The global airline industry is evaluated to identify possible correlations and trends with financial performance metrics as measured using available public records and corporate filings. An evaluation of this global group of airlines is also performed to determine any correlation between specific airline characteristics (i.e., fleet size and load factors) and their respective SAM level. This

study has been designed to control for commercial airlines, operating scheduled service, and possessing annual operating revenues in excess of USD 20M.

The sole independent variable is the strategic alignment maturity level. There are six secondary measures which are used to calculate the SAM level. These factors are represented by the six IT-business alignment criteria: (a) communications maturity, (b) competency/value maturity, (c) governance maturity, (d) partnership maturity, (e) scope and architecture maturity, and (f) human resource skills maturity. The dependent variables are categorized as operational parameters (e.g., on-time performance, flight cancellations, mishandled baggage, over-bookings, and customer complaints), financial parameters (e.g., current ratio, inverse debt ratio, return on total assets, basic earning power ratio, and annual operating revenue), and airline characteristic parameters (e.g., fleet size and average load factor).

Rationale

The research conducted in IT-business strategic maturity alignment has proven valuable to firms in many industries. These studies have evaluated the holistic relationships among interdependent organizational characteristics (Hu & Huang, 2006; Huang & Hu, 2007; Luftman, Lewis, & Oldach, 1993; Reich & Benbasat, 2000). Those relationships have provided insight into the connections that exist between business and IT on multiple levels. It is this holistic view of business that has become the foundation for the alignment maturity assessment model (Luftman, 2000). The worldwide commercial airline industry has never before been the target of this type of study. A study of this type has the potential for spawning other related research within this

industry in the future. The results of this study can extend the current knowledge in this industry and provide valuable insight for airline executives and managers to use when charting future strategic direction.

Research Questions

The extraordinary number of mergers and bankruptcies within the global commercial airline industry indicates the existence of a problem that demands the attention of researchers (ATA, 2008). It has been suggested by other researchers that a lack of alignment between technology and business strategies can exhibit characteristics similar to what has been identified in these ATA (2008) statistics (Bergeron, Raymond, & Rivard, 2003; Henderson & Venkatraman, 1991; Hirschheim & Sabherwal, 2001). The following research questions are based on this premise and are fundamental to this study. Each research question addresses a specific relationship between an airline's strategic alignment maturity level and a performance metric. The hypotheses associated with each research question examine this relationship with strategic alignment as well as the secondary factors associated with strategic alignment maturity: (a) communication maturity, (b) competency and value maturity, (c) governance maturity, (d) partnership maturity, (e) scope and architecture maturity, and (f) human resource skills maturity. The performance metrics selected as part of this study represent (a) classical accounting and financial metrics, (b) operational metrics which are capable of acting as a proxy for customer satisfaction, and (c) airline characteristic measures. This multi-faceted approach is supported by other research in this area and is capable of providing a more

complete portrait of an airlines level of performance (Tarnoff, 2005; Kerzner, 2003; Gardner, 2004; Craig & Amernic, 2008)

The research questions which follow target those parts of an airline's corporate structure where the alignment of business and IT objectives is most critical and most influential in achieving corporate objectives. Across the airline industry there is little variation in the types of corporate structures used to manage business. While the names of the organizations may differ from airline-to-airline the functional areas remain the same: (a) flight operations; (b) flight attendant operations; (c) ramp operations—fuel handlers, baggage handlers, servicing, and cleaners; (d) customer service—sales, marketing, ticket counters, reservations, and gate agents; (e) IT; (f) engineering; (g) maintenance and quality control; (h) administration—human resources, compensation, and benefits (ATA, 2009). Airline corporate objectives are stated in terms of market share, revenue, and earnings per share. These objectives are influenced greatly by those airline organizations which have a direct effect on cost and passenger miles flown. As ATA (2009) noted, this influence is what drives IT to focus on operational elements within the airlines more than any other. Several studies have identified a significant IT bias toward operational areas within all airlines (Button et al., 2007; Gillen, D., 2006; Goll et al., 2006; Kelemen, Z., 2002; Rosencrance, L., 2005; Vasigh, B., & Fleming, K., 2005). For these reasons, the focus of this study is on those metrics which provide strong indicators of performance within day-to-day operations. These measures are then correlated with a measure of business-IT alignment maturity at the corporate level.

The first research question is designed to evaluate the relationship between an airline's strategic alignment maturity level and several operational performance metrics.

The performance metrics to be used here are those amassed by the USDOT for those airlines with annual revenues, which represent at least 1% of the total revenue generated by domestic scheduled-service passenger carriers. The use of these data is not new. Many studies have found this data to be an appropriate indicator of an airline's overall performance, as well as an excellent proxy for customer satisfaction (Behn & Riley, 1999; Bowen & Headley, 2008; Foreman & Shea, 1999; Mayer & Sinai, 2002; Mazzeo, 2003; Suzuki, 2000). An aggregate representation of these characteristic metrics serve as a guiding performance metric.

RQ1: What relationship, if any, exists between an airline's strategic alignment maturity level and its operational performance as measured by the USDOT?

H1-1_0: There is no significant correlation between an airline's strategic alignment maturity level and its operational performance as measured by the USDOT.

H1-1_A: There is a significant correlation between an airline's strategic alignment maturity level and its operational performance as measured by the USDOT.

H1-2_0: There is no significant correlation between an airline's communications maturity and its operational performance as measured by the USDOT.

H1-2_A: There is a significant correlation between an airline's communications maturity and its operational performance as measured by the USDOT.

H1-3_0: There is no significant correlation between an airline's competency and value maturity and its operational performance as measured by the USDOT.

H1-3_A: There is a significant correlation between an airline's competency and value maturity and its operational performance as measured by the USDOT.

H1-4_0: There is no significant correlation between an airline's governance maturity and its operational performance as measured by the USDOT.

H1-4_A: There is a significant correlation between an airline's governance maturity and its operational performance as measured by the USDOT.

H1-5_0: There is no significant correlation between an airline's partnership maturity and its operational performance as measured by the USDOT.

H1-5_A: There is a significant correlation between an airline's partnership maturity and its operational performance as measured by the USDOT.

H1-6_0: There is no significant correlation between an airline's scope and architecture maturity and its operational performance as measured by the USDOT.

H1-6_A: There is a significant correlation between an airline's scope and architecture maturity and its operational performance as measured by the USDOT.

H1-7_0: There is no significant correlation between an airline's human resource skills maturity and its operational performance as measured by the USDOT.

H1-7_A: There is a significant correlation between an airline's human resource skills maturity and its operational performance as measured by the USDOT.

As with the first research question, this second question targets the relationship between an airline's strategic alignment maturity level and a performance metrics. In contrast, this research question examines a relationship with financial performance metrics. These metrics are gleaned from available public records and corporate filings.

The use of classical accounting and financial metrics is well documented in the literature (Craig & Amernic, 2008; Fu-Jiing, Kaie-Chin, & Yi-Yin, 2005; Goodale, 2002; Lampkin & Raghavan, 2008). An aggregate representation of these financial performance metrics serves as the relevant performance metric.

RQ2: What relationship, if any, exists between an airline's strategic alignment maturity level and its financial performance as measured using available public records and corporate filings?

H2-1_0: There is no significant correlation between an airline's strategic alignment maturity level and its financial performance as measured using available public records and corporate filings.

H2-1_A: There is a significant correlation between an airline's strategic alignment maturity level and its financial performance as measured using available public records and corporate filings.

H2-2_0: There is no significant correlation between an airline's communications maturity and its financial performance as measured using available public records and corporate filings.

H2-2_A: There is a significant correlation between an airline's communications maturity and its financial performance as measured using available public records and corporate filings.

H2-3_0: There is no significant correlation between an airline's competency and value maturity and its financial performance as measured using available public records and corporate filings.

$H2\text{-}3_A$: There is a significant correlation between an airline's competency and value maturity and its financial performance as measured using available public records and corporate filings.

$H2\text{-}4_0$: There is no significant correlation between an airline's governance maturity and its financial performance as measured using available public records and corporate filings.

$H2\text{-}4_A$: There is a significant correlation between an airline's governance maturity and its financial performance as measured using available public records and corporate filings.

$H2\text{-}5_0$: There is no significant correlation between an airline's partnership maturity and its financial performance as measured using available public records and corporate filings.

$H2\text{-}5_A$: There is a significant correlation between an airline's partnership maturity and its financial performance as measured using available public records and corporate filings.

$H2\text{-}6_0$: There is no significant correlation between an airline's scope and architecture maturity and its financial performance as measured using available public records and corporate filings.

$H2\text{-}6_A$: There is a significant correlation between an airline's scope and architecture maturity and its financial performance as measured using available public records and corporate filings.

H2-7_0: There is no significant correlation between an airline's human resource skills maturity and its financial performance as measured using available public records and corporate filings.

H2-7_A: There is a significant correlation between an airline's human resource skills maturity and its financial performance as measured using available public records and corporate filings.

The purpose of the previous two research questions was to examine the relationship between an airline's strategic alignment maturity level and operational/financial performance metrics. In contrast, this third question is designed to look for relationships with one of the basic characteristics of the airline, its physical size. Since the size of an airline's fleet is seen as one of the primary drivers toward the use of IT, the number of aircraft is viewed as a convenient way of representing the influence that size has on an airline's operations.

RQ3: What relationship, if any, exists between an airline's strategic alignment maturity level and the airline's fleet size, as measured by the number of aircraft supporting normal operations?

H3-1_0: There is no significant correlation between an airline's strategic alignment maturity level and the airline's fleet size, as measured by the number of aircraft supporting normal operations.

H3-1_A: There is a significant correlation between an airline's strategic alignment maturity level and the airline's fleet size, as measured by the number of aircraft supporting normal operations.

H3-2_0: There is no significant correlation between an airline's communications maturity and the airline's fleet size, as measured by the number of aircraft supporting normal operations.

H3-2_A: There is a significant correlation between an airline's communications maturity and the airline's fleet size, as measured by the number of aircraft supporting normal operations.

H3-3_0: There is no significant correlation between an airline's competency and value maturity and the airline's fleet size, as measured by the number of aircraft supporting normal operations.

H3-3_A: There is a significant correlation between an airline's competency and value maturity and the airline's fleet size, as measured by the number of aircraft supporting normal operations.

H3-4_0: There is no significant correlation between an airline's governance maturity and the airline's fleet size, as measured by the number of aircraft supporting normal operations.

H3-4_A: There is a significant correlation between an airline's governance maturity and the airline's fleet size, as measured by the number of aircraft supporting normal operations.

H3-5_0: There is no significant correlation between an airline's partnership maturity and the airline's fleet size, as measured by the number of aircraft supporting normal operations.

$H3\text{-}5_A$: There is a significant correlation between an airline's partnership maturity and the airline's fleet size, as measured by the number of aircraft supporting normal operations.

$H3\text{-}6_0$: There is no significant correlation between an airline's scope and architecture maturity and the airline's fleet size, as measured by the number of aircraft supporting normal operations.

$H3\text{-}6_A$: There is a significant correlation between an airline's scope and architecture maturity and the airline's fleet size, as measured by the number of aircraft supporting normal operations.

$H3\text{-}7_0$: There is no significant correlation between an airline's human resource skills maturity and the airline's fleet size, as measured by the number of aircraft supporting normal operations.

$H3\text{-}7_A$: There is a significant correlation between an airline's human resource skills maturity and the airline's fleet size, as measured by the number of aircraft supporting normal operations.

The purpose of this next research question is to examine the most common metric used by airline executives to manage cost and revenue on a daily basis—average load factor. Studies that have embraced load factor as a performance metrics, argued that it provides a more immediate indication of performance than that found in typical market-based performance measures (Davila & Venkatachalam, 2004; Yang, Raeside, & Smyth, 2005). Average load factor is used by every airline to monitor its profitability. This metric thus provides valuable insight into an airline's efficiency.

RQ4: What relationship, if any, exists between an airline's strategic alignment maturity level and the airline's average load factor?

H4-1_0: There is no significant correlation between an airline's strategic alignment maturity level and the airline's average load factor.

H4-1_A: There is a significant correlation between an airline's strategic alignment maturity level and the airline's average load factor.

H4-2_0: There is no significant correlation between an airline's communications maturity and the airline's average load factor.

H4-2_A: There is a significant correlation between an airline's communications maturity and the airline's average load factor.

H4-3_0: There is no significant correlation between an airline's competency and value maturity and the airline's average load factor.

H4-3_A: There is a significant correlation between an airline's competency and value maturity and the airline's average load factor.

H4-4_0: There is no significant correlation between an airline's governance maturity and the airline's average load factor.

H4-4_A: There is a significant correlation between an airline's governance maturity and the airline's average load factor.

H4-5_0: There is no significant correlation between an airline's partnership maturity and the airline's average load factor.

H4-5_A: There is a significant correlation between an airline's partnership maturity and the airline's average load factor.

H4-6_0: There is no significant correlation between an airline's scope and architecture maturity and the airline's average load factor.

H4-6_A: There is a significant correlation between an airline's scope and architecture maturity and the airline's average load factor.

H4-7_0: There is no significant correlation between an airline's human resource skills maturity and the airline's average load factor.

H4-7_A: There is a significant correlation between an airline's human resource skills maturity and the airline's average load factor.

The last research question is designed to examine the relationship between an airline's strategic alignment maturity level and its annual operating revenue. This research question is similar in nature that previously described in RQ2. The fact that this question is focused entirely on the annual operating revenue, rather than an aggregate of several financial metrics, makes this question unique. As noted earlier, the USDOT uses annual operating revenue as a differentiator among airlines. This research question could validate that distinction.

RQ5: What relationship, if any, exists between an airline's strategic alignment maturity level and the airline's annual operating revenue?

H5-1_0: There is no significant correlation between an airline's strategic alignment maturity level and the airline's annual operating revenue.

H5-1_A: There is a significant correlation between an airline's strategic alignment maturity level and the airline's annual operating revenue.

H5-2_0: There is no significant correlation between an airline's communications maturity and the airline's annual operating revenue.

H5-2_A: There is a significant correlation between an airline's communications maturity and the airline's annual operating revenue.

H5-3_0: There is no significant correlation between an airline's competency and value maturity and the airline's annual operating revenue.

H5-3_A: There is a significant correlation between an airline's competency and value maturity and the airline's annual operating revenue.

H5-4_0: There is no significant correlation between an airline's governance maturity and the airline's annual operating revenue.

H5-4_A: There is a significant correlation between an airline's governance maturity and the airline's annual operating revenue.

H5-5_0: There is no significant correlation between an airline's partnership maturity and the airline's annual operating revenue.

H5-5_A: There is a significant correlation between an airline's partnership maturity and the airline's annual operating revenue.

H5-6_0: There is no significant correlation between an airline's scope and architecture maturity and the airline's annual operating revenue.

H5-6_A: There is a significant correlation between an airline's scope and architecture maturity and the airline's annual operating revenue.

H5-7_0: There is no significant correlation between an airline's human resource skills maturity and the airline's annual operating revenue.

$H5\text{-}7_A$: There is a significant correlation between an airline's human resource skills maturity and the airline's annual operating revenue.

Significance of the Study

The commercial airline industry is a vital component of the U.S. economy (GAO, 2009). According to the GAO this industry is responsible for directly generating billions of dollars of economic activity each year, which in turn acts as a catalyst for other economic growth. The specific value of the airline industry, according to the GAO, can be seen in communities surrounding airports, businesses that rely on the airlines to link markets, and the value they provide by promoting the global exchange of people, products, and ideas.

In an apparent contradiction, the commercial airline industry continues to be an extremely volatile enterprise (GAO, 2009). Customer service and safety were the source of much industry consternation in the 1990s (Scovel, 2006) and since deregulation in 1978, the economic health of the airlines has remained a cyclic concern (GAO, 2009). Based on the most currently available data published by the GAO, the U.S. commercial airline industry lost $4.3 billion in the first 3 quarters of 2008. The 11 airlines, which together generated 75% of the industry's revenue, have already posted 2008 fourth quarter financials that show a combined loss of $2.4 billion.

While the root cause of the airlines' predicament is still not completely understood, the GAO (2009) and the USDOT (Scovel, 2006) both point to the industry's inability to rapidly adjust to changes in the environment. A combination of recent events has contributed to the large number of airlines ceasing or scaling back operations. In

2008 twelve airlines filed for bankruptcy protection, more than in the three previous years combined (ATA, 2008). The impact to the labor markets has been equally dire. Between 2000 and 2005, the size of the workforce at the six largest network airlines decreased by 27% (Scovel, 2006).

The Air Transportation Association (ATA, 2008) has characterized those airlines that remain as having a genuine appreciation for the value of technology when attempting to achieve a sustainable competitive advantage. This statement is in apparent contradiction to Goll et al. (2006) who noted how these same airlines struggle with the alignment of business strategies and IT strategies. The use of the strategic alignment maturity model can help focus some much needed attention on this problem. Demonstrating a direct correlation between strategic alignment maturity levels and an airline's ability to achieve its performance objectives can help the industry effectively allocate scarce resources. Much research has been conducted in the area of IT-business strategic alignment, but no work has specifically addressed the U.S. airline industry.

Through the execution of this study, there exists a potential to provide significant value for the airline industry as it captures empirical evidence of the relationship between IT-business strategic alignment maturity and other performance metrics. This research study affords an opportunity for the industry to evaluate the organizational efficiencies that may be present in airlines of varying size and within different market categories. An evaluation of the alignment of IT and business strategies could provide significant insight into the cause of the airlines' inability to quickly react to their ever changing environment.

From a broader academic perspective, this study represents the first attempt at capturing strategic maturity data within the commercial airline industry, providing additional cross-industry insight into the effectiveness of this model. The results of this study can also be utilized as an opportunity to benchmark these new data against other industries where this model has already been applied (Luftman & Kempaiah, 2007). Finally, this study, with the addition of the airline industry, could provide an opportunity to improve the existing strategic alignment maturity model.

Definition of Terms

Several terms are used throughout this dissertation. These terms are frequently used within differing context throughout the literature. For this reason, these terms are defined here in an effort to facilitate a common frame of reference.

Strategic Alignment. Strategic alignment is the synchronization of IT and business processes and mechanisms in such as way as to improve the organization's IT effectiveness and thus maximize the value of IT to the firm (Ness, 2005; Porter, 1980; Ward & Peppard, 2002).

IT Effectiveness. Information technology effectiveness is a dimension of strategic alignment which directly impacts an organization's level of performance and its ability to bring value to any business venture (Ness, 2005; Tallon, Kraemer, & Gurbaxani, 2000).

Strategy Formulation. Strategy Formulation is a phase of any strategic management process which creates the strategic direction through which organizational objectives can be achieved (Porter, 1980; Ward & Peppard, 2002).

Strategic Suitability. Strategic suitability is the overall rationale of the strategy chosen by an organization; considers the ability of a chosen strategy to address the underlying competitive position (Porter, 1980; Ward & Peppard, 2002).

Airline Fleet Size. Airlines operate with a variety airframe types. The choices made by management with regard to the types of airframes are usually indicative of the markets that are being addressed. Unlike airframe types, the fleet size is more of a direct measure of the airlines size and complexity of operations. This measure represents the aggregate sum of all aircraft being used in scheduled service (ATA, 2007).

Average Seat Mile. Average seat mile (ASM) is the most common measure of the capacity provided by an airline. This value is calculated by multiplying the number seats (i.e., occupied and unoccupied) that were available on a specific aircraft by the number of miles that that aircraft flew. The average across the airline's entire fleet, for a specific calendar month, represents the airline's ASM for that month (ATA, 2007).

Revenue passenger mile. A revenue passenger mile (RPM) is the most common measure of demand within the airline industry. A single revenue passenger mile is equivalent to one passenger being flown one mile. The RPM metric is the average revenue passenger miles generated by every aircraft in the fleet for a specific calendar month (ATA, 2007).

Average load factor. Load factor (LF) is the percentage of available seats which are occupied by revenue generating passengers. Average load factor (ALF) is the ratio of RPM to ASM for a given calendar month (ATA, 2007).

Assumptions and Limitations

Assumptions and limitations are a necessary part of any scholarly study. Assumptions permit the simplification of the problem, while limitations can help reduce the scope to a manageable level. The following sections identify the assumptions and limitations made as part of this particular study.

Assumptions

There are five primary assumptions made in the execution of this study. The first involves the application of empirical research techniques through the use of cross-sectional survey methods. The very nature of this approach assumes that the variables are stable over time.

The second assumption is related to the correlation among the various parameters. The conduct of this research elicits the support of multiple airlines to assess this correlation. It is assumed, through this cross-industry perspective, that the degree of correlation between the dependent and independent variables is statistically consistent from one airline to another within the industry, or at least across airlines within a specific category.

The next assumption involves the selection of the sample frame. The sample frame consists of a representative set of airlines throughout the world. This sample is limited to carriers offering scheduled passenger service. For consistency purposes this group is restricted to those carriers with annual operating revenues exceeding USD 20M.

The fourth assumption, on which this study is based, also involves the sample population. The countries from which these airlines are selected are limited to those

nations which are represented by the *Group of Twelve* (G-12) Nations. It is assumed that the industrial and economic characteristics of these nations offer sufficient control to ensure that any cross-nation comparisons are meaningful.

Finally, an assumption has been made that the operational performance metrics amassed by the USDOT are indicative of an airline's overall performance. These metrics are certainly important to the airlines' customers and may drive these customers toward those airlines with better statistics, making them more successful. While, there is no empirical evidence to indicate that there is a conscious or subconscious event associated with a customer's decision to fly with one airline versus another, the anecdotal evidence is strong.

Limitations

The first limitation of this study is related to the financial measures that are used to assess the success or health of each airline. These traditional business metrics have limited value since they only capture a firm's performance over a relatively short period of time. This may not be reflective of its true health. It may also be inconsistent with the firm's overall IT-business strategic alignment maturity level.

A second limitation is associated with the technique used to collect data. Because the survey used to collect data is anonymous, there is no direct contact with each respondent. This lack of personal contact, while giving the respondent a greater sense of anonymity, does not allow for any personal pressure to secure the respondent's participation.

This research is design to target the global commercial airline industry. The framework associated with this research design is, by itself, a limiting factor in the generalizability of the results. Limiting the study to the commercial airline industry does not permit generalization of the results across other industries. In addition, it is important to note that this cross-sectional study is limited to a snapshot of the industry at a particular point in time. For this reason, the results may not be sustained over time. As economic conditions change and technology evolves, the results found here may lack repeatability.

Theoretical and Conceptual Framework

This section discusses the theoretical and conceptual framework which makes up the field of inquiry within IT-business strategic alignment. Some key works within this field are cited to illustrate the underlying theoretical perspectives. This theoretical perspective is then linked to the quantitative research approach adopted by this study.

Theoretical Perspective

IT-business strategic alignment can trace its origin back to the early works of Chandler (1962). It was Chandler (1962) who first began to examine the relationship between the structure of the organization and the strategies that management chose for that organization. This work by Chandler (1962) and a later work by Rockart and Morton (1984) not only demonstrated a causal relationship between structure and strategy, it also implied a need for balance between them.

Subsequent developments of Chandler's theories led to the evolution of strategic alignment theories. The theories and frameworks used today are based on the concept of strategic fit developed by Henderson and Venkatraman (1993). This theory of strategic fit involves the notion that the environment in which any organization operates contains both internal and external domains which are frequently acting in opposing directions (Miller, 1988). Miller (1988) suggested that, while organizations continually attempt to align these two domains, each domain's dynamic nature makes this an ever-changing process.

Venkatraman and Prescott (1990) described the external domain as an environment where the firm competes and where customer interaction occurs. Any differentiations from the competition will occur in that external domain. The internal domain, according to Venkatraman and Prescott (1990), is where functional and administrative structures evolve. It is here that organizations develop the skills necessary to establish significant core competencies. The authors argued that strategic fit was achieved when the internal and external domains were aligned within the business units and within the IT organization. They concluded that when the internal and external domains were aligned, the organization's performance was positively affected.

In an earlier work, Hambrick and Lie (1985) suggested strategic alignment could be viewed through three different lenses—situation specific view, universal view, and contingency view. The specific view suggests that every strategy is unique, while the universal view proposes that there exists a set of universal strategies from which to select. Neither of these have faired well over time. The contingency view suggests that any given environment will present multiple strategy options which are dependent on both the

internal and external environments (March, 1999). This view, as it applies to strategic alignment, has found a significant following (Hambrick, 1983; Hambrick & Lei, 1985; Lukas, Tan, & Hult, 2001; Miller, 1987; Mintzberg, 1979; Pinder & Moore, 1979). Based on this theoretical perspective, an argument can be made that the appropriateness of any given strategy is dependent on the business's competitive position.

These previous works on the contingency view of strategic alignment, led to the formation of a comparative approach. This approach provided credibility to the argument that the strategy construct could be subdivided into several key facets (Lukas et al., 2001). The underlying premise of the work by Lukas et al. (2001) was supported by this multifaceted construct. Lukas et al. (2001) posited the use of two orientations to describe the dimensions of the strategy construct—*prospective* and *protective*. They described *prospective* as an emphasis on risk-taking, while *protective* was seen as having an emphasis on analytical problem solving. This characterization was among the first to describe the strategic alignment paradox as one involving the two competing positions of business and IT.

A different variation of the comparative approach led to the development of the strategic alignment maturity (SAM) model by Luftman and Brier (1999). In its current form, the SAM assessment instrument consists of five levels of maturity, each evaluated on six criteria. The alignment of IT and business objectives involves an assessment of how well business and IT are in agreement with these six alignment categories. This agreement offers a lens through which researchers cannot only examine how IT and business regard the effectiveness of each individual category, but also provides insight into the how they view the relative importance placed on each category (Luftman,

2003b). One of the main appeals of this approach is that the measurement instrument has undergone a rigorous validation study which demonstrated a high degree of reliability and validity (Sledgianowski, Luftman, & Reilly, 2006).

Quantitative Research Approach

The theoretical perspective developed by previous research in this field, and described in the previous section, has led to the adoption of a quantitative approach for this research. The fundamental nature of this study is supported by an ontological and epistemological perspective which seeks to identify causal relationships between an airline's strategic alignment maturity and various financial and operational characteristics (Gelo, Braakmann, & Benetka, 2008). In addition, the theoretical perspective, as it relates to this specific field of inquiry, represents a philosophical stance which embodies an objective, or positivist, research assumption (Crotty, 1998; Morgan, 2007). For these reasons, this study is best served by a quantitative research approach.

Organization of the Remainder of the Study

The remainder of this study is organized into four chapters. Chapter 2, *Literature Review*, presents a review of relevant previous work, which will serve to frame this study within that historical context. Chapter 3, *Methodology*, summarizes the processes used to conduct the study. This includes a description of data sources, participants, test instrument, data collection procedures, and techniques used to analyze the resulting data. Chapter 4, *Results*, is used to review the test data and the associated statistical analysis. The final chapter, *Discussion, Implications, Recommendations*, evaluates the study's

results from the standpoint of the original objectives and previous studies. This section is also used to provide recommendations for future research.

CHAPTER 2. LITERATURE REVIEW

Introduction

There are many facets to IT-business strategic alignment found within the current literature. The very survival of every business hinges on its ability to successfully compete within its respective markets. In such a relentless competitive environment, companies must be capable of measuring their position in the market and their progress along a predefined strategy. Niven (2005) suggested that there were three factors that could explain the problems these firms face when attempting to accurately monitor and measure their progress. The first is the limitations imposed by financial measures. Unfortunately, traditional business metrics can only tell a firm where it has been, not where it is going. The second factor is an increase in intangible assets. Niven (2005) suggested that this intellectual property could be as high as 75% of most companies' net worth. This makes it difficult to measure a firm's true worth in the market. The last factor Niven (2005) proposed to explain this measurement problem has to do with executives' ability to effectively and clearly communicate the firm's strategy to the entire organization in a way that enables the direction of day-to-day activities. This state of confusion causes many organizations to give up and rely solely on financial measures, thus ignoring strategic implementation enablers. The balancing act becomes even more onerous when one brings into this equation the dependence that most firms have developed with IT. It is this dependence that has forced firms to recognize the need to integrate IT decisions with other planning and decision-making processes at all levels of the organization (Pryor, Anderson, Toombs, & Humphreys (2007).

Continuously changing environments demand IT managers and business managers who are capable of responding to the need for continuous innovation and improvement. Mintzberg (1978) said it best when he noted that there is more to this process than simply creating a strategy. He pointed to many examples where a strategy's intended results were never realized, and equally as many whose end results were never intended. His work extended the research of other noted authors of that time and contributed to the understanding of how an organization makes important decisions, while linking those decisions to form a strategy. The concepts that Mintzberg (1978) described were rooted in Chandler's (1962) notion of causality and balance between organizational structures and processes (Rockart & Morton, 1984).

The following section provides a review of available literature related to IT-business alignment. This review includes some of most notable and relevant theories, frameworks, and studies that are capable of providing a stable foundation from which to pursue this line of research. This literature review begins with an examination of the *contingency view* of strategic alignment, followed by a review of the literature from an integrated *fit and functional* perspective. These two perspectives provide a solid foundation from which to continue this discussion with two specific applications of strategic alignment, which are referred to as the Balanced Scorecard and IT-business alignment. The next three sections of this literature review focus on the theory and implementation of the strategic alignment maturity (SAM) model as it relates to IT-business alignment. This includes maintaining IT-business alignment, the effectiveness of IT-business alignment, and performance management.

Contingency View of Strategic Alignment

The concept of strategic fit within an organization is generally thought of as an alignment of various internal variables, such as those associated with strategy and organizational structure (Chandler, 1962). Henderson and Venkatraman (1991) extended this concept to include a similar IT element and referred to this perspective as functional integration. This expanded approach recognized the importance of both an external and internal perspective when developing strategic alignment between IT and business units. Porter (1996) suggested that both internal and external fit provide an organization with a method by which it can enhance operational performance and attain a sustainable competitive advantage. This concept of fit and alignment, integrated with a contingency theory perspective, provides the underlying theme for this portion of the literature review. Contingency theory, as it relates to strategic management, suggests that any given environment will present multiple strategy options and that no optimal strategy exists (March, 1999). Stated simply, those organizations that are able to develop a fit among the various contextual, design, and structural factors will enjoy elevated performance levels (Barth, 2003).

The following sub-sections examine the current literature as it relates to four different aspects of strategic fit: (a) environment-related contingencies, (b) governance-related contingencies, and (c) contingencies associated with the organizational structure, (d) market contingencies. Strategic fit is used to describe the degree to which resources and capabilities are aligned with business opportunities. Each contingency facet offers a unique perspective through which to evaluate an organization's strategic fit or alignment.

Environment-Related Contingencies

Two studies within the literature are representative of the how environmental contingencies can affect an organization's strategic fit. The first was conducted by Ensign (2001). Here the author developed a conceptual scheme to examine organizational fit from various perspectives, which the author described with a combination of relationships. Some of these interactions were between the firm's strategy and organizational structure, or internal environmental variables, while others were associated with the interplay between strategy and the external environment. Ensign (2001) argued that this framework, and others like it, had proven helpful in developing the constructs necessary for the study of fit within an organization.

The second study takes advantage of a framework similar to Ensign's (2001) (Xu, Cavusgil, & White, 2006). This research examined the influence that internal alignment had on a firm's performance. In particular, this research studied the fit among strategy, processes, and structure. The authors evaluated this alignment from the perspective of multinational firms operating in global markets. Their results suggested that the need for internal fit was on a par with the more commonly accepted need for external fit. Together these two studies provide insight into the various constructs that make up both the internal and external environmental contingencies associated with a firm's strategic fit.

Governance-Related Contingencies

The second aspect of strategic fit to be examined here has to do with the influence that external governance has on an organization's alignment. As mentioned in an earlier

section, the history of the U.S. commercial airline industry is characterized by periods of little or no regulation, followed by periods of extraordinary regulation, which then led to the current period where modest regulatory influences exist. Three studies have been chosen to highlight the influence that regulatory constraints can have on an organization's strategic fit, with a particular focus on the U.S. commercial airline industry.

A study of the U.S. airline industry by Goll et al. (2006) examined the relationship between the business strategies used by the various airlines, the impact of regulation/deregulation, the airline's fleet size, and each firm's general financial performance. The authors suggested that changing market environments were influential on the business strategies chosen by each airline as they entered deregulation. It also showed how the size of an airline had a moderating affect on this relationship. The airline's fleet size seemed to influence the strategy chosen by the airline when dealing with deregulation. At the time of deregulation, those airlines with greater routes and larger fleets of aircraft found deregulation to have a greater influence on their strategic positioning within the new markets than did the smaller carriers. The authors also argued that this moderating influence, which size seemed to exhibit, had an equally compelling influence on the relationship between business strategy and the operational performance of the company. Again, the larger carriers had a greater number of options from which to choose and were able to more quickly take advantage of market opportunities. Some of the larger airlines found it necessary to adopt multiple business models depending on the competition in specific regional markets. Markides and Charitou (2004) studied this specific situation where strategic innovators created highly focused competition intended to attack the established firms in the industry. This forces the existing firms to adopt

some radically different strategies for these markets. As Markides and Charitou (2004) suggested, this becomes a strategic balancing act. They found that a firm performs best when management viewed this as two independent strategic alignment exercises, which may in some cases force the firm to operate like two completely separate entities.

In a more recent study, Peteraf and Reed (2007) examined the effects of regulatory constraints as it related to managerial choices within the U.S. airline industry. The authors examined two forms of managerial choices. The first involved choices that were directly constrained by regulation—*operational variables*. The second set of choices involved those that were constrained indirectly by regulatory influences—*administrative practices*. Peteraf and Reed (2007) argued that when regulatory constraints were in place, managerial choices were not stifled, but rather altered in their form. Managers were found to have developed mitigating strategies to offset these constraints. When choices were limited in one area they seemed to compensate by exercising greater choices in other areas. The conclusions offered by Peteraf and Reed (2007), when coupled with the previous examples, illustrate the innovative side of U.S. airlines when faced with regulatory barriers.

These three studies (Goll et al., 2006; Markides & Charitou, 2004; Peteraf & Reed, 2007) focused on the manner in which firms balance external governance forces with other internal and external forces. The extent to which these firms are successful in balancing these various forces is at the core of this study. This effort to balance external governance forces, among others, is an integral part of the strategic alignment maturity on which this study is based. The research provided by these authors provides an analytical basis upon which this study's recommendations and conclusions can be drawn.

Contingencies Associated with the Organizational Structure

This next section examines areas where the organizational structure or make-up of the organization has been demonstrated to have an influence on an organization's fit and alignment. Five particular studies have been chosen for their diverse perspectives in this area. These researchers have examined strategic fit contingencies from the perspective of (a) managerial skills (Barth, 2003), (b) organizational climate (Burton, Lauridsen, & Obel, 2004), (c) planning process (Bloodgood, 2007), (d) knowledge management (Kearns & Sabherwal, 2006), and (e) Business-IT strategy-structure (Bergeron et al, 2003).

The study conducted by Barth (2003) argued that the maturity of any given industry is directly related to the level of alignment found among that industry's participants. In this case alignment was determined by the fit between the specific competitive strategy in use by the firm and the existence of the managerial skills necessary to implement and follow that competitive strategy. Barth (2003) suggested that those firms with the greatest fit between these two characteristics demonstrated superior performance. He went on to argue that the more mature an industry was the lower its performance and suggested the reason for this lies in reduced agility and increased corporate inertia.

The second study, by Burton et al. (2004), examined the influences that organizational climate and strategic fit have on a firm's performance. The idea of organizational climate was operationalized with the use of measurable organizational characteristics such as organizational tension, resistance to change, and conflict. The

authors chose to use return on assets (ROA) as a measure of corporate performance. Burton et al. (2004) offered two specific conclusions. First, it was shown that organizations with high tension and high conflict, which were also inclined to move into markets that were already proven viable, were more likely to see a reduction in performance, as measured by ROA. In contrast, organizations with low tension and low conflict seemed to do well with a strategy which called for them to defend an existing market.

Bloodgood's (2007) contribution to how organizational structures influence strategic fit approached strategic fit from a slightly different perspective. The author's focus was on how an organization's planning processes and strategic development were influenced by the dynamics within both internal and external environments. Bloodgood (2007) argued that the difficulties associated with this form of alignment were rooted in corporate inertia and the difficulty in constructing processes which had little short term value. Those organizations that were able to demonstrate progress in this area found greater success in prioritizing strategic elements, developing more comprehensive plans, and sharing knowledge throughout the organization.

The recent study by Kearns and Sabherwal (2006) evaluated the significance of knowledge management in the relationship between strategic alignment and various contextual factors. They also examined the role of IT projects in the link between strategic alignment and IT's impact on the business. The researchers found that management's knowledge of IT was affected by the organization's emphasis on knowledge management and the degree to which IT decisions are centralized. It is argued that this had a positive affect on the level of involvement by business managers in

strategic IT planning and in the participation of IT managers in business planning. This increased coordination between business and IT led to a greater alignment between these two elements within the organization.

The last study to be examined in this category (Bergeron et al., 2003) illustrated how organizations find themselves in a constant state of transformation. The rapid advancement of markets and technologies leaves companies with the daunting challenge to be smarter and more nimble, while maintaining a high degree of strategic alignment. This same study supported the notion that conflicting alignment patterns exist among business strategy, business structure, IT strategy, and IT structure. From a slightly different perspective, this research was also able to show how organizations performed better if they developed IT strategies which were founded on three basic premises: (a) prioritization, (b) cost-effective portfolios, and (c) justifiable portfolios. In addition, the business strategies that led to greater performance metrics included well defined organizational structures and robust analysis of past and present performance.

Each of these studies has examined the influence that some form of organizational structure or organizational make-up has had on a firm's ability to align their strategic endeavors. These studies underscore the presence of an eclectic set of organizational contingencies that organizations face on a regular basis. No two firms will have the same set of contingency factors and no two firms will address them in the same manner. Virtually every element of an organization's strategic alignment maturity is affected by its overall organization structure. These studies provide a foundation on which to further examine this phenomenon within the context of the strategic alignment maturity model used in this study.

Market Contingencies

The last set of contingencies to be discussed involves those which have an outward facing element. These are referred to as market contingencies because of their direct involvement with elements in the market place. A recent study (Geiger, Ritchie, & Marlin, 2006) on strategy/structure fit and its influence on an organization's performance suggested various forms of industry concentration had a moderating effect. A high concentration industry is characterized by a small number of firms possessing a dominant share of the market. The authors concluded that firms operating in industries with higher concentrations relied on alignment between their strategy and organizational structure to a greater extent than those firms in less concentrated industries. Those high concentration organizations that exhibited the greatest degree of alignment between strategy and structure also showed evidence of high levels of performance.

Industry concentration can sometimes drive companies to develop strategies designed to shift that concentration or to help achieve greater strategic alignment (Geiger et al., 2006). A unique concept of alignment involves a firm's multiple-channel strategies. The idea of aligning a firm's multi-channel strategies with its business strategy, organizational structure, and environment has been studies by numerous authors from various vantage points. The research by Kabadayi, Eyuboglu, and Thomas (2007) provided a unique perspective to organizational fit and strategic alignment as they relate to a firm's performance. While they examined various strategies and their interactions with both internal and external environments, the authors also suggested how multiple channel designs could have an enabling affect on strategic alignment.

Cheng et al. (2007) also studied multiple-channel alignment strategies by examining the emergence of the Internet and its influencing characteristics when combined with existing channels. These authors employed three different financial metrics to capture empirical evidence of a relationship with the firm's performance, which included event-study methodology metrics, Economic Value Added (EVA) metrics, and Market Value Added (MVA) metrics. Geyskens, Gielens, and Dekimpe (2002) also used event-study and combined it with a net present value calculation to demonstrate a relationship between the firm's performance and the use of multiple-channel strategies. The results of both these studies showed that the combination of classical channels with eChannel techniques could increase the financial performance of a firm, as long as a degree of alignment existed with business strategies, organizational structures, and the environment.

The final study demonstrating the influence of market contingencies was conducted by Zott and Amit (2008). The authors analyzed the degree to which a firm's performance was reliant on product market strategies and business model choices. In their conclusions, Zott and Amit (2008) suggested the need to view both product market strategies and business model choices as complementary and dependent. Interestingly, the authors' research seemed contradictory to that of the classical alignment perspective where a firm's internal administrative structure and its alignment with strategy are the primary focus. Zott and Amit (2008) took a view which focused on boundary-spanning transactions between an organization and those external influences, such as partners, customers, and suppliers.

Collectively, these studies have confirmed the underlying contingency characteristic which argues that superior performance within the firm is not achieved by adapting some optimal combination of strategy, structure, and environment. Instead, these studies have suggested the presence of an open system which posits the existence of numerous paths to a given end-state. While the contingency factors may vary among these studies, the results are consistent in their argument for an open systems approach to strategic fit. Since contingencies can have a significant influence on the strategic fit and alignment of an organization, these studies can provide the necessary insight with which to evaluate the results presented in this study.

Fit and Function View of Strategic Alignment

Research conducted by Rockart and Morton (1984) represents one of the first works to view IT as more than a tool to support existing business strategies. This study suggested the proactive use of IT to help create new business opportunities. To enable the practical use of these complex concepts, Henderson and Venkatraman (1989; 1991; 1993) developed a framework which was instrumental in helping practitioner understand the potential of IT within the current business centric organization. This framework, known as the strategic alignment model, is comprised of four fundamental domains of strategic choice: (a) business strategy, (b) IT strategy, (c) business organizational infrastructure and processes, and (d) IT infrastructure and processes.

Business strategy represents the external business domain and focuses on those strategic choices and decisions that are related to business scope, distinctive competencies, and business governance. In contrast, IT strategy is focused on how the

organization is positioned in the IT marketplace and involves choices and decisions associated with IT scope, systemic competencies, and IT governance. The internal domains of the organizations are the focus of the business organizational infrastructure and process and the IT infrastructure and process. The business organization is concerned with those choices and decisions that target the firm's administrative infrastructure, business processes, and business skills. In a similar manner, the IT organization focuses on those choices and decisions related to IT architecture, IT processes, and IT skills.

These four domains represent two fundamental underpinnings, which are referred to as strategic fit and functional integration. Strategic fit is used to describe the extent to which an organization has developed consistency and flexibility in the relationship between external and internal components. Strategic fit portrays the relationship between business strategy and organizational infrastructure and processes. From an IT perspective, strategic fit is used to express the linkage between IT strategy and IT infrastructure and processes (Luftman, 2009).

Functional integration describes the degree to which the strategic choices made by IT management are linked and supportive of the strategic choices made by business management (Luftman, 2009). As described by Henderson and Venkatraman (1989), functional integration is comprised of both *strategic integration* and *operational integration*. *Strategic Integration* demonstrates the external linkage between IT strategy domain and business strategy domain. This form of integration is used to ensure that choices made by IT management are able to support and shape the business strategies. *Operational Integration* demonstrates the internal linkage of the IT infrastructure and

process with the business organizational infrastructure and process. This concept is intended to ensure that IT is prepared to support the expectations of the business.

While the two dimensions of strategic fit and functional integration provide a link between four domains, a third dimension was suggested by Henderson and Venkatraman (1989). They described this third dimension as cross dimensional alignment and argued that it overcame the limitations of a bivariate model which included only strategic fit and functional integration. This cross dimensional alignment addressed the linkage between business strategy and IT infrastructure and processes, as well as, the linkage between IT strategy and business organizational infrastructure and processes.

The research presented here represents the underpinning on which this study is built. The strategic alignment maturity model (Luftman, 2000) is a direct manifestation of the ground work laid by Rockart and Morton (1984) and Henderson and Venkatraman (1989). These works demonstrated the IT-business relationship and argued that the consideration of both business and IT during the strategic planning stage was paramount to achieving a competitive position in the marketplace. The concepts associated with strategic fit, functional integration, and cross dimensional alignment are further extended in the strategic alignment maturity model on which this study is based.

The Balanced Scorecard

The very nature of a competitive environment forces companies to find novel and unique ways to measure their position in the market and to measure their progress along a predefined strategy (Fonvielle & Carr, 2001). This challenge, combined with a firm's reliance on pseudo-tangible commodities like information technology, makes the need for

measurement difficult at best. This quandary was at the core of a recent study by Witcher and Chau (2007) which proposed to combine the balanced scorecard with the processes used by management to capture and institutionalize strategic goals. Here the authors described the underlying premise of the balanced scorecard as one which recognizes the value of financial measures but encourages businesses to supplement that data with other industry indicators that can help predict future financial success. As Niven (2005) explained, organizations are constantly looking for a process that can translate their strategic vision into a performance measurement. The use of any performance measurement must provide insight into an organization's level of success associated with the implementation of a strategic vision.

Witcher and Chau (2007) argued that forcing management to embed the techniques associated with the balanced scorecard into strategic planning processes forced management to focus on both long-term and short-term corporate capabilities. They posited a set of dynamic core capabilities which are inherent to any strategic management effort. This set of capabilities included core competences, cross-functional management, and top executive audits. The authors noted that the value of the scorecard was found in the fact that it forced senior management to look at all the important operational measures at the same time. This not only allowed management to assess improvements in one particular area, but it also allowed them to see the effect that change would have had on other areas.

The balanced scorecard has been used in numerous studies. Four particular studies are representative of the more recent works in this area. These studies have been singled out because of the diverse uses of the balanced scorecard technique. These uses

began with the use of the balanced scorecard to incorporate IT goal settings and IT planning into the strategy formulation process (Van der Zee & de Jong, 1999). This look at diverse uses continues with a study that attempts to integrate performance measurements with the balanced scorecard (Fonvielle & Carr, 2001). Finally, two studies have been chosen which demonstrate the communicative roll of the balanced scorecard (Hu & Huang, 2006; Huang & Hu, 2007).

Van der Zee and de Jong (1999) conducted a study which is notable for its inclusion of IT planning and IT goal setting. The balanced scorecard was used in two case studies to examine the manner in which IT goal setting and IT planning were integrated into business strategy formulation. In this work, the authors identified technological innovation as a significant driver in strategic formulation. Other studies had identified the importance of innovation as an enabler for strategic alignment (Mintzberg & Lampel, 1999; Moody, 2003); but Van der Zee and de Jong (1999) noted its importance early in the goal setting phase. The researchers argued that when IT innovation is critical to the success of a business, it must be included in the planning and decision-making processes at all levels within the organization.

The second study of note in this discussion about the balanced scorecard is Fonvielle and Carr's (2001) study on the integration of the scorecard with a performance measurement system. This integration was seen as a way for executive management to clearly demonstrate the connection between the organization's strategic objectives and how performance is measured. Fonvielle and Carr (2001) noted how this approach allows management to translate their vision into operational terms with quantifiable measures. This clarity of vision makes it possible for management to translate a complex

and intangible vision into a set of critical success factors. While Fonvielle and Carr (2001) demonstrated how the communication of vision could be enhanced through the integration of the scorecard with performance metrics, other studies have found value associated with other areas of communication (Hu & Huang, 2006; Huang & Hu, 2007).

The last two studies in this area used the balanced scorecard to examine other forms of communication within organizations (Hu & Huang, 2006; Huang & Hu, 2007). Hu & Huang (2006) examined relationship management within an organization. Here the balanced scorecard was used to demonstrate how relationship management could enhance communications between the IT and business units.

In the second case study (Huang & Hu, 2007), the authors identified four key elements of IT-business alignment for which the scorecard could play a significant role: (a) integrated planning, (b) effective communication, (c) active relationship management, and (d) institutionalized culture of alignment. The common thread running through these elements is communication. The scorecard is seen by the authors as contributing to the alignment of business and IT by providing a communications platform. Both of these studies by Hu and Huang (Hu & Huang, 2006; Huang & Hu, 2007) demonstrated how alignment of IT and business could be viewed as more than a passive harmonizing exercise. The goals and strategies of the company need to express management's vision and an IT functional design needs to be developed in line with that vision. Hu and Huang (2006) argued that striving for alignment requires a holistic approach which balances process as well as culture.

While the balanced scorecard represents a useful tool with which a company can measure the success of a predefined strategy, it is still only a top-down tool which lacks

input from those who have the grass-roots insight of the business (Fonvielle & Carr, 2001). The balanced scorecard approach is overly simplistic and provides management little more than an illusion of control (Hu & Huang, 2006; Huang & Hu, 2007). Management practices and processes are not adequately considered. This approach addresses the question of *what* the business does, but ignores the equally meaningful question of *how* the organization should accomplish it. For these reasons the business scorecard cannot be relied on exclusively. While these characteristics may detract from the practical value of the balanced scorecard, the underlying theory provides a perspective which can be useful in the analysis of the results associated with this study.

IT-Business Alignment

Strategic alignment, with its beginnings in the contingency perspective, has matured through theoretical variations that have evolved within the fit and functional integration perspective. The research in these areas has given rise to a more precise and holistic view of strategic alignment. This view is described within the literature as IT-business alignment. Pyburn (1991) introduced this concept with his examination of IT strategy alignment and how business influenced that alignment. Pyburn (1991) did not attempt to discover the illusive *best IT strategy*; rather the objective was to facilitate a discussion of the beliefs held by management and industry practices. Pyburn (1991) identified four phases of IT strategic alignment, which have provided the underpinning of the models and frameworks to follow. The first phase of IT strategic alignment identified by Pyburn (1991) was seen in those firms that were assessing current alignment between their IT strategies and their competitive strategies. The second phase appeared in an

organization as it began to identify the potential impacts of IT on business strategies. The next phase gave rise to an awareness of how IT could influence the business by creating alternative IT strategies. The final phase was generally observable when an organization was able to build a strategy that was complementary to the business and competitive strategies. It is important to note that Pyburn (1991) did not examine the way business influences IT and so IT-business alignment was not part of his study. The importance of Pyburn's (1991) work was found in its systematic definition of how IT strategies can influence and affect business strategies. This ultimately led to a reciprocal viewpoint where business strategy was seen to influence IT strategies.

In the same time frame as Pyburn (1991), Lehmann (1993) was conducting a study that would begin to examine both IT and business strategic alignment collectively. Lehmann (1993) identified the role of IT as it became more prominent in most firms. A shift in the way managers were viewing business strategy development was also changing the role of IT. IT was finally being seen as a core competence that was an integral part of the way a company conducted business. A more extensive study was conducted in this same vein of thought by Luftman et al. (1993). Here the authors examined the use of linkages associated with (a) business strategy, (b) information technology strategy, (c) organizational infrastructure and processes, and (d) IT infrastructure and processes. As with the earlier alignment studies, (Henderson & Venkatraman, 1991; Itami & Numagami, 1992; Lehmann, 1993; Pyburn, 1991; Venkatraman & Prescott, 1990), this later study by Luftman et al. (1993) represented a more holistic view across all of the characteristic elements.

The strategic alignment framework study by Luftman et al. (1993) applied the strategic alignment model which was first developed by Henderson and Venkatraman (1993). This model was seen as an effective manner in which to measure the degree of synchronization among the four strategic characteristics (e.g., business strategy, information technology strategy, organizational infrastructure and processes, and IT infrastructure and processes). The level of synchronization was then compared to the business's level of performance to identify any possible relationships.

Luftman et al. (1993) identified three areas where IT initiatives were significantly and deleteriously impacted by the processes and structures within the organization. First, it was found that applying updated technology to an organization with inefficient business processes was detrimental to the success of that IT initiative. Second, the study showed that, far too often, organizations would engage in IT initiatives without consideration for how those initiatives might influence the organization's business strategies. The final observation showed that many companies were plagued by a collection of IT initiatives that were implemented without ever achieving the desired results. These studies provide an important link between the contingency studies described in previous sections and the strategic alignment maturity model which is discussed next. This linkage is important to understanding the progression of knowledge leading to the conduct of this study.

Strategic Alignment Maturity Model

The logical place to begin a literature review of the strategic alignment maturity (SAM) model is with the twelve component strategic alignment model (Luftman, 1996).

Information technology and business alignment is defined by the relationship that exists among these twelve alignment components. These alignment components can be assigned to one of four categories: (a) business strategy, (b) organization infrastructure and processes, (c) IT strategy, and (d) IT infrastructure and processes. The business and IT strategy groups examine the scope, competencies, and governance related to both the business and IT segments of the organization. The organization and IT infrastructure and processes groups examine the structure, processes, and skills found in the IT and business organizations. Luftman (1996) described how IT and business would both attempt to define themselves in terms of their individual components and attempt to achieve specific goals across their individual organizations. The alignment of these components addresses how both IT and business harmonize these activities. The twelve components essentially describe the IT-business alignment relationship. These twelve components provide the foundation on which the SAM model was built.

The subsequent development of the SAM model is based on the combination of this IT-business alignment model with the results of other studies related to enablers and inhibitors of alignment (Luftman, 2000; Luftman, Papp, & Brier, 1999). The SAM model was first suggested by Henderson and Venkatraman (1991) and refined by Luftman and Brier (1999). In its current form, the SAM assessment instrument consists of five levels of maturity, each evaluated on six criteria. The alignment of IT and business objectives involves an assessment of how well business and IT are in agreement with these six alignment categories. This level of agreement provides management with important insight into how IT and business regard the effectiveness of each individual category. More importantly, it offers insight into the relative importance placed on each

category by the IT and business units (Luftman, 2003b). The six criteria on which IT-business alignment maturity is evaluated are summarized in Table 1.

Table 1. *IT-Business Alignment Maturity Criteria*

Criteria Element	Description of Criteria Element
Communications Maturity	Embodies the effective exchange of ideas within and between the IT and business organizations
Competency/Value Maturity	Ensures that the level of service attained is linked to a clearly defined criteria with specific rewards and penalties
Governance Maturity	Considers the methods by which IT managers, business partners, and service providers share the authority associated with conflict resolution, resources, risk, and other IT responsibilities
Partnership Maturity	Defines the IT-business relationships that exist among the various organizations
Technology Scope Maturity	Describes the breadth to which IT is integrated across the organization as well as with external partners
Human Resource Skills Maturity	Encompasses all IT human resource considerations

Note. Table derived from Luftman (2000), Luftman (2003a) and Luftman (2003b).

This theoretical framework was empirically tested and validated using a confirmatory factor analysis which examined six factors and identified 22 indices (Sledgianowski et al., 2006). The alignment of business and IT strategies involves an inter-relationship of capabilities that can be measured using the six components of maturity (i.e., communications, competency and value, governance, partnership, technology scope, and skills). These components then make it possible to assess the firm's level of maturity (Luftman & Kempaiah, 2007). Each of the six IT-business

alignment maturity criteria is associated with a set of attributes that help management assess specific dimensions or practices within each area. Based on the assessment of these dimensional characteristics, a rating can be calculated which places the organization into on of the following five levels of maturity (Luftman, 2000; Luftman, 2003a; Sledgianowski et al., 2006): (a) initial/ad hoc process, (b) committed process, (c) established focused process, (d) improved/managed process, and (e) optimized process.

While the SAM approach purports to take into account the relative importance of each criterion when considering alignment maturity, it provides little support for this in the guidance for implementing the model. It does include management process but seems to de-emphasize the importance of any particular process. Little work has been accomplished to validate the significance of the individual criteria and, in fact, governance, skill, and partnership have each been cited as demonstrating weak relevance. These positions continue to be challenged as more empirical data are made available and the SAM model is gaining greater acceptance. The following studies are representative of the recent works in this area and provide the necessary support for the choice of the strategic alignment maturity model for this study.

Supporting Study 1

Three particular studies were conducted to assess the SAM model. The first was conducted by Sledgianowski and Luftman (2005). In this case study the goal was to identify tools that could be used to help an organization achieve and maintain IT-business strategic alignment. One of the conclusions offered by Sledgianowski and Luftman (2005) was that organizations needed to develop specific management practices and

engage in strategic IT choices that were designed to facilitate the integration of the business and IT perspectives. This needed to be a conscious effort if it were to have any chance of succeeding.

Sledgianowski and Luftman (2005) also developed some best practices for each of the six alignment maturity criteria. These best practices are of specific value for this literature review because of the insight they provide into the SAM model. The first criterion was *communications*. The study found that communication between the business and IT organizations needed to be pervasive throughout the organization. Every effort needed to be taken to create multiple communication channels and to strive for richer forms of communication.

The next criterion for alignment maturity was *competency/value* (Sledgianowski & Luftman, 2005). Here the study recommended that service level agreements be put in place between IT and business. The authors also recommended that there be frequent and formal assessments of those agreements. They concluded that it was important that the knowledge gained from those assessments be shared and communicated throughout both the IT and business organizations.

Governance was the third criterion (Sledgianowski & Luftman, 2005). The authors argued that the presence of an IT steering committee could have great value for both the IT and business organizations. These steering committees tended to increase the quality of communications between the organizations as well as within the IT and business units. The authors also found that these committees seemed to bring much needed transparency to the relationship between the IT and business units.

Sledgianowski and Luftman (2005) also provided best practices suggestions for the fourth alignment maturity criterion—*partnership*. The authors found that organizations which were able to achieve a partnership relationship were able to drive toward more effective solutions. The ability of these two groups to co-adapt and improvise allowed the organization to achieve results of greater value to the company.

The last criterion for alignment maturity is *technology scope* (Sledgianowski & Luftman, 2005). For this condition, the researchers offered some best practices, which involved leveraging IT infrastructures company-wide. Being able to extend a common IT infrastructure throughout the organization and even into the supply chains of the customers and suppliers was identified as having strategic value for the company.

Supporting Study 2

The research conducted by Luftman and Kempaiah (2007) involved the most recent study related to the SAM model. Here the authors examined data collected from 197 organizations in the United States, Latin America, Europe, and India. These organizations were predominantly Global 1,000 companies. There were four observations that provided some additional insight into the SAM model: (a) alignment maturity varies among industries, (b) strategic alignment seems to be on the rise among companies, (c) business executives consistently score higher in alignment than do IT executives, and (d) the ranking scores associated with Level 2, 3, and 4 companies are strikingly consistent across alignment categories.

Supporting Study 3

The final study to be examined as part of the SAM model discussion is one conducted by Hua (2007). Here the author applied the strategic alignment maturity model in a manner designed to help better understand how a firm could maximize the potential of its Information and Communications Technology (ICT) as strategic resources. The author identified four sets of decisions that needed to be coordinated as part of the overall alignment process: (a) business strategy, (b) ICT strategy, (c) business (or organizational) infrastructure, and (d) ICT infrastructure. Hua (2007) observed that the basic premise of SAM is that organizations traditionally concentrate independently on either a strategic fit or functional integration approach. But, according to Hua (2007), prior research argues for a more holistic approach, one that considers both strategic fit and functional integration, to fully develop the organization's competitive potential. Hua (2007) goes on to explain that each of these foci has an external and internal domain. The external domain involves the business or ICT strategy, while the internal domain is found in the organizational infrastructure and processes. In essence, Hua (2007) suggested that the SAM model needed to achieve integration of both the business and ICT domains at two levels. The first level is the strategic level, which views the links between ICT and business strategies. The second level is the operational level, which looks at the infrastructure and processes links between business and ICT.

Hua's (2007) work has offered other ways of looking at IT-business strategic alignment maturity. It has provided credibility to those who believe that *how* an organization does business is equally as important as *what* the organization does. Hua (2007) argued that process should be considered as a fundamental part of strategy and

that the six criteria used in the SAM model may not be sufficient when assessing alignment.

Maintaining Alignment

The previous sections have discussed methods used to describe and measure the gaps in IT-business alignment, but little insight was provided to help practitioners maintain alignment that may already exist. The literature is replete with examples of how alignment is a constantly moving target, but the models fall short of suggesting a process for maintaining it. The study described above, by Luftman and Brier (1999), suggested a method for maximizing alignment enablers and minimizing alignment inhibitors. Based on the work by Luftman and Brier (1999), other researchers proposed processes with which organizations could attain and sustain IT-business alignment. These processes included the following six steps (Luftman, 2000; Luftman, 2003a; Luftman & Brier, 1999): (a) set the goals and establish a team, (b) understand the IT-business linkage, (c) analyze and prioritize gaps, (d) use project management plans to specify actions, (e) choose and evaluate success criteria, and (f) sustain alignment.

With this process, Luftman and Brier (1999) argued that an organization could only benefit from IT if there was a conscious effort to develop and cultivate an *alignment behavior*. They went on to present a concise list of behavioral traits that are characteristic of organizations that have achieved a successful level of alignment within the organization. These traits included (a) equally weighted IT and business capabilities, (b) a learning culture that enhances the skills necessary for success, (c) team-based environments that empower workers, (d) consensus regarding required outcomes of

business processes, (e) an established sense of urgency surrounding IT-enabled projects, (f) a view of IT deployment as a method of creating customer value, and (g) a culture of open communication.

The process purported by Luftman and Brier (1999) has led to several studies involving IT governance as a method to prioritize projects and allocate IT resources. In fact, much of the more recent work has contributed to this topic (Fonvielle & Carr, 2001; Hirschheim & Sabherwal, 2001; Hu & Huang, 2006; Hua, 2007; Huang & Hu, 2007; Moody, 2003; Niven, 2005; Sledgianowski & Luftman, 2005; Tallon, 2007; Weiss, Thorogood, & Clark, 2006). These studies have suggested numerous forms that IT governance can take, such as; budget, CIO reporting structure, communication, steering committees, and value measurements; to name just a few. The concept of a steering committee was one of the more common suggestions. Collectively, the literature cited above suggested that steering committees include business process managers, change managers, external customers, functional managers, and vendors. Some of the more widely noted successes attributed to these steering committees include improvements in levels of bureaucracy, career building, communication, complex decision making, marketing, risk management, priority setting, and organizational relationships.

This subject area, as it relates to IT-business strategic alignment, is one of the weakest in terms of quantity of research and the amount of empirical data available. A less than complete understanding of the enablers and inhibiters of alignment makes it difficult to cultivate a process for achieving or maintaining alignment. The conclusions drawn from the literature in this area provide a basis on which to argue that alignment varies from industry to industry, making it even more difficult to identify a common set

of criteria which is important to all organizations' strategic alignment. As a result much of the results ascribed to by the literature are qualitative in nature.

Effectiveness of IT-Business Strategic Alignment

The effectiveness of IT-business strategic alignment can be viewed from many different angles. There is a growing awareness within many industries that strategic alignment is more than simply matching IT and business strategies. This concept portrays a more holistic view of the organization to include IT flexibility and the resulting IT effectiveness (Ness, 2005). Based on that premise, this section reviews the current literature which deals with the degree to which IT-business strategic alignment has proven to be an effective tool in driving an organization toward a sustainable competitive advantage through greater IT effectiveness. This section looks at the effectiveness of IT-business strategic alignment as it is seen from four diverse and distinct perspectives: (a) communicating a vision, (b) IT-enabled innovation, (c) unique inhibitors, and (d) alternative perspectives of IT-business strategic alignment. Each of these sections is used to examine current literature with unique viewpoints of IT-business alignment and provides insight into critical sub-topics associated with this study.

Communicating a Vision

As IT budgets continue to climb, the number of projects that are over budget or behind schedule continues to increase. It has been estimated that 68% of all corporate IT projects fall into this unfavorable category (Jeffery & Leliveld, 2004). The study by Jeffery and Leliveld (2004) conducted several surveys and identified the strategic gap

between business and technology as the most significant contributor to the poor outcomes cited earlier. The authors' objective was to identify the methods and processes necessary to bridge that gap. They were able to identify various forms of organizational communications as being at core of this gap. Moreover, organizational communications were seen as being especially important when it came to communications by executive management in the areas of vision, strategies, and goals of the IT organization. Mintzberg (1993) too found the communication of an organization's vision as being critical in IT-centric organizations and other dynamic and uncertain environments. Mintzberg (1993) found that the most common pitfalls in the development and successful execution of strategy were all communication related—conservative nature, biases of opinions, political culture/structure, and the need for control. Achievement of the desired performance objectives was found to be highly dependent on an organizations ability to effectively communicate the relationship between the IT and business strategies.

The study by Rathnam, Johnsen, and Wen (2004) examined this same communication gap by identifying ways to close it and subsequently improve the overall alignment of the IT and business unit strategies. Rathnam et al. (2004) conducted interviews of executives for a particular Fortune 50 financial services company. These interviews were used to collect data that would help researchers understand how this communication problem could be resolved. The results offered by Rathnam et al. (2004) suggested two methods that could improve this situation: (a) develop a robust business architecture and (b) establish a separate but centralized IT department. Rathnam et al. (2004) and the studies by Mintzberg (1993) and Jeffery and Leliveld (2004) collectively demonstrated the value of communications as organizations strive for strategic IT-

business alignment. Most importantly, these studies showed how important it is for management to effectively communicate the organization's vision, since this is where the organization's direction and goals should be found. This visionary communication is an important part of the communication between the IT and business units within an organization and is evaluated as part of this study.

IT-Enabled Innovation

The formation of strategy within an organization occurs in cycles of innovation (Mintzberg & Lampel, 1999). The changes that occur during these cycles need to be controlled and directed by management in a way that does not stifle the creativity within these cycles. Mintzberg and Lampel (1999) found that the level of collaborative contact that exists between the IT and business units is at the core of all strategic change. Porter (1996) also noted the value of collaboration in the development of strategy. He showed how IT-business strategic alignment necessitates trade-offs within business and IT to achieve the firm's objectives. This creates a combination of operational efficiency and strategy that leads to superior performance. Sometimes these collaborations bring forth new ideas and sometimes they bring forth a recasting of old strategies. Whatever the results, it is important for the IT and business units to see themselves as partners when confronting competitive and confrontational environments. One additional insight from Mintzberg and Lampel's (1999) study was that managers were able to provide significant inertia to these cycles through the use of their own creativity. This desire to explore new ways of doing things was seen as being contagious and encouraged innovation within the organization.

Recognizing that innovation may not be the stated objective (Mintzberg & Lampel, 1999), these innovative cycles are what allow an organization to reinvent itself by creating new business processes, products, and services (Moody, 2003). In fact, Moody's (2003) study found that strong governance characteristics within IT and business can lead to the loss or impairment of innovation, even though it is seen as essential to strategic alignment. Moody (2003) argued that the underlying reason for this is the fact that IT innovation is related more to the culture within an organization, while IT alignment relies more on the command and control characteristics of the organization. If allowed to remain unchecked, the result of this contradiction can be deleterious for the organization.

The combination of these studies leads to the following conclusions regarding innovation and its relationship to IT-business strategic alignment (Mintzberg & Lampel, 1999; Moody, 2003; Porter, 1996). First, it is important to see IT alignment as impacting the efficiencies within a firm, while innovation (and other IT enablers) influence the effective use of IT resources. Secondly, while innovation can certainly benefit from IT alignment, it is seen as more directly linked to the organization's culture. Aligning the cultures within the IT and business units will have a greater impact on the development of an innovative environment.

Two additional insights can be gained from the works associated with innovation and strategic alignment. First, organizations that possess informal communication and power structures are much more conducive to the creation of innovative environments (Moody, 2003). The second finds that innovative organizations prefer action, such as experimentation, rather than the churn of process that is commonplace in most design

teams (Moody, 2003; Tallon et al., 2000). Together, these observations show that organizations with more informal lines of communications and decentralized decision-making processes are more likely to exhibit innovative characteristics. It is important that efforts to align IT-business strategies not attempt to interfere with this culture, but rather align that culture between the IT and business units.

While innovation is not a direct focus of this study, it is an integral part of the strategic decisions made by both the IT and business units within the firms that make up the commercial airline industry. The very nature of IT and business innovation is at the core of those strategic decisions (Downs et al., 2003). It is therefore important to understand how the alignment and misalignment of IT-business strategies can impact a firm's performance (Luftman & Brier, 1999). This understanding must also be augmented with an appreciation of how innovative-friendly business strategies participate in the development of a superior competitive advantage (Khandwalla & Mehta, 2004). The awareness of how innovation contributes to, or interferes with, IT-business strategic alignment maturity provides important support for the conclusions and recommendations posed by this study.

Unique Inhibitors

The literature is replete with studies attempting to identify inhibitors to IT-business strategic alignment. Recent studies seem to imply that the list of inhibitors, likewise enablers, is an inexhaustible list and better viewed from a holistic perspective (Henderson & Venkatraman, 1991; 1993; Itami & Numagami, 1992; Lukas et al., 2001;

Venkatraman & Prescott, 1990). To that end this section examines a collection of studies that provide a unique perspective of inhibitors to IT-business strategic alignment.

The first study to be examined in this section was conducted by Ives, Jarvenpaa, and Mason (1993) with the stated objective being to examine alignment within the global business environment. The authors recognized that IT was inexorably changing the nature of business and that aligning worldwide information systems and IT infrastructure with global business strategies was central to success in this environment. Ives et al. (1993) identified five factors that seemed to undermine IT-business alignment when the organization was attempting to conduct business worldwide: (a) environmental complexities, (b) cultural resistance, (c) cross-country disparate IT solutions, (d) size of the IT project, and (e) the geographical distance between nodes within the IT environment. While it might be said that these elements also have some significance within a purely domestic operation, the nature of international business tends to exacerbate these factors.

Similar studies by Lukas et al. (2001) found that while business performance is strongly influenced by an appropriate balance between environment and strategy, there are still many unknowns. These researchers studied the strategic fit paradigm through the use of case studies which revealed that the alignment of environment and strategy may have a differing degree of influence on an organization's level of performance within specific environmental conditions. In particular, highly centralized cultures, like those seen in Asia, can present long lasting idiosyncrasies with environmental influences which tend to interfere with the expected relationship between organizational performance and the degree of alignment. In no way should one infer that alignment is not possible within

highly centralized cultures. Through this observation, the authors were simply showing how the alignment between environment and strategy might present different enablers and inhibitors within these cultures.

The last study of inhibitors presented in this literature review involves a study by Hirschheim and Sabherwal (2001). Hirschheim and Sabherwal (2001) suggested that organizations frequently make decisions that lead to misalignment rather than alignment of IT-business strategies. These authors noted that this misalignment can be categorized in three ways: (a) paradoxical decision making, (b) over shooting of alignment—IT and business are not in lock-step during changes in strategy, or (c) reverting to a previously misaligned position. The inhibitors associated with each of these categories are quite different than those discussed elsewhere in the literature. This is due largely to the overt acts of management which cause the organization to move away from alignment rather than toward it.

The first category of overt misalignment described by Hirschheim and Sabherwal (2001) was called *paradoxical decision making.* This form was most frequently seen in one of four alignment scenarios. The first was referred to as *organizational inertia*. Organizational inertia was found in situations where the business or technology environment caused the company's business or IS/IT strategy to change. This change was seen to occur in only one aspect of the strategy, while leaving the other misaligned.

The second type of misalignment in this category was described by the authors as *sequential attention to goals*. When multiple elements of a business environment change, it was not uncommon to see management focus attention on one issue while deferring action on the other issues. This almost always led to a misaligned situation.

The third scenario in this category of overt misalignment was referred to as *gaps in knowledge*. Hirschheim and Sabherwal (2001) argued that this scenario occurred as a result of a move by technology beyond the limits that business management can comprehend; or when the complexity of the business strategies exceeded IT management's ability to synthesize the environment. This category's last scenario, *split-responsibilities,* was cited by the authors as a situation where executives had decided to divide the responsibility for IS/IT strategy formulation among two or more managers. The coordination required to adequately address the overall strategy and align it with the business strategy became onerous. This almost always led to a misaligned condition between IT and business units.

These studies have shown a view of IT-business strategic alignment where non-standard or uncommon inhibitors were present. Many studies have cautioned about concluding that the complete realm of inhibitors or enablers has been fully revealed. Recent research in this field consistently emphasizes the use of a holistic view of organizations. From this perspective, researchers have exposed alignment factors which had been ignored in other industries and in different environments. These studies of IT-business strategic alignment inhibitors and enablers represent the foundation on which the IT-business strategic alignment maturity model is based. These studies are of significant value to this study in that they provide the underpinning for any forthcoming recommendations and conclusions.

Alternative Perspectives of IT-Business Alignment

This section examines four studies that represent some of the alternative perspectives in IT-business alignment. The first examines alignment between business planning and information systems planning (King & Teo, 1997). The next evaluates IT-business alignment from a social dimension (Reich & Benbasat, 2000). The third study is of interest because of its view of IT-business alignment though the use of alignment profiles (Weiss et al., 2006). Lastly, this section reviews a study which adopted a process level alignment, as opposed to the more conventional firm level alignment (Tallon, 2007).

King and Teo (1997) conducted a study which adopted a *stages-of-growth* model to help examine the relationship between business and information systems planning. The authors argued that stages-of-growth models are prominent in many studies related to both organizational research and information systems research. They also pointed to the fact that these models have been successfully used to help researchers understand a variety of organizational phenomena through their assertion that the growth of organizations occurs in predictable patterns or stages. These stages-of-growth models argue that these stages are sequential in nature, occur in non-reversible hierarchical progressions, and engage with a wide variety of organizational structures and activities. As part of this work, King and Teo (1997) proposed a four-stage model which suggested that an organization's level of efficiency was directly related to the level of integration between business planning and information systems planning. The four levels of maturity were: (a) administrative integration—non strategic, (b) sequential integration—supports business strategy, (c) reciprocal integration—supports and influences business

strategy, and (d) full integration—joint development of business and IS strategies. This type of study is an important part of this literature review because of its specific alignment perspective.

A second study of interest is one performed by Reich and Benbasat (2000) which presented research that explored the social dimension of alignment and examined some of the factors that influenced it. The framework used by Reich and Benbasat (2000) proposed four constructs that influenced or led to alignment: (a) shared domain knowledge between business and IT executives, (b) successful IT history, (c) communication between business and IT executives, and (d) connections between business and IT planning activities. The first two constructs were seen as antecedents that defined the current state of the last two. Each of these constructs (with the possible exception of successful IT history) represented an opportunity to develop or improve the sharing of domain knowledge between the business and IT executives. The authors focused on the underlying mechanism of information sharing as being the driver for each of these constructs.

In this next study (Weiss et al., 2006) the authors suggested three profiles linking IT to different business objectives. With these profiles the authors studied methods for identifying the appropriate types of IT alignment. Two dimensions (e.g., internal IT-business integration and external market engagement) were used to define the three alignment profiles: (a) technical resource profile, (b) business enabler profile, and (c) strategic weapon profile. The *technical resource* profile suggested the lowest level of IT-business integration and IT-market engagement. The *business enabler* profile was characterized by its early stages of IT integration for specific parts of the business. The

strategic weapon profile used IT to mobilize and extend the organization's business objectives. These extended strategies required more extensive internal and external IT deployments.

The final study, which was chosen for examination due to its alternative perspective on IT-business alignment, is one conducted by Tallon (2007). While most studies in this field viewed IT-business alignment as a firm-level alignment, Tallon's (2007) study took a process-level perspective. Tallon (2007) argued that the complexity and unobservable nature of IT-business alignment, and the fact that IT and business strategies were difficult to characterize quantitatively, made it harder to assess alignment with the typical firm-level alignment models. For that reason the author suggested a process-level alignment methodology. Tallon (2007) argued that a process-level perspective offered management a view of the organization which helped to identify those key processes that were truly critical to the success of both the IT and business strategies. As Tallon (2007) explained, this emphasis was intended to identify the true *locus of alignment*, not simply the *extent of alignment*. By converting formal strategic plans into business tasks or activities, the organization was able to move to this process-centric alignment and gain a better understanding of the locus of alignment that was consistent with the firm's competitive objectives.

These alternative perspectives of IT-business alignment (King & Teo, 1997; Reich & Benbasat, 2000; Weiss et al., 2006; Tallon, 2007) provide an added dimension to the theoretical and practical premise for this study. The recognition of other forms of alignment and different lenses though which to view alignment both provide value to this study. These alternate perspectives can provide important insight when attempting to

understand the limitations and constraints which must be placed on any forthcoming recommendations and conclusions.

Performance Management

Performance management must be an integral part of any firm's day-to-day operations if that firm is to continue to survive and grow (International City/County Management Association, 2010). When establishing performance metrics it is important to consider customers as well as stakeholders (Tarnoff, 2005). Tarnoff suggested the need for companies to shift away from the classical engineering and financial measures to those that are more directly related to customer satisfaction. This requires organizations to establish a wider variety of operational metrics. Several types of metrics have been suggested to include benchmarking (Kerzner, 2003; Lavingia, 2004; Owusu-Yeboah, 2009), cost benefit (Craig & Amernic, 2008; Lampkin & Raghavan; 2008), goal oriented, (Fu-Jiing et al., 2005; Goodale, 2002), public communication measurements (Tarnoff, 2005), and quality management (Barclay, 2005). Regardless of the measures that are utilized, they must be capable of tracking performance over time as well as providing a timely snap-shot on which management can act. IMCA (2010) suggested that performance management metrics can have far-reaching implications, such as (a) energizing the work force, (b) identifying those areas where service needs to be improved, (c) supporting the development of focused strategies, (d) progress tracking, (e) demonstrating improvement, (f) reducing costs associated with business processes, (g) increasing management accountability, and (h) increasing workforce satisfaction.

Scholar-practitioners typically use performance metrics as a way of studying how organizations operate while under various internal and external forces. The first subsection, which follows, examines benchmarking techniques which have been used in three different industries. The second subsection explores the use of classical financial metrics. The final subsection examines the types of metrics that have proven successful in the commercial airline industry.

Benchmarking Techniques

Benchmarking measurements provide senior management with important insight into how the organization compares with others in the same industry or market (Tarnoff, 2009). Benchmarking is an important element in the development of strategic plans and can have an immediate impact on a firm's competitive position (Kerzner, 2003). The most typical forms of benchmarking include comparisons of cost, quality, and productivity (Owusu-Yeboah, 2009).

Barclay (2005) examined the use of benchmarking within companies that rely heavily on supply chain management. He reported variations in benchmarking techniques across many industries, but also noted some common threads: (a) general business considerations, (b) financial control systems, (c) logistics systems, (d) customer service management, (e) technical capability, and (f) quality management.

Novack and Thomas (2004) conducted a similar study of logistic-type firms. The authors found that these types of firms used a metric which they referred to as *perfect order performance*. Perfect order performance is associated with the degree to which a firm precisely meets customer expectations. The study suggested that any firm which

was involved with precise pick-up and delivery schedules (materials and passengers) could greatly benefit from this form of benchmarking. This form of benchmarking, like others, is closely associated with customer satisfaction.

Gardner's (2004) research, which studied the airline industry, is highly relevant to this study. The author endorsed the metrics provided by the U.S. Department of Transportation (i.e., on-time arrivals, denied boarding, mishandled baggage, and customer complaints) as being appropriately customer focused and thus provided the best data for determining relative quality performance among airlines. This study by Gardner suggested a method for combining the four USDOT metrics into an overall metric by applying exponential weighting for each element.

Financial Performance Metrics

Much work as been performed across many industries in the area of financial and accounting metrics. These types of metrics represent one of the most fundamental communication tools available to senior management (Craig & Amernic, 2008). In a study of the Canadian National Railways Company, Craig and Amernic noted that the most frequently used metrics during the post-privatization period were operating ratio (i.e., operating expense divided by total revenue) and free cash flow. Lavingia (2004) studied best practices benchmarking in the realm of cost engineering and found the metric of choice involved capital versus expense. Another study, which examined several electrical firms, attempted to quantify growth opportunities and thus relied on sales revenue and long-term debt ratio as the preferred metric (Fu-Jiing et al., 2005).

These studies demonstrated how the specific financial metrics chosen were largely dependant on the focus of the study or the firm's objectives. Still other studies have underscored the value of a reliable group of financial and accounting metrics that are preferred by most industries. These classical metrics have the power to provide substantive insight into an organization's performance as well as significant benchmarking capabilities (Goodale, 2002; Lampkin & Raghavan, 2008). These metrics include: (a) current ratio (b) revenue factor, (c) debt ratio, (d) return on assets, (e) return on equity, and (f) operating expenses.

Airline Industry Performance Metrics

The following studies are focused specifically on the commercial airline industry and the metrics used to assess the performance of both individual airlines and the industry as a whole. Airline specific performance metrics have been studied from a variety of perspectives. The following discussion divides these studies into three groups: (a) on-time performance, (b) load factor, and (c) broader-based performance measures. Each of these groups provides insight into how, when, and why these metrics are used.

On-time performance. The first five studies concentrate on the use of on-time performance. Mazzeo (2003) examined the relationship between high market concentration and on-time performance. In his findings, Mazzeo concluded that an airline's on-time performance varied depending on the individual routes examined. Another study, which also utilized on-time performance as a metric, found a correlation between on-time performance and market share within the airline industry (Suzuki, 2000). Suzuki examined how on-time performance could be used as a predictor of future

market share within highly competitive market segments. The model used data collected by the USDOT and pointed to a tendency by passengers to switch airlines once they had experienced a flight delay with a specific airline. Foreman and Shea (1999) focused on delays from a slightly different perspective. These authors demonstrated how the average delay decreased after an airline was required to publish on-time performance metrics. In addition, the authors identified a correlation between on-time performance and competition within specific markets.

Mayer and Sinai (2002) performed empirical research related to on-time performance by examining the effects of air space congestion on flight delays. They related this to certain patterns of flight scheduling and the use of hub-airports by an airline. The authors found that hub-operations were the primary contributor to airspace congestion. They also noted that airlines are likely to accept flight delays if the network benefits of hub operations outweighed the overall cost of operations. In a similar study, Brueckner (2002) examined on-time performance to gage the impact of airport congestion on the cost of operations for all airlines operating at that airport.

Load factor performance. Load factor is another metric used within the airline industry to gauge performance. The airlines' use of load factor has permeated nearly every aspect of an airline's operations. In a study by Yang et al. (2005) the authors examined the evolution of load factor as part of revenue management efforts from 1992 to 2002. The authors concluded that the use of load factor was successful in improving revenue and earnings. This research also demonstrated how this focus on load factor caused many carriers to operate at the margins, while attempting to maximize returns. Those small airlines that chose to operate at the margin (i.e., most efficiently) were found

to be among the airlines most like to become overwhelmed by external shocks to their operations, such as economic downturns. The authors suggested that small-efficient airlines, which attempt to maximize returns by operating at the margin, tend to expand too far and were thus unable to absorb shocks to their operations.

A second study involving load factor performance was conducted by Davila and Venkatachalam (2004). The authors found that passenger load factor was positively associated with CEO compensation and was thus an accurate non-financial measure of the firm's performance. The findings suggested that load factor provided a valuable incremental information source that could measure the results of managements' actions with greater fidelity and provided a more immediate indication of performance than that found with accounting and other market-based performance measures.

Broader-based performance measures. The first broad-based study to be discussed is one that continues to be updated annually. Bowen and Headley (2008) have published the Airline Quality Rating (AQR) every year since 1991. While the algorithms have been refined over the years, the source of these data has remained constant. The source data used for each of these reports was from the USDOT monthly *Air Travel Consumer Report*. More specifically, the authors created a composite quality index by using performance statistics related to on-time performance, denied boarding events, mishandled baggage events, and customer complaints. A weighting was applied to each statistical category based on a survey of industry experts. This approach has provided airlines with insight into how their specific airline is performing year-over-year, as well as how it ranks among competitors each year.

Behn and Riley (1999) posited that scholars and practitioners require more than the classical financial statements in order to assess the health of the commercial airline industry. The authors argued that the ability to predict financial performance within an airline could only be achieved through the addition of nonfinancial performance metrics. This study examined on-time performance, mishandled baggage, ticket over-sales, and in-flight service and found them to be significant proxies for customer satisfaction. Two findings were specifically worth noting. First, the authors concluded that customer satisfaction, load factor, market share, and available ton-miles were all associated with operating revenue, while customer satisfaction and available ton-miles are associated with operating expenses. The second finding of note was the conclusion that nonfinancial performance metrics seemed to demonstrate a greater propensity for predicting quarterly revenues, expenses, and operating income.

This section on performance management has examined a collection of studies which have demonstrated the use of various types of metrics. These previous works are significant for this study as they pointed to the combined use of classical financial metrics along with non-financial metrics which can act as proxies for customer satisfaction. The USDOT was also identified as a very useful source of this non-financial data.

CHAPTER 3. METHODOLOGY

The problem to be addressed within this study is associated with the extraordinary number of mergers and bankruptcies that seem to characterize the commercial airline industry. Since 1978, more than 200 commercial air carriers in this market have either merged, ceased operations, or filed for bankruptcy protection (ATA, 2008). The purpose of this quantitative study is to evaluate the global commercial airline industry from an IT-business alignment perspective and correlate the alignment of each airline with their respective performance metrics. The six IT-business alignment maturity criteria (e.g., communications, competency/value, governance, partnership, technology scope, and human resource skills) are used to determine each airline's strategic alignment maturity level. These maturity levels are then evaluated to identify possible correlations and trends associated with operational performance metrics amassed by the USDOT, financial performance metrics found in public corporate filings, and basic characteristics associated with an airline's overall operations.

This chapter begins with an overview of the research design which reveals the underlying methodology. This is then followed by a description of the sample, survey instrument, and data collection methods to be used in this study. These early sections provide the necessary foundation for the operational description of the research variables and the subsequent data analysis. The chapter will conclude with a review of validity and reliability issues, as well as the ethical issues being considered as part of this study's construct.

Research Design

This section on research design focuses on two specific areas: (a) methodology and (b) strengths and limitations. A detailed discussion on the methodology offers a frame of reference which provides greater insight into the purpose and objective of this study. A further discussion of the strengths and limitations of this research design reveal the rationale for the specific design details. These two elements are important to the research design as they attempt to anticipate problems and provide techniques to mitigate them early in the study.

Methodology

The purpose of this quantitative correlational study is to evaluate the global commercial airline industry from an IT-business alignment perspective and correlate the alignment maturity levels of each airline with their respective performance metrics. This study evaluates the IT-business strategic alignment maturity of major global commercial airlines in those nations represented by the G-12 nations. It is proposed that an airline's level of strategic alignment maturity will correlate with its general operational and financial performance, as well as, some basic operational characteristics. This study is designed to evaluate each firm using the constructs which were evaluated as part of previous research using the SAM model survey (Sledgianowski et al., 2006). This survey has been applied to many different industries within the past five years (Luftman & Kempaiah, 2007; Sledgianowski & Luftman, 2005). The SAM survey instrument is used to gather information involving the perception of both the business and IT elements within each airline on six key IT-business alignment criteria: (a) communications

maturity, (b) competency/value maturity, (c) governance maturity, (d) partnership maturity, (e) scope and architecture maturity, and (f) human resource skills maturity (Luftman, 2003b). The implementation of the SAM survey, as part of this study, remains consistent with these previous studies so that cross-study comparisons can be made. Operational performance data, which is used to correlate with the maturity levels, includes data collected by the USDOT related to existing airline metrics (i.e., on-time performance, flight cancellations, mishandled baggage, over-bookings, and customer complaints). Financial performance data is also be correlated and these data are derived from various data contained in available public records and corporate filings (i.e., 10K and 10Q filings). The final correlation variables include two basic airline characteristic parameters—the airline's fleet size and average load factor.

Strengths and Limitations

The use of this form of survey has both strengths and limitations. The strength of this approach is in its appeal to the professional nature of the respondents. In addition, it allows the incorporation of techniques which can be used to reach out to those who do not respond without compromising the anonymity of those who do respond. This technique is discussed at greater length later in this chapter. This approach also demonstrates to each respondent that the research team is dedicated to constructing a valid sample and that the respondent's participation is deemed to be critical to its success. Finally, it provides the respondent with an assurance of anonymity and confidentiality.

One of the limitations associated with this survey format is the lack of personal contact with the respondents. This lack of personal contact, while giving the respondent

a greater sense of anonymity, does not allow for any personal pressure to secure the respondent's participation. Other techniques are used to help mitigate this limitation.

An additional limitation in this research design is the inability to generalize the results across other industries. Using the same survey instrument that was executed within other industries helps mitigate this concern. Similarly this research may not support generalization within the airline industry across national boarders. To help moderate this concern the sample population includes airlines from G-12 nations. This still require a significantly large number of airlines from different nations.

Additionally, this study is limited to those carriers with a minimum of USD 20M in annual revenues. The results may not be generalizable for smaller carriers. A further limitation is imposed on RQ1, which targets only Group III U.S. carriers. The correlative performance data associated with these Group III U.S. carriers are not readily available for other airlines. This implies that the results from RQ1 may not support generalizability for those airlines outside that limited population.

Finally, it is important to note that this is not a longitudinal study. For this reason, the results may not be sustained over time. As economic conditions change and technology evolves, the results found here may lack repeatability.

Sample

This research strategy draws its participants from a select group of global commercial airlines. This sample includes only those passenger carriers with scheduled operations. This sample further discriminated, for consistency purposes, to include only those carriers with annual operating revenues exceeding USD 20M. Within the U.S. this

includes major airlines, national airlines, and large regional airlines. A combined total of 34 U.S. carriers are in these groups.

In order to select a similar representative group of airlines outside of the U.S. the countries that participate in the *Group of Twelve* (G-12) have been identified. The characteristics associated with a G-12 participant are viewed as providing a sample in which cross-nation comparisons can be meaningful. The G-12 is a forum of 13 industrially advanced countries and represents those nations which have agreed to participate in the *General Arrangements to Borrow* (GAB). The essential purpose of the GAB is to make resources available to the International Monetary Fund (Bank for International Settlements, 2009). The countries that make up the G-12 include Australia, Belgium, Canada, France, Germany, Italy, Japan, Netherlands, Spain, Sweden, Switzerland, United Kingdom, and United States. Note that the name of the organization did not change when Switzerland was added as the 13th country in 1984. Based on these criteria it is estimated that 93 airlines outside of the U.S. qualify for this study, bringing the total population to 127 airlines. This entire sample is used to examine RQ2, RQ3, RQ4, and RQ5.

This entire sample is not eligible for use within the context of RQ1. This research questions focuses on the performance metrics collected by the USDOT, which is limited to a group of 19 airlines. This group is generally representative of those major carriers in Group III. Two criteria are used by the USDOT to identify these carriers. The first requires that the airline operate nonstop scheduled-service flights between points within the U.S. and its territories. The second criterion looks for airlines that generate annual revenues which represent at least 1% of the total revenue generated by U.S. domestic

scheduled-service passenger carriers. Those airlines that meet these two criteria are required to file operational performance data with the USDOT Bureau of Transportation Statistics (2009), Office of Airline Information in compliance with Federal regulation 14 CFR Part 234.

A group of 6 individuals (i.e., 3 from IT and 3 from business) from each of the 127 airlines was surveyed as part of this study. These individuals were recruited from both the IT and business sides of the airline. Assuming an adequate response rate, the total of 114 surveys (6 surveys sent to 19 airlines) is capable of providing statistically significant results for RQ1. The entire set of 762 surveys (6 surveys sent to 127 airlines) would then be available to evaluate RQ2, RQ3, RQ4, and RQ5. Statistical significance is based on the power analysis conducted and discussed in the next section

Power Analysis

The methodology for executing this study involves the selection of a group of survey respondents from a population of global airlines. To produce statistically significant results, it is necessary to ensure that the total number of respondents is adequate. The G*Power 3 stand-alone power analysis software application is used for this analysis (Faul, Erdfelder, Lang, & Buchner, 2007). For this tool to be effective, several constraints must be established. The first constraint involves the type of statistical tests that is to be used to analyze the resulting data. For the purpose of power analysis, this study is best served by an approach which tests a hypothesis that expects the population value of r^2 to be greater than zero and implements a single predictor. Faul et

al. (2007) suggest that this criterion should drive the power analysis to adopt the F-test family of tests.

Since this power analysis is being used in an a priori fashion it is necessary to establish a reasonable significance criterion (α) and a desired probability that no Type II errors occur. Prior studies have shown that an α-value of 0.05 and a power value of 0.80 to be adequate (Sledgianowski et al., 2006). Finally, applying a medium effect size (f^2 = 0.15) the G*Power 3 application indicates a minimum sample size of 55. For RQ1 to be successful, this requires the participation of at least 10 U.S. airlines from the subset of 19 Group III airlines. The success of RQ2 through RQ5 rests on the participation of at least 10 airlines from the population of 127 global carriers.

Survey Instrument

The strategic model developed by Henderson and Venkatraman (1991) and modified by Luftman and Brier (1999) resulted in the development of the survey instrument chosen for this study. This instrument has been subjected to rigorous empirical testing and validation (Sledgianowski et al., 2006). The collective results of these and other studies lend credence to the use of this survey instrument for the purpose of assessing an organization's current strategic alignment maturity level.

The survey was distributed through U.S. Postal Service (USPS) or an appropriate express mail provider. The exact choice depended on (a) cost, (b) timeliness of delivery, and (c) ease to which the participant is able to return the survey. The information required from this survey involves the perception of both the business and IT elements within each participating airline on six key IT-business alignment maturity criteria: (a)

communications maturity, (b) competency/value maturity, (c) governance maturity, (d) partnership maturity, (e) scope and architecture maturity, and (f) human resource skills maturity (Luftman, 2003b). The instruments used by Dr. Jerry Luftman (2003b) in his most recent studies has been adopted for this study, with his permission. Questions are grouped using the six key IT-business alignment criteria mentioned above. Each question has been fashioned on a 5-point Likert-type scale. For those questions which are scored by the respondent as N/A or a response is omitted, the actual value has been replaced with the average of the scores for the remaining questions associated with that construct.

The participants in this survey responded anonymously. Three survey packages were sent to each airline's Chief Executive Operating (CEO) and an additional three surveys were sent to the Chief Information Officer (CIO). The CEO and CIO were asked to identify individuals within their respective organizations who were best able to respond to the survey, based on their knowledge of the organization. Each respondent was provided a postage paid envelop with which to return the survey.

Performance data was gathered from public records. These data were used to help identify relationships and trends. Operational performance data included data collected by the USDOT related to existing airline metrics (e.g., on-time performance, flight cancellations, mishandled baggage, over-bookings, and customer complaints). Average data were compiled from the most recent 12-month period. Financial performance data was derived from available public records and corporate filings (e.g., 10K and 10Q filings). These data were also collected from the most recent 12 month period. Airline

characteristic data related to the size of the airline and average load factor were collected from data gathered by the International Air Transport Association (IATA, 2009).

Data Collection

The recruiting strategy for the SAM survey was a four step process: (a) short pre-notice mailing approximately 1 week prior to the actual survey being sent; (b) sending the survey with a return post-paid envelope; (c) thank-you mailing a few days after the survey is sent, encouraging the participant to complete the survey if not already completed; and (d) sending a replacement survey to non-respondents 2 to 4 weeks after the initial survey was sent (Swanson & Holton, 2005). Certain elements of this study rely on an above average response rate. Many of the elements which make up this data collection method are included to help boost that response rate. This process was expected to take about 6 to 8 weeks to complete.

The survey is a self-administered questionnaire. The CIO and CEO for each airline were approached with the use of an introductory letter, delivered by the USPS or an express mail provider. The introductory letter encouraged these individuals to sponsor this research within their organizations. This letter was intended to arrive about 1 week prior to the survey. The letter (a) identified the purpose of the research survey, (b) explained how the results of this research could benefit the respondent and his or her organization, (c) explained why it is important for each respondent to participate, (d) assured the respondent that answers would be kept confidential and anonymous, (e) explained how all information would be safeguarded, and (g) informed them that the actual survey would arrive in about 1week.

A package of three surveys was sent directly to the CEO and CIO. Each participant received their survey directly from these individuals. The survey package included a postage paid return envelope in which the respondent could easily return the completed survey. Each respondent was assured anonymity and confidentiality.

Operational Definition of Variables

This section is devoted to defining the operational nature of each variable used in this research. Each variable is classified as either a dependent or independent variable. Within these two subsections, each variable is described along with its method of measurement and the type of data being collected.

Independent Variable

The sole independent variable associated with this study is the strategic alignment maturity level. This parameter represents the outcome of this study and is calculated from the measurement of the six IT-business alignment criteria which are derived from the SAM survey instrument: (a) communication maturity, (b) competency and value maturity, (c) governance maturity, (d) partnership maturity, (e) scope and architecture maturity, and (f) human resource skills maturity. The following paragraphs describe the strategic alignment maturity level and how it is operationalized within this study. As part of this description each of the six IT-business alignment criteria are described in a similar manner.

Strategic alignment maturity level (*X*). The SAM level represents the sole independent variable for this study. This independent variable is comprised of the average of the mean values from the six secondary factors discussed previously as X_1 through X_6. These factors are represented by the six IT-business alignment criteria: (a) communication maturity, (b) competency and value maturity, (c) governance maturity, (d) partnership maturity, (e) scope and architecture maturity, and (f) human resource skills maturity.

The SAM value can range from 1 to 5. Organizations that score a value of 1 are seen has having an *Initial/Ad Hoc Process* (Sledgianowski & Luftman, 2005). Here the organization is at its lowest level of alignment, where business and IT are not aligned. Attempts to align processes are conducted on an ad hoc basis. Organizations with a SAM value of 2 are referred to by Sledgianowski and Luftman (2005) as having a *Committed Process*. In this case the organization is at least committed to the IT-business alignment process. The SAM value of 3 is used to describe organizations that have *Established/Focused Process* activities. These organizations are described by Sledgianowski and Luftman (2005) as possessing established alignment processes which are focused on business objectives. The next level of alignment is represented by a SAM value of 4. The authors referred to this level as having *Improved/Managed Process*. In this type of an organization there exists a strong alignment process which recognizes the value that IT brings to the organization. A SAM value of 5 is seen as the highest level of alignment. Sledgianowski and Luftman (2005) described these organizations as having an *Optimized Process* of strategic alignment. These organizations are found to have fully integrated and co-adaptive processes involving both business and IT.

To arrive at a mean SAM level value for each airline a value for each secondary factor must first be derived for every survey respondent. The results from the survey questions, which provide the constructs for each secondary factor, are used to arrive at a mean value for each of these factors. This creates six secondary factor values for each respondent.

Once these secondary factors have been computed for each survey respondent, a mean SAM level value, associated with each respondent, is derived. The mean SAM level value is calculated using the six secondary factor values computed previously. This value represents a SAM level form the perspective of a single participant.

Finally, a SAM level value is computed for each airline. This airline SAM level value is calculated by averaging the SAM level values of each survey respondent within that airline organization. The individual secondary factors data are collected in ordinal form; therefore, the calculation of this final SAM level value is rounded down to the nearest integer value and remains as an ordinal value. The following sub-sections present an operational description of each of the secondary factors.

Communications maturity (X_1). Communications maturity is a measure of the effectiveness of communication between the IT and business organizations within a specific airline (Luftman, 2000). This variable is used to quantify the clarity with which ideas are exchanged within the airline organization. The survey instrument developed by Luftman (2003b) has been used to collect ordinal data using a 5-point Likert-type scale, which are representative of the level of communication maturity. Survey questions 1 through 6 were applied for this purpose. The average of these six questions represents

the level of communication maturity within a specific airline as observed by a single respondent.

Competency and value maturity (X_2). Competency and value maturity is a measure of how effective the IT and business organizations are at demonstrating their value to each other (Luftman, 2000). This variable is used to quantify not only an organization's commitment to collecting metric data, but also its commitment to acting on those results. The survey instrument developed by Luftman (2003b) has been used to collect ordinal data using a 5-point Likert-type scale, which are representative of the level of competency and value maturity. Survey questions 7 through 14 were applied for this purpose. The average of these eight questions represents the level of competency and value maturity within a specific airline as observed by a single respondent.

Governance maturity (X_3). Governance maturity is a measure of how effective the IT and business organizations are at working with each other to set priorities and allocate resources (Luftman, 2000). The survey instrument developed by Luftman (2003b) has been used to collect ordinal data using a 5-point Likert-type scale, which are representative of the level of governance maturity. Survey questions 15 through 21 were applied for this purpose. The average of these seven questions represents the level of governance maturity within a specific airline as observed by a single respondent.

Partnership maturity (X_4). Partnership maturity is a measure of the interaction between the IT and business organizations (Luftman, 2000). This variable is used to measure the perceived importance and the trust that each organization maintains for the other. The survey instrument developed by Luftman (2003b) has been used to collect ordinal data using a 5-point Likert-type scale, which are representative of the level of

partnership maturity. Survey questions 22 through 27 were applied for this purpose. The average of these six questions represents the level of partnership maturity within a specific airline as observed by a single respondent.

Scope and architecture maturity (X_5). Scope and architecture maturity is a measure of information technology maturity (Luftman, 2000). This variable is used to examine those characteristics that are inherent in a superior IT organization such as flexibility, integration, and the use of process standards. The survey instrument developed by Luftman (2003b) has been used to collect ordinal data using a 5-point Likert-type scale, which are representative of the level of scope and architecture maturity. Survey questions 28 through 32 were applied for this purpose. The average of the five questions represents the level of scope and architecture maturity within a specific airline as observed by a single respondent.

Human resource skills maturity (X_6). Human resource skills maturity is a measure of the IT organization's human resources characteristics (Luftman, 2000). This variable is used to measure characteristics such as, innovation, locus of power, readiness for change, and job opportunities. The survey instrument developed by Luftman (2003b) has been used to collect ordinal data using a 5-point Likert-type scale, which are representative of the level of human resource skills maturity. Survey questions 33 through 39 were applied for this purpose. The average of the seven questions represents the level of human resource skills maturity within a specific airline as observed by a single respondent.

Dependent Variables

The dependent variables are those parameters that are being controlled for in this study. These parameters are presumed to influence the independent variable and consist of the following five variables: (a) operational performance, (b) financial performance, (c) airline fleet size, (d) average load factor, and (e) airline annual operating revenue. Each of these groups is discussed in the following paragraphs.

Operational performance (Y_1). The airline operational performance variable is comprised of five secondary factors consisting of measures used by the USDOT to assess an airline's relative performance within the industry: (a) on-time performance, (b) flight cancellations, (c) mishandled baggage, (d) over-bookings, and (e) customer complaints. Each of these secondary factors is measured on an interval scale. A single operational performance value is calculated for each airline using the aggregate sum of each of these individual factors. It is important to note that the scales associated with the raw data are dissimilar and could cause some factors to be highly weighted. To eliminate this unintended weighting, each secondary factor is normalized to a common scale; to ensure equal weighting. Table 2 summarizes this normalization process and shows a normalized scale of between 0.01 and 0.57. All data used to support these secondary factors are published by the USDOT (USDOT, 2009) and is based on monthly data filed by the airlines. These data are filed with the USDOT Bureau of Transportation Statistics (2009), Office of Airline Information in compliance with Federal regulation 14 CFR Part 234. Those airlines required to report operational performance metrics provide nonstop scheduled-service flights between points within the U.S. and its territories, and represent

at least 1% of the total revenue generated by domestic scheduled-service passenger carriers. The following paragraphs describe each of these secondary factors.

Table 2. *Normalized Characteristics of Operational Performance Secondary Factors*

Secondary Factor	Normalized Parameter	Expected Normalized Range
On Time Performance	% of Flight Operations	0.12 to 0.23
Flight Cancellations	% of Flight Operations	0.01 to 0.20
Mishandled Baggage	Per 100 Passengers	0.15 to 0.57
Over-bookings	Per 100 Passengers	0.08 to 0.27
Customer Complaints	Per 10,000 Passengers	0.03 to 0.10

On-time performance (Y_{1A}). On-time performance is a measure of flight delays and cancellations. For the purpose of this study, those flights which were delayed or cancelled as a result of extreme weather related events are not included. A flight is considered to have departed on-time if it left the airport gate no more than 15 minutes after the scheduled time as published in the carriers' Computerized Reservation System (CRS). Similarly, flights are considered to have arrived on-time if the aircraft touches down at the destination airport no more than 15 minutes after the scheduled time as published in the carriers' CRS. On-time performance is measured on an interval scale and is recorded as a percentage of all flight operations. For consistency purposes, this value is converted to the number of delays per flight operations by subtracting the percentage of on-time performance from 100%.

Flight cancellations (Y_{1B}). Flight cancellations are a subset of the on-time performance data discussed previously. While these data are integral to the on-time performance data, for the purposes of this study flight cancellations are studied separately. The decision by an airline to cancel a flight is seen as extreme and therefore warrants special consideration and evaluation. Flight cancellation is measured on an interval scale and is recorded as a percentage of all flight operations.

Mishandled baggage (Y_{1C}). Mishandled baggage is a measure of the number of mishandled-baggage reports filed per 100 passengers that flew a specific carrier. These data are measured on an interval scale. Mishandled-baggage reports include lost, damaged, delayed, or pilfered baggage. These reports are filed with the airline that originally accepted the baggage.

Over-bookings (Y_{1D}). Over-booking is a measure of the number of passengers that were denied boarding due to an over-sale condition, even though they held confirmed reservations. These data do not include those passengers who were affected by cancelled, delayed, or diverted flights. For the purposes of this study, these data include passengers who voluntarily surrendered there seat as a result of an over-booking condition. There are four scenarios that are excluded from these data, as cited in the *Air Travel Consumer Report*: (a) a passenger can be accommodated on another flight scheduled to arrive within one hour of the original flight; (b) a passenger who fail to comply with ticketing procedures; (c) an aircraft of smaller capacity is substituted; and (d) a passenger who is denied boarding due to safety-related weight restrictions on an aircraft with 60 or fewer seats. Over-bookings data are reported per 100 passengers and are measured on an interval scale.

Customer complaint (Y_{1E}). Customer complaint is a measure of those complaints filed with the USDOT, which are identifiable to a specific air carrier. These data are submitted to the USDOT in various forms (i.e., in writing, by telephone, by e-mail, or in person). The USDOT does not attempt to validate any of the complaints prior to reporting them. Reports which are safety related are referred to the Federal Aviation Administration and are not included in these data. While some of these data may crossover into other areas (e.g. mishandled-baggage reports), these data are significant due to the reporting level. Many complaints are handled within the airline and are not reported to the USDOT. Those reports that rise to this reporting level are considered significant and noteworthy. Customer complaint data are reported per 10,000 enplaned passengers and data are measured on an interval scale.

Financial performance (Y_2). Financial metrics which provide insight into a firm's policies and operations are of particular interest when evaluating that firm's financial performance. For that reason, this study examines each participating airline's public filings and calculates financial ratios which are representative of the firm's financial performance. Each of these financial performance ratios is measured on an interval scale. These measures are, by their very nature, normalized to allow comparison across firms. This also ensures equal weighting for the purposes of correlation analysis with strategic alignment maturity levels. The financial performance variable is comprised of an aggregate sum of the these secondary factors: (a) current ratio, (b) inverse debt ratio, (c) return on total assets, and (d) basic earning power ratio. Table 3 summarizes the expected range for each of these factors and demonstrates an expected

range of -0.40 to 2.80. The following paragraphs describe each of these secondary factors.

Table 3. *Normalized Characteristics of Financial Performance Secondary Factors*

Secondary Factor	Expected Range
Current Ratio	0.40 to 2.80
Inverse Debt Ratio	1.00 to 2.80
Return on Total Assets	-0.40 to 0.30
Basic Earning Power Ratio	-0.10 to 0.20

Current ratio (Y_{2A}). Current ratio is the primary measure of a firm's liquidity (Brigham & Houston, 2007). These data are calculated by dividing the firm's current assets by its current liabilities. Both the current assets and current liabilities data are derived from an airline's public corporate filings. These data are provided on an interval scale.

Inverse debt ratio (Y_{2B}). Debt ratio is an asset management tool and is one measure of a firm's solvency. More specifically, debt ratio measures the percentage of assets that are the result of debt (Brigham & Houston, 2007). These data are calculated by dividing the firm's total debt by its total assets. Total debt includes both current liabilities and long-term liabilities. Total assets are calculated as the sum of fixed assets and current assets. For the purposes of this study, the inverse of this classic measure is used to ensure the data bias is consistent with that of the other measures (i.e., larger

positive values describe a positive financial effect on the firm). These data are derived from each airline's public corporate filings and are provided on an interval scale.

Return on total assets (Y_{2C}). Return on total assets (ROA) is a measure of a firm's profitability. ROA is an indication of the efficiency by which a firm's assets generate revenue (Brigham & Houston, 2007). This ratio is calculated by dividing the firm's net income by its total assets. Net income is defined as the total operating revenue minus the cost of operations. Total assets are calculated as the sum of fixed assets and current assets. For the purposes of this study, these data are derived from each airline's public corporate filings. These data are provided on an interval scale.

Basic earning power (Y_{2D}). Basic earning power ratio is a measure of the ability of a firm's assets to generate operating revenue (Brigham & Houston, 2007). This ratio views a firm's earnings separate from taxes and leveraged assets. This ratio is calculated by dividing the firm's earnings before interest and taxes (EBIT) by its total assets. Total assets are calculated as the sum of fixed assets and current assets. For the purposes of this study, these data are derived from each airline's public corporate filings. These data are provided on an interval scale.

Airline fleet size (Y_3). Airline characteristic variables can provide insight into the size of that specific airline's operations and the complexity of the IT infrastructure. Fleet size is the most frequently used characteristic variable within the industry and is used here as one of the dependent variables. The size of each airline is measured by the exact number of aircraft being used in scheduled service. These data are obtained from the International Air Transport Association (IATA, 2009) and is reported on an interval scale.

Average load factor (Y_4). Airline executives utilize load factor data, in support of day-to-day operations. These data are extremely important in helping to manage cost and target specific revenue objectives. Average load factor (ALF) is the ratio of revenue passenger miles (RPM) to average seat miles (ASM) for a given calendar month (ATA, 2007). The concept of break-even load factor is a critical element in the tactical and strategic decision made by airline executives. These data are obtained from the International Air Transport Association (IATA, 2009) and are reported on an interval scale.

Annual operating revenue (Y_5). The importance of an airline's annual operating revenue underscored by the USDOT's uses annual operating revenue as a differentiator among airlines. The revenue generated by operations can be a strong indicator of the efficiency of both the business and IT organizations within the airline. These data are derived from each airline's public corporate filings and are provided on an interval scale.

Data Analysis

The following section describes the specific inferential tests to be conducted as part of this research. The first subsection examines the requirement for normal distribution of the SAM survey data and describes the associated test for normality. The second section focuses on the correlation tests which are directly related to the research questions posed by this study. The final section discusses the standard error technique to be applied as part of this analysis.

Test for Normality

As noted in the previous section, all dependent data are collected in interval form. In contrast, the survey instrument used to collect the independent data (i.e., SAM level data) uses a Likert-type scale and thus generates ordinal data. An argument can be made that when ordinal data are characterized as being part of a normal distribution, then the application of inferential statistical techniques, which are parametric in nature, can be applied (Böckenholt et al., 2001; Grether, 1976; O'Brien, 1979, 1982). The parametric inferential statistics used here rely on the presence of a bivariate normal distribution. To check for normality, the Shapiro-Wilk test is used. This test provides a reliable assessment of normality when small samples are involved (Boslaugh & Watters, 2008). The null hypothesis associated with Shapiro-Wilk suggests that the sample is from a population with a normal distribution. This supposition of normality is rejected where $p < 0.05$.

Correlation Analysis

Assuming that the previous test for normality shows a bivariate normal distribution a parametric correlation analysis is conducted. The correlation of the SAM level with operational performance (RQ1), financial performance (RQ2), fleet size (RQ3), average load factor (RQ4), and airline annual operating revenue (RQ5) parameters employ the use of the Pearson product-moment correlation coefficient—Pearson's *r* (Welkowitz, Cohen, & Ewen, 2006). The use of Pearson's *r* is made possible with the assumption of a bivariate normal distribution, as discussed in the previous section. This statistical technique is used to evaluate the ordinal relationship between the

SAM level and the respective independent variables. The real-value of the SAM level is applied in this case rather than the conventionally used integer rounded value. At a significance level of $p < 0.05$, a statistically significant value of r will suggest that there is a low probability of a Type I error and the null hypothesis should be rejected.

Standard Error of the Mean

The Standard Error of the Mean (SEM) is defined as the theoretical standard deviation of all sample means which are derived from different samples within a given population (Boslaugh & Watters, 2008). In other words, SEM is a method for computing the uncertainty of a sample mean. The SEM is dependent on both the sample size and the population variance (Welkowitz et al., 2006). Since the population variance is unknown, this analysis uses the sample variance as a best estimate. This approach provides additional insight into the confidence interval that is inferred from the data.

Validity and Reliability

Validity and reliability are both critical to any research study. Validity is what links the study to reality. The stronger this link becomes, the more valid the study's conclusions and inferences become. Reliability represents the repeatability of the study's results. A test must be reliable before it can be valid. The following discussion addresses both the validity and reliability argument for this study.

Validity

This study leverages the strategic alignment maturity (SAM) model as a means of assessing an airline's degree of alignment between its IT and business organizations. The use of this model embraces an underlying assertion that an organization's strategic alignment of IT and business is not a state of being, but rather a spectrum of maturity. This section discusses three general forms of validity that are of interest to this quantitative study—content validity, construct validity, and criterion-related validity.

Content validity describes how well the test represents the environment or population (Hubley & Zumbo, 1996). The idea of representing a complex organizational characteristic as a maturity spectrum has been demonstrated in other areas of information technology and information systems. Two particular parallel studies were performed in the fields of information systems planning (King & Teo, 1997) and IT portfolio management maturity (Jeffery & Leliveld, 2004).

Construct validity relies on statistical confirmation to show that the underlying construct is being accurately measured (Cooper & Schindler, 2006; Hubley & Zumbo, 1996). To examine the construct validity of the SAM model, it is necessary to show that the chosen constructs represent the underlying theoretical constructs. This aspect has been demonstrated by numerous studies where the SAM model, or portions of it, has been associated with an organization's IT-business alignment (Ives et al., 1993; Pyburn, 1991).

Criterion-related validity is the most rigorous form of validity. Here validity is attained if a statistical significance is demonstrated between the hypothesized variable relationships (Cooper & Schindler, 2006; Swanson & Holton, 2005). Hubley and Zumbo

(1996) describe this in terms of how accurately the criterion is estimated—concurrent validity—and how well the criterion is predicted—predictive validity. The operationalization of a construct is said to have criterion-related validity if it is able to perform in a manner similar to the underlying construct.

The study conducted by Sledgianowski et al. (2006) specifically addressed the criterion-related validity for the SAM model. Confirmatory factor analysis was used to validate the six constructs within the SAM and also identified the 22 indices that make up the survey instrument. In addition, the calculation of Cronbach's coefficient alpha and composite factor reliability both showed results that exceeded the 0.70 recommended minimum for test-retest reliability (Segars, 1997) at a significance of $p < 0.001$. Each of the SAM constructs was subjected to mixed-model repeated measures analysis of variance (ANOVA) for comparison of the six constructs across business units. Sledgianowski et al. demonstrated significant results across business units at $p < 0.001$ and at $p < 0.01$ for the interaction effect associated with the maturity factors within business units. A statistically significant relationship between the SAM indices and the underlying construct were demonstrated.

Reliability

Hubley and Zumbo (1996) explained reliability as the characteristic of a test that makes it dependable and repeatable. A valid test is one that is both accurate and suitable. The instrument to be used in this study is said to be reliable, and provide internal consistency (Fowler, 2002), if multiple questions designed to measure the same characteristics do indeed provide consistent data. The SAM model, or portions of it, has

been exercised for nearly two decades and has proven to be an accurate and suitable representation of IT-business alignment maturity (Henderson & Venkatraman, 1993; Luftman, 2003b; Luftman et al., 1993; Tallon, 2007).

Ethical Considerations

The survey for this study is intended to gauge the level of strategic alignment maturity of individual companies within the global commercial airline industry. If an assessment can be identified to a specific airline or if an airline-to-airline comparison were to become publicly available, it might tend to show certain airlines in a less than favorable light (Crotty, 1998; Swanson & Holton, 2005). While unlikely, this kind of information could have an impact on the public perception of those airlines and cause a shift in market valuations. In this case the jobs of the executives that participated in the survey could be at risk. A significant market shift could have unintended consequences on other innocent employees.

To prevent the scenario described above from occurring, the survey methodology has been designed to ensure anonymity and confidentiality (Cooper & Schindler, 2006; Creswell, 2003; Fowler, 2002). There is no way to identify a particular airline's response or to know who within that airline participated. In addition, the data from this survey will be published only in an aggregate form. This eliminates the possibility that the identity of an airline could be inferred from the characteristic data.

Informed consent was obtained through the use of an introductory letter provided to each participant. This letter contained the following statement: *Returning this survey is implied consent for the use of the data you provide. Your participation is not*

mandatory. You are free to discontinue participation at any time without prejudice. All surveys will be kept confidential and your participation will remain anonymous. Results will only be reported in summary form. Informed consent was obtained by virtue of receiving each completed survey.

Protection of confidentiality was an important element in the development of the methodology used to conduct this research. Participant names were not solicited nor were they collected. The survey instrument requested information on each participant's job position and the airline in which they were associated. The airline names were coded to ensure that an individual's response could not be directly attributed to a specific airline.

Lastly, data security measures were developed and executed. All paper surveys were scanned into a digital form and the paper data were shredded. The digital data were stored in encrypted files and placed on CDROM. The CDROM will be shredded eight years after the publication date, of this dissertation.

CHAPTER 4. RESULTS

Introduction

A review of the data collected and description of the related statistical analysis performed in conjunction with that data are provided in this chapter. The data collection summary consists of a review of the survey responses representing the independent variable in this study. In addition, the data collected for each dependent variable is also reviewed (i.e., operational performance data, financial performance data, and airline characteristic data). The related statistical analysis first demonstrates the normality of the independent data, followed by a detailed examination of the hypotheses associated with the five research questions.

Data Collection Summary

The data collected for this study is divided into four groups: (a) survey data, (b) operational performance data, (c) financial performance data, and (d) airline characteristic data. The survey data represents the independent variable for this study. Each group of data is described in detail in the following sections.

Summary of Survey Responses

A set of questionnaires was distributed to the CEO and CIO of each airline which operates within one of the G-12 nations and generates at least USD 20M in annual operating revenues. A total of 127 airlines were recruited with the CEO and CIO each receiving a package of three questionnaires to distribute within their respective business

and technical organizations. A total of 762 questionnaires were distributed among the 127 airlines. Among those airlines recruited, 18 airlines from 8 countries completed and returned surveys. Seven of these 18 airlines failed to return either the business or IT set of surveys, thus making those surveys unusable. A total of 66 surveys representing 11 airlines from 4 countries were deemed usable, representing a response rate of 8.7%. Table 4 summarizes the number of airlines and questionnaires distributed within each G-12 nation. The 34 airlines recruited from the U.S. included the 19 airlines on which the USDOT collects monthly performance metrics (i.e., AirTran Airways, Alaska Airlines, American Airlines, American Eagle, Atlantic Southeast Airlines, Comair, Continental Airlines, Delta Air Lines, ExpressJet Airlines, Frontier Airlines, Hawaiian Airlines, jetBlue Airways, Mesa Airlines, Northwest Airlines, Pinnacle Airlines, Skywest Airlines, Southwest Airlines, United Airlines, and US Airways). This elite group of 19 airlines is generally representative of those major carriers in Group III. Two criteria are used by the USDOT to identify these carriers. The first requires that the airline operate nonstop scheduled-service flights between points within the U.S. and its territories. The second criterion looks for airlines that generate annual revenues which represent at least 1% of the total revenue generated by U.S. domestic scheduled-service passenger carriers. Those airlines that meet these two criteria are required to file operational performance date with the USDOT Bureau of Transportation Statistics (2009), Office of Airline Information in compliance with Federal regulation 14 CFR Part 234. This group of 19 airlines was recruited to support the analysis associated with RQ1, while the entire group of 127 airlines was recruited to support RQ2, RQ3, RQ4, and RQ5.

Table 4. *Survey Distribution Statistics*

Airline Nation of Operations	Airlines Recruited	Surveys Mailed
Australia	9	54
Belgium	3	18
Canada	5	30
France	8	48
Germany	10	60
Italy	8	48
Japan	14	84
Netherlands	4	24
Spain	7	42
Sweden	8	48
Switzerland	4	24
United Kingdom	13	78
United States	34	204
Total =	127	762

A summary of the surveys that were returned is summarized in Table 5. While 87 surveys were returned from 18 airlines not all of these surveys were useable. Only those airlines that returned the complete set of surveys (i.e., three surveys form the IT organization and three surveys from the business organization) were included in this study. The 36 surveys for U.S. airlines represent responses for six airlines. All six of these airlines were from the group of 19 airlines that were recruited to support RQ1.

Table 5. *Summary of Surveys Returned*

Airline Nation of Operations	Data Collected		Useable Data	
	Surveys Returned	Participating Airlines	Useable Surveys	Participating Airlines
Australia	0	0	0	0
Belgium	0	0	0	0
Canada	3	1	0	0
France	0	0	0	0
Germany	18	4	12	2
Italy	0	0	0	0
Japan	12	2	12	2
Netherlands	3	1	0	0
Spain	9	2	6	1
Sweden	0	0	0	0
Switzerland	3	1	0	0
United Kingdom	3	1	0	0
United States	36	6	36	6
Total =	87	18	66	11

The strategic model developed by Henderson and Venkatraman (1991) and modified by Luftman and Brier (1999) resulted in the development of the survey instrument chosen for this study. The survey was distributed to each participating CEO and CIO via USPS Priority Mail. Completed surveys were returned with the use of a self-addressed and prepaid express mail envelop. The information gleaned from this survey involved the perception of both the business and IT elements within each participating airline on six key IT-business alignment maturity criteria: (a) communications maturity (COMM), (b) competency/value maturity (COMP), (c) governance maturity (GOV), (d) partnership maturity (PART), (e) scope and architecture

maturity (SCOPE), and (f) human resource skills maturity (SKILL; Luftman, 2003b). Questions are grouped using these six key IT-business alignment criteria. Each question is fashioned on a 5-point Likert-type scale. Table 6 provides a summary of the question topics and an identifiable question-number which is used throughout this analysis.

Table 6. *Survey Question Descriptions*

Survey Question Topic	Criteria	Question Number
Understanding of Business by IT	COMM	1
Understanding of IT by Business	COMM	2
Inter/Intra-Organizational Learning	COMM	3
Protocol Rigidity	COMM	4
Knowledge Sharing	COMM	5
Liaison Breadth/Effectiveness	COMM	6
IT Metrics	COMP	7
Business Metrics	COMP	8
Balanced Metrics	COMP	9
Service Level Agreements	COMP	10
Benchmarking	COMP	11
Formal Assessments/Reviews	COMP	12
Continuous Improvement	COMP	13
Demonstrated Contribution of IT to Business	COMP	14
Business Strategic Planning	GOV	15
IT Strategic Planning	GOV	16
Budgetary Control	GOV	17
IT Investment Management	GOV	18
Steering Committees	GOV	19
Prioritization Process	GOV	20
React/Respond Quickly	GOV	21

Table 6. *Survey Question Descriptions (Continued)*

Survey Question Topic	Criteria	Question Number
Business Perception of IT Value	PART	22
Role of IT in Strategic Business Planning	PART	23
Shared Goals, Risk, Rewards/Penalties	PART	24
IT Program Management	PART	25
Relationship/Trust Style	PART	26
Business Sponsor/Champion	PART	27
Scope of IT Systems	SCOPE	28
Standards Articulation and Compliance	SCOPE	29
Architectural Integration	SCOPE	30
Business and IT Change Management	SCOPE	31
Infrastructure Flexibility	SCOPE	32
Innovation and Entrepreneurship	SKILL	33
Locus of Power	SKILL	34
Change Readiness	SKILL	35
Career Crossover	SKILL	36
Education and Cross-Training	SKILL	37
Social, Political, and Trusting Interpersonal	SKILL	38
Attract and Retain Best Talent	SKILL	39

The detailed data collected from each of the eleven participating airlines is summarized in Tables 7 through 12. Each table summarizes the data collected for one of the six SAM criteria. The average score for each question is broken down by airline. The average SAM criteria score for each airline is displayed at the bottom of each table.

Table 7. *Airline Average Communication Maturity by Survey Question*

Question Number	Participating Airline										
	1	2	3	4	5	6	7	8	9	10	11
01	1.50	2.00	3.00	3.17	2.83	2.33	3.67	3.50	4.17	2.50	2.50
02	1.67	2.33	4.00	3.50	2.67	3.17	3.83	2.00	3.83	2.00	2.00
03	1.83	2.83	3.50	2.33	2.33	2.17	2.67	4.50	2.83	2.83	3.00
04	1.50	2.17	3.17	2.83	2.33	2.17	1.83	3.17	2.83	2.17	2.00
05	1.83	2.33	3.50	2.33	1.83	2.67	1.83	3.00	2.83	2.67	2.50
06	1.83	1.83	3.00	2.83	1.33	2.33	2.00	3.50	2.67	1.50	1.67
Average	1.69	2.25	3.36	2.83	2.22	2.47	2.64	3.28	3.19	2.28	2.28

Table 8. *Airline Average Competency and Value Maturity by Survey Question*

Question Number	Participating Airline										
	1	2	3	4	5	6	7	8	9	10	11
07	2.50	2.67	3.33	1.50	3.00	2.67	3.17	3.50	3.00	2.50	2.50
08	2.50	2.67	3.50	2.67	2.83	3.17	3.67	3.50	3.50	2.83	2.83
09	2.00	2.33	4.00	2.67	2.83	3.00	3.00	3.50	2.33	2.50	2.50
10	1.50	3.00	3.00	3.00	3.33	2.17	3.17	4.00	3.17	2.83	2.83
11	1.67	2.17	3.17	2.17	2.33	2.00	1.67	3.50	1.50	2.17	2.17
12	2.00	3.00	3.83	2.00	3.67	2.50	3.00	2.50	3.83	3.00	3.00
13	2.33	3.17	3.17	2.17	2.00	2.50	2.33	3.50	2.83	2.83	2.17
14	2.00	2.67	3.33	3.00	2.33	2.17	2.50	3.33	3.00	3.00	2.83
Average	2.06	2.71	3.42	2.40	2.79	2.52	2.81	3.42	2.90	2.71	2.60

Table 9. *Airline Average Governance Maturity by Survey Question*

Question Number	Participating Airline										
	1	2	3	4	5	6	7	8	9	10	11
15	1.50	2.67	4.00	2.50	3.00	3.33	3.17	3.33	3.33	2.67	2.33
16	1.50	2.83	3.33	2.83	3.00	2.83	3.17	3.67	3.00	2.83	2.50
17	2.00	3.17	2.67	2.83	2.67	2.00	2.83	2.50	2.50	3.17	2.67
18	2.00	1.83	2.67	1.83	3.83	2.17	2.67	2.50	3.00	1.83	1.83
19	1.83	3.00	4.00	2.00	3.00	2.00	2.00	3.00	3.00	3.00	3.00
20	2.00	3.33	3.00	1.50	3.67	1.50	3.00	2.83	3.17	3.50	3.00
21	1.50	3.17	3.67	2.17	2.67	2.17	3.67	3.50	3.00	3.00	2.67
Average	1.76	2.86	3.33	2.24	3.12	2.29	2.93	3.05	3.00	2.86	2.57

Table 10. *Airline Average Partnership Maturity by Survey Question*

Question Number	Participating Airline										
	1	2	3	4	5	6	7	8	9	10	11
22	1.33	3.33	3.33	2.50	2.33	2.17	3.17	3.50	2.83	3.17	3.00
23	1.67	2.67	3.17	2.17	2.33	2.00	2.17	3.50	2.50	2.83	2.83
24	2.33	2.50	2.67	2.67	2.00	2.17	2.83	3.00	2.67	2.50	2.83
25	1.83	2.00	3.67	2.83	4.00	2.00	3.00	3.17	3.00	2.00	2.00
26	2.67	2.67	3.33	2.17	3.50	2.00	2.83	3.50	2.17	2.67	2.67
27	1.67	2.67	3.17	2.00	3.00	2.17	2.67	4.00	2.67	2.83	2.83
Average	1.92	2.64	3.22	2.39	2.86	2.08	2.78	3.44	2.64	2.67	2.69

Table 11. *Airline Average Scope and Architecture Maturity by Survey Question*

Question Number	Participating Airline										
	1	2	3	4	5	6	7	8	9	10	11
28	2.33	2.50	3.50	1.67	2.67	2.50	2.33	3.50	2.33	2.67	2.50
29	1.83	2.17	3.67	2.50	3.67	2.67	3.83	2.67	3.17	2.67	2.67
30	1.83	2.83	3.67	1.83	3.67	2.00	2.67	2.67	2.33	2.67	2.67
31	1.83	2.50	3.33	2.50	3.33	2.33	3.00	2.67	3.33	2.50	2.33
32	2.00	2.67	2.83	1.67	2.83	2.50	2.50	2.50	2.83	2.17	2.17
Average	1.97	2.53	3.40	2.03	3.23	2.40	2.87	2.80	2.80	2.53	2.47

Table 12. *Airline Average Human Resource Skills Maturity by Survey Question*

Question Number	Participating Airline										
	1	2	3	4	5	6	7	8	9	10	11
33	1.83	2.33	3.33	3.50	3.83	2.00	2.50	2.50	3.33	2.33	2.33
34	2.00	2.17	2.83	3.33	2.83	2.17	2.00	3.50	2.50	2.00	2.00
35	2.00	2.50	3.83	2.17	2.50	2.50	2.33	2.50	2.17	2.50	2.50
36	1.67	2.00	3.00	3.33	2.17	2.00	2.33	3.33	2.17	1.83	2.00
37	2.00	2.00	3.50	3.83	1.67	2.00	2.33	3.00	2.33	2.00	2.33
38	2.00	2.83	3.00	2.00	3.00	1.67	3.00	3.17	2.00	2.67	2.33
39	2.17	2.17	3.33	2.50	3.50	2.00	3.00	2.50	2.00	2.17	2.17
Average	1.95	2.29	3.26	2.95	2.79	2.05	2.50	2.93	2.36	2.21	2.24

Each airline identified six individuals to participate in this survey. Three of the participants were from the IT organization and the other three were associated with the business organization. Table 13 summarizes how the responses from these two groups differed for each airline and how each airline's average score compared with the industry average.

Table 13. *Airline Strategic Alignment Data Summary*

	SAM	COMM	COMP	GOV	PART	SCOPE	SKILL
Airline-1	1.89	1.69	2.06	1.76	1.92	1.97	1.95
IT Average	1.89	1.72	1.96	1.76	1.83	2.13	1.95
Business Average	1.89	1.66	2.16	1.76	2.01	1.81	1.95
Airline-2	2.55	2.25	2.71	2.86	2.64	2.53	2.29
IT Average	2.55	2.39	2.83	2.86	2.39	2.73	2.10
Business Average	2.54	2.11	2.59	2.86	2.89	2.33	2.48
Airline-3	3.33	3.36	3.42	3.33	3.22	3.40	3.26
IT Average	3.41	3.39	3.58	3.52	2.94	3.67	3.33
Business Average	3.26	3.33	3.26	3.14	3.50	3.13	3.19
Airline-4	2.47	2.83	2.40	2.24	2.39	2.03	2.95
IT Average	2.55	2.89	2.38	2.33	2.33	2.53	2.86
Business Average	2/39	2.77	2.42	2.15	2.45	1.53	3.04
Airline-5	2.84	2.22	2.79	3.12	2.86	3.23	2.79
IT Average	2.94	2.06	2.92	3.33	2.72	3.86	2.76
Business Average	2.73	2.38	2.66	2.91	3.00	2.60	2.82
Airline-6	2.30	2.47	2.52	2.29	2.08	2.40	2.05
IT Average	2.40	2.50	2.63	2.33	2.11	2.67	2.14
Business Average	2.21	2.44	2.41	2.25	2.05	2.13	1.96

Table 13. *Airline Strategic Alignment Data Summary (Continued)*

	SAM	COMM	COMP	GOV	PART	SCOPE	SKILL
Airline-7	2.75	2.64	2.81	2.93	2.78	2.87	2.50
IT Average	2.84	2.61	2.88	2.95	2.61	3.33	2.76
Business Average	2.65	2.67	2.74	2.91	2.95	2.41	2.24
Airline-8	3.15	3.28	3.42	3.05	3.44	2.80	2.93
IT Average	3.05	3.00	3.29	3.00	3.06	3.07	2.86
Business Average	3.26	3.56	3.55	3.10	3.82	2.53	3.00
Airline-9	2.81	3.19	2.90	3.00	2.64	2.80	2.36
IT Average	2.87	3.28	2.96	3.05	2.39	3.07	2.48
Business Average	2.76	3.10	2.84	2.95	2.89	2.53	2.24
Airline-10	2.54	2.28	2.71	2.86	2.67	2.53	2.21
IT Average	2.58	2.44	2.92	2.86	2.39	2.93	1.95
Business Average	2.51	2.12	2.50	2.86	2.95	2.13	2.47
Airline-11	2.48	2.28	2.60	2.57	2.69	2.47	2.24
IT Average	2.49	2.50	2.71	2.63	2.28	2.87	1.95
Business Average	2.46	2.06	2.49	2.51	3.10	2.07	2.53
Industry Average =	2.65	2.59	2.76	2.73	2.67	2.64	2.50

Appendix A through Appendix K has also been provided to graphically illustrate the information contained in Table 13. Each appendix represents a single airline, which participated in this study. There are six plots in each appendix; one plot summarizing the survey responses associated with each of the six SAM criteria. Each plot illustrates the average responses for each question provided by the IT and business units for the respective airline. These data are compared with the average response by the airline and the average response by the industry.

Operational Performance Data Collection

Operational performance data consists of data collected by the USDOT related to existing airline metrics (e.g., on-time performance, flight cancellations, mishandled baggage, over-bookings, and customer complaints; USDOT, 2009). On-time performance is represented by the percentage of scheduled operations which are delayed, excluding those delays which are the result of extreme weather. Similarly, flight cancellations are calculated as the percentage of scheduled operations which are cancelled. Cancellations do not include those which occurred as a result of extreme weather conditions. The mishandled baggage metric is calculated as the number of mishandled baggage reports per 100 enplaned passengers. The metric which accounts for over-bookings is calculated as the number of passengers which are denied boarding per 100 enplaned passengers. This metric includes those passengers that voluntarily surrendered their seat. The last operational performance metric involves customer complaints which are filed with the USDOT in writing, by telephone, via e-mail, or in person. Safety related complaints are excluded from this total. The customer complaint metric is calculated as the number of complaints per 10,000 passengers enplaned.

An aggregate of these five metrics, collected from the most recent 12 month period, is used to determine an operational performance metric for each airline. The data associated with this period represent data closest to the period in which the survey data was collected. In addition, the use of a 12-month period ensures that any seasonal effects, which may be present in these data, are controlled. The operational performance metric for those participating airlines ranged from 0.61 to 1.09. Individual performance metrics represent deficient performance characteristics; lower values represent better

operational performance. Since the individual operational performance scores can be reproduced using public records, these scores can only be reference here in a summary form. The disclosure of the specific data would violate the anonymity guarantee on which the survey data was provided. These data are used in support of RQ1.

Financial Performance Data Collection

The financial performance metric is represented as the aggregate sum of four specific secondary factors: (a) current ratio, (b) inverse debt ratio, (c) return on total assets, and (d) basic earning power ratio. Current ratio is calculated by dividing the airline's current assets by its current liabilities. Inverse debt ratio is calculated by dividing the airline's total assets by its total debt. Return on total assets is calculated by dividing the airline's net income by its total assets. Finally, basic earning power ratio is calculated by dividing the airline's EBIT by its total assets. The raw data necessary to generate these secondary factors was collected from a variety of public records and corporate filings (Financial Times, 2010; ICC Information Limited, 2010; Securities and Exchange Commission, 2010; Worldscope International, 2010). The specific financial source used was dependent on the airline and national origin. All financial data was converted to USD using current currency exchange rates (Oanda, 2010).

An aggregate of these four financial metrics, collected from the most recent 12 month period, is used to determine a financial performance metric for each airline. The data associated with this period represent data closest to the period in which the survey data was collected. The financial performance metric for those participating airlines ranged from 1.78 to 4.31. Individual performance metrics represent positive performance

characteristics; higher values represent better financial performance. Since the individual financial performance scores can be reproduced using public records, these scores can only be reference here in a summary form. The disclosure of the specific data would violate the anonymity guarantee on which the survey data was provided. These data are used in support of RQ2 and RQ5.

Airline Characteristic Data Collection

Airline characteristic data consists of two parts (a) size of the airline and (b) average load factor. This data is gathered by the International Air Transport Association (IATA, 2009) and reported by Air Transport Intelligence (2010). Fleet sized data represents the number of aircraft on the date in which the data was harvested and ranged from 25 to 300 aircraft. Load factor data represents each airline's average load factor for the most recent 12 month period and ranged from 0.65 to 0.80. The data associated with this time period represent data closest to the period in which the survey data was collected. The use of a 12 month period ensures that any seasonal effects are controlled. These data are used in support of RQ3 and RQ4.

Data Analysis

The data analysis associated with this study was divided into four elements. The first data analysis element examined the normality of the survey data. The use of parametric or non-parametric statistical techniques was dependant on the results of this test. The second data analysis element involved the generation of descriptive statistics related to the survey data. These statistics provide a quantitative summary of these data.

The third element focused on the necessary post hoc power analyses, which are important to gage the extent to which Type II errors were present in the data. The final data analysis element involved the conduct of the various correlation analyses surrounding each of the hypotheses.

Test for Normality

The data provided in Table 13 was used to test for normality. A Shapiro-Wilk test was performed using the calculated SAM Level and each of the six categories across all 11 airlines participating in this study. The results of these tests are shown in Table 14. The supposition of normality is rejected where $p < 0.05$. Since p is greater than 0.05 in each of the seven cases, the assumption of normality is retained, allowing parametric statistical techniques to be used. These results, as well as all subsequent correlational analysis, were generated with the use of the IBM SPSS Statistics software package—PASW® Statistics GradPack 18.0.0.

Table 14. *Shapiro-Wilk Test of Normality*

SAM Criteria	SAM	COMM	COMP	GOV	PART	SCOPE	SKILL
Significance (p)	0.898	0.417	0.426	0.320	0.715	0.758	0.482

Survey Descriptive Statistics

This section provides several important descriptive statistics associated with the survey data. Table 15 summarizes this information by describing the mean, standard

deviation, standard error of the mean (SEM), and confidence interval for the strategic alignment maturity level and each of the six related IT-business alignment criteria. The SEM represents the standard deviation of the sample mean for each criterion. Since the data was found to be normally distributed this data can be used to calculate the approximate confidence interval for the mean.

Table 15. *SAM Survey Descriptive Statistics*

Criteria	Mean	Standard Deviation	Standard Error Mean	95% Confidence Interval	
				Lower	Upper
SAM	2.646	0.396	0.119	2.380	2.912
COMM	2.591	0.525	0.158	2.238	2.944
COMP	2.758	0.399	0.120	2.490	3.026
GOV	2.727	0.465	0.140	2.415	3.040
PART	2.667	0.441	0.133	2.370	2.963
SCOPE	2.639	0.443	0.134	2.342	2.937
SKILL	2.502	0.421	0.127	2.219	2.785

Strategic Alignment Maturity and Operational Performance Metrics (RQ1)

The purpose of RQ1 is to examine the relationship between an airline's strategic alignment maturity level (derived from the questionnaire) and its operational performance measure (derived from the USDOT data). A power analysis was first conducted in an effort to determine the likelihood that Type II errors were present in the data associated with the sample population. For this purpose, an F-test for linear multiple regression was performed using the G*Power 3 stand-alone power analysis software application (Faul et

al., 2007). A subset of the total sample population, represented by 36 surveys from U.S. airlines, was used to support this research question. Prior studies have shown that for an α-value of 0.05, a power value of 0.80 is necessary in order to ensure sufficient statistical rigor (Sledgianowski et al., 2006). For this specific sample an effect size (f^2) of 0.231 would be necessary. A Pearson's correlation (r) was applied to the data collected for RQ1 as they related to each of hypotheses listed in Table 16. The Pearson's correlation, along with the resulting coefficient of determination (r^2), effect size (f^2), and statistical significance (p) are summarized in Table 17. While the data in Table 17 identified four cases in which sufficient statistical power was achieved (i.e., 1H-3, 1H-4, 1H-5, and 1H-7), none of the cases provided a statically significant result (i.e., $p < 0.05$); therefore, none of the null hypotheses associated with RQ1 can be rejected. Figure 1 provides a graphical representation of calculated correlations. Since the results were not statistically significant and two of the hypotheses lacked the necessary statistical power, this graph can only be used to indicate a possible trend.

Table 16. *Research Question-1 Hypotheses*

$H1\text{-}1_0$	There is no significant correlation between an airline's strategic alignment maturity level and its operational performance as measured by the USDOT.
$H1\text{-}1_A$	There is a significant correlation between an airline's strategic alignment maturity level and its operational performance as measured by the USDOT.
$H1\text{-}2_0$	There is no significant correlation between an airline's communications maturity and its operational performance as measured by the USDOT.
$H1\text{-}2_A$	There is a significant correlation between an airline's communications maturity and its operational performance as measured by the USDOT.
$H1\text{-}3_0$	There is no significant correlation between an airline's competency and value maturity and its operational performance as measured by the USDOT.
$H1\text{-}3_A$	There is a significant correlation between an airline's competency and value maturity and its operational performance as measured by the USDOT.
$H1\text{-}4_0$	There is no significant correlation between an airline's governance maturity and its operational performance as measured by the USDOT.
$H1\text{-}4_A$	There is a significant correlation between an airline's governance maturity and its operational performance as measured by the USDOT.
$H1\text{-}5_0$	There is no significant correlation between an airline's partnership maturity and its operational performance as measured by the USDOT.
$H1\text{-}5_A$	There is a significant correlation between an airline's partnership maturity and its operational performance as measured by the USDOT.
$H1\text{-}6_0$	There is no significant correlation between an airline's scope and architecture maturity and its operational performance as measured by the USDOT.
$H1\text{-}6_A$	There is a significant correlation between an airline's scope and architecture maturity and its operational performance as measured by the USDOT.
$H1\text{-}7_0$	There is no significant correlation between an airline's human resource skills maturity and its operational performance as measured by the USDOT.
$H1\text{-}7_A$	There is a significant correlation between an airline's human resource skills maturity and its operational performance as measured by the USDOT.

Table 17. Operational Performance Correlation With SAM Criteria (RQ1)

Hypothesis	SAM Criteria	r	r^2	f^2	p
H1-1	SAM	0.428	0.183	0.224	0.397
H1-2	COMM	0.118	0.014	0.014	0.824
H1-3	COMP	0.455	0.207	0.261*	0.364
H1-4	GOV	0.480	0.230	0.299*	0.335
H1-5	PART	0.626	0.392	0.644*	0.184
H1-6	SCOPE	0.406	0.165	0.197	0.424
H1-7	SKILL	0.454	0.206	0.260*	0.366

* Sufficient statistical power was achieved at $f^2 > 0.231$.

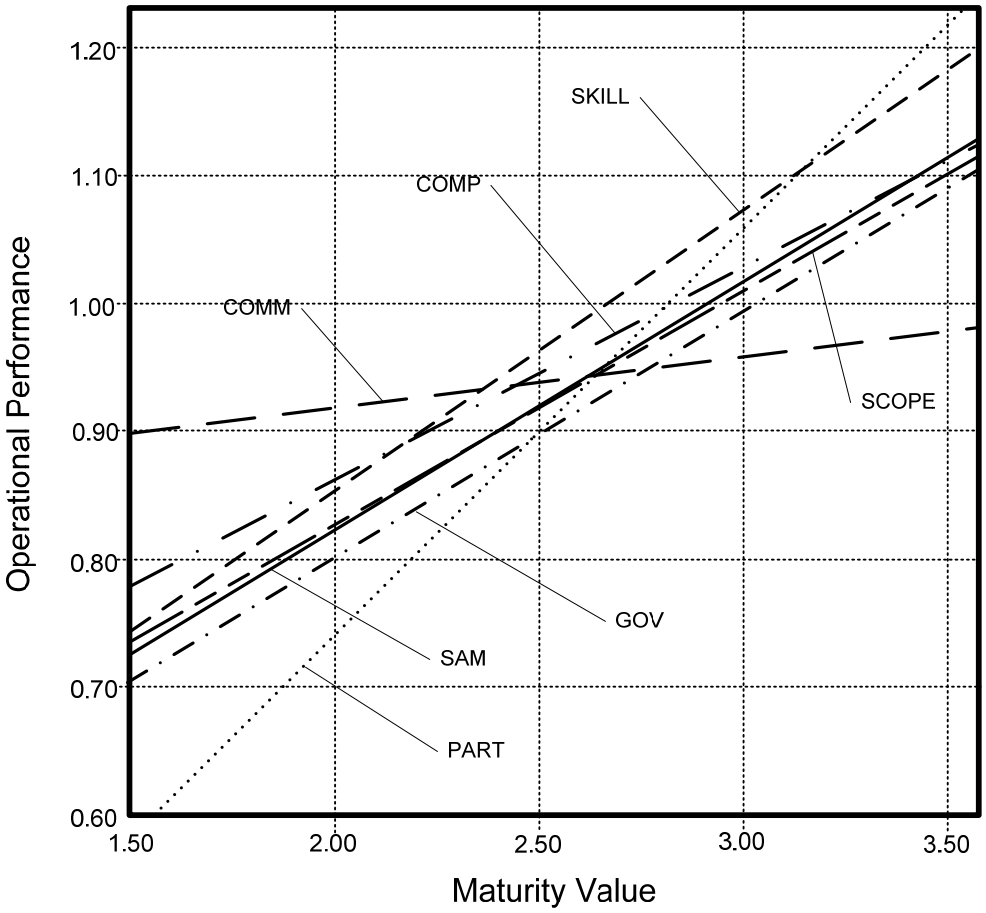

Figure 1. Operational Performance Versus Maturity Components

Strategic Alignment Maturity and Financial Performance Metrics (RQ2)

The purpose of RQ2 is to examine the relationship between an airline's strategic alignment maturity level (derived from the questionnaire) and its financial operational performance (derived from public financial records). A power analysis was first conducted in an effort to determine the likelihood that Type II errors were present in the data associated with the sample population. For this purpose, an F-test for linear multiple regression was performed using the G*Power 3 stand-alone power analysis software application (Faul et al., 2007). This power analysis applies to RQ2 through RQ5 each of which targeted the entire sample population, represented by 66 surveys. As noted in the previous discussion, prior studies have shown that for an α-value of 0.05, a power value of 0.80 is necessary in order to ensure sufficient statistical rigor (Sledgianowski et al., 2006). Assuming a medium effect size ($f^2 = 0.15$) the achieved power value for this sample size was 0.87.

A Pearson's correlation (r) was applied to the data collected for RQ2 as they related to each of hypotheses listed in Table 18. The Pearson's correlation and the resulting statistical significance (p) are summarized in Table 19. Three cases demonstrated correlation at $p < 0.05$ (i.e., H2-1, H2-2, and H2-3). For these three cases the null hypothesis is rejected. The remaining case each failed to demonstrate statistically significant results and the null hypotheses cannot be rejected. Figure 2 provides a graphical representation of calculated correlations. The failure of four of the hypotheses to demonstrate statistical significance prevents this graph from being used for anything other than an indicator of a possible trend.

Table 18. *Research Question-2 Hypotheses*

$H2\text{-}1_0$	There is no significant correlation between an airline's strategic alignment maturity level and its financial performance as measured using available public records and corporate filings.
$H2\text{-}1_A$	There is a significant correlation between an airline's strategic alignment maturity level and its financial performance as measured using available public records and corporate filings.
$H2\text{-}2_0$	There is no significant correlation between an airline's communications maturity and its financial performance as measured using available public records and corporate filings.
$H2\text{-}2_A$	There is a significant correlation between an airline's communications maturity and its financial performance as measured using available public records and corporate filings.
$H2\text{-}3_0$	There is no significant correlation between an airline's competency and value maturity and its financial performance as measured using available public records and corporate filings.
$H2\text{-}3_A$	There is a significant correlation between an airline's competency and value maturity and its financial performance as measured using available public records and corporate filings.
$H2\text{-}4_0$	There is no significant correlation between an airline's governance maturity and its financial performance as measured using available public records and corporate filings.
$H2\text{-}4_A$	There is a significant correlation between an airline's governance maturity and its financial performance as measured using available public records and corporate filings.
$H2\text{-}5_0$	There is no significant correlation between an airline's partnership maturity and its financial performance as measured using available public records and corporate filings.
$H2\text{-}5_A$	There is a significant correlation between an airline's partnership maturity and its financial performance as measured using available public records and corporate filings.
$H2\text{-}6_0$	There is no significant correlation between an airline's scope and architecture maturity and its financial performance as measured using available public records and corporate filings.
$H2\text{-}6_A$	There is a significant correlation between an airline's scope and architecture maturity and its financial performance as measured using available public records and corporate filings.
$H2\text{-}7_0$	There is no significant correlation between an airline's human resource skills maturity and its financial performance as measured using available public records and corporate filings.
$H2\text{-}7_A$	There is a significant correlation between an airline's human resource skills maturity and its financial performance as measured using available public records and corporate filings.

Table 19. *Financial Performance Correlation* With *SAM Criteria (RQ2)*

Hypothesis	SAM Criteria	*r*	*p*
H2-1	SAM	0.642	0.033*
H2-2	COMM	0.676	0.023*
H2-3	COMP	0.698	0.017*
H2-4	GOV	0.444	0.171
H2-5	PART	0.498	0.119
H2-6	SCOPE	0.532	0.092
H2-7	SKILL	0.553	0.077

* Correlation is significant at the 0.05 level (2-tailed).

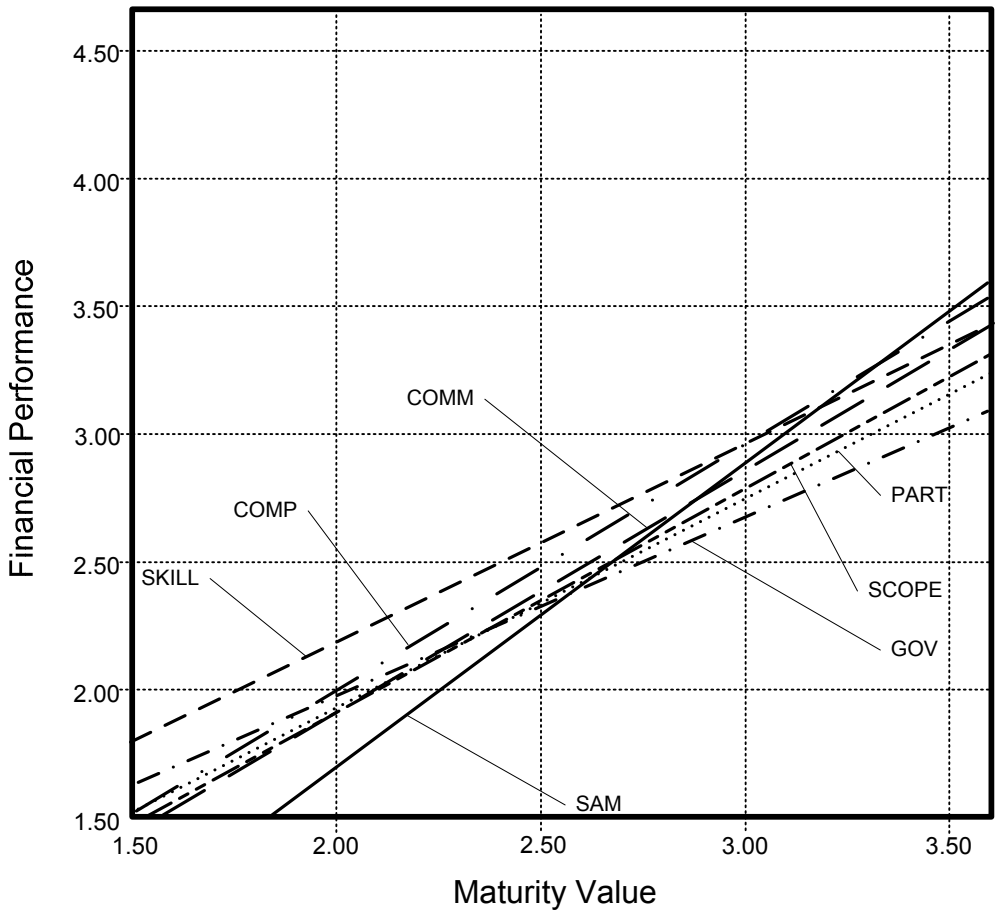

Figure 2. Financial Performance Versus Maturity Components

Strategic Alignment Maturity and Airline Fleet Size (RQ3)

The purpose of RQ3 is to examine the relationship between an airline's strategic alignment maturity level (derived from the questionnaire) and its fleet size. A Pearson's correlation (*r*) was applied to the data collected for RQ3 as they related to each of hypotheses listed in Table 20. The Pearson's correlation and the resulting statistical significance (*p*) are summarized in Table 21. None of the cases provided a statically significant result (i.e., $p < 0.05$); therefore, none of the null hypotheses associated with RQ3 can be rejected. Figure 3 provides a graphical representation of calculated correlations between an airline's fleet size and the SAM level criteria. Since the results were not statistically significant this graph can only be used to indicate a possible trend.

Table 20. *Research Question-3 Hypotheses*

$H3\text{-}1_0$	There is no significant correlation between an airline's strategic alignment maturity level and the airline's fleet size
$H3\text{-}1_A$	There is a significant correlation between an airline's strategic alignment maturity level and the airline's fleet size
$H3\text{-}2_0$	There is no significant correlation between an airline's communications maturity and the airline's fleet size
$H3\text{-}2_A$	There is a significant correlation between an airline's communications maturity and the airline's fleet size
$H3\text{-}3_0$	There is no significant correlation between an airline's competency and value maturity and the airline's fleet size
$H3\text{-}3_A$	There is a significant correlation between an airline's competency and value maturity and the airline's fleet size
$H3\text{-}4_0$	There is no significant correlation between an airline's governance maturity and the airline's fleet size
$H3\text{-}4_A$	There is a significant correlation between an airline's governance maturity and the airline's fleet size
$H3\text{-}5_0$	There is no significant correlation between an airline's partnership maturity and the airline's fleet size
$H3\text{-}5_A$	There is a significant correlation between an airline's partnership maturity and the airline's fleet size
$H3\text{-}6_0$	There is no significant correlation between an airline's scope and architecture maturity and the airline's fleet size
$H3\text{-}6_A$	There is a significant correlation between an airline's scope and architecture maturity and the airline's fleet size
$H3\text{-}7_0$	There is no significant correlation between an airline's human resource skills maturity and the airline's fleet size
$H3\text{-}7_A$	There is a significant correlation between an airline's human resource skills maturity and the airline's fleet size

Table 21. *Airline Fleet Size Correlation With SAM Criteria (RQ3)*

Hypothesis	SAM Criteria	*r*	*p*
$H3\text{-}1_0$	SAM	0.116	0.734
$H3\text{-}2_0$	COMM	0.088	0.797
$H3\text{-}3_0$	COMP	0.046	0.893
$H3\text{-}4_0$	GOV	0.149	0.663
$H3\text{-}5_0$	PART	-0.012	0.972
$H3\text{-}6_0$	SCOPE	0.180	0.596
$H3\text{-}7_0$	SKILL	0.177	0.602

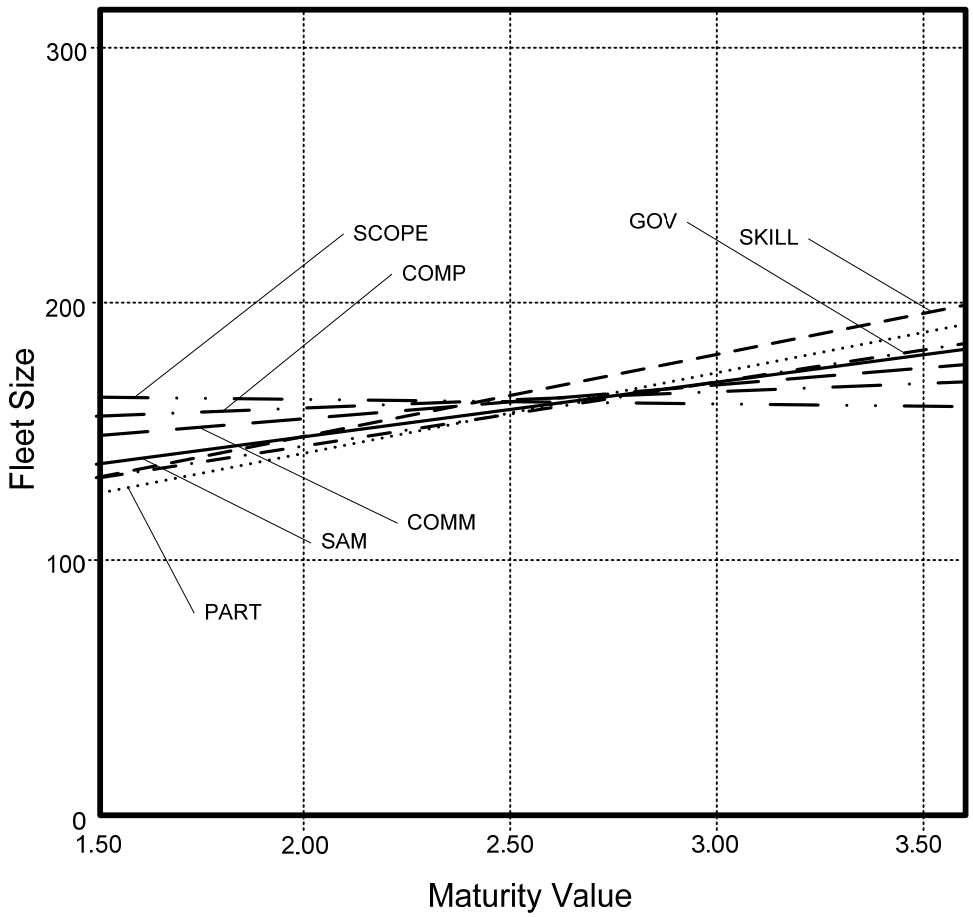

Figure 3. Fleet Size Versus Maturity Components

Strategic Alignment Maturity and Average Load Factor (RQ4)

The purpose of RQ4 is to examine the relationship between an airline's strategic alignment maturity level (derived from the questionnaire) and its average load factor. A Pearson's correlation (r) was applied to the data collected for RQ4 as they related to each of hypotheses listed in Table 22. The Pearson's correlation and the resulting statistical significance (p) are summarized in Table 23. Two cases demonstrated correlation at $p < 0.01$ (i.e., H4-4 and H4-6). Three other cases demonstrated correlation at $p < 0.05$ (i.e., H4-1, H4-3, and H4-5). For these five cases the null hypothesis is rejected. The results for H4-2 and H4-7 failed to demonstrate statistically significant results and the null hypotheses cannot be rejected. Figure 4 illustrates the linear trend of average load factor as it relates to the SAM Level and each of the SAM criteria. Figure 4 provides a graphical representation of calculated correlations. The trends illustrated for those variables which demonstrated significant results 01 (i.e., H4-1, H4-3, H4-4, H4-5, and H4-6) show a consistent trend, while the remaining variables (i.e., H4-2 and H4-7) appear have outlier characteristics.

Table 22. *Research Question-4 Hypotheses*

$H4\text{-}1_0$	There is no significant correlation between an airline's strategic alignment maturity level and the airline's average load factor.
$H4\text{-}1_A$	There is a significant correlation between an airline's strategic alignment maturity level and the airline's average load factor.
$H4\text{-}2_0$	There is no significant correlation between an airline's communications maturity and the airline's average load factor.
$H4\text{-}2_A$	There is a significant correlation between an airline's communications maturity and the airline's average load factor.
$H4\text{-}3_0$	There is no significant correlation between an airline's competency and value maturity and the airline's average load factor.
$H4\text{-}3_A$	There is a significant correlation between an airline's competency and value maturity and the airline's average load factor.
$H4\text{-}4_0$	There is no significant correlation between an airline's governance maturity and the airline's average load factor.
$H4\text{-}4_A$	There is a significant correlation between an airline's governance maturity and the airline's average load factor.
$H4\text{-}5_0$	There is no significant correlation between an airline's partnership maturity and the airline's average load factor.
$H4\text{-}5_A$	There is a significant correlation between an airline's partnership maturity and the airline's average load factor.
$H4\text{-}6_0$	There is no significant correlation between an airline's scope and architecture maturity and the airline's average load factor.
$H4\text{-}6_A$	There is a significant correlation between an airline's scope and architecture maturity and the airline's average load factor.
$H4\text{-}7_0$	There is no significant correlation between an airline's human resource skills maturity and the airline's average load factor.
$H4\text{-}7_A$	There is a significant correlation between an airline's human resource skills maturity and the airline's average load factor.

Table 23. *Average Load Factor Correlation With SAM Criteria (RQ4)*

Hypothesis	SAM Criteria	*r*	*p*
H4-1_0	SAM	0.659	0.027*
H4-2_0	COMM	0.312	0.351
H4-3_0	COMP	0.635	0.036*
H4-4_0	GOV	0.862	0.001**
H4-5_0	PART	0.680	0.021*
H4-6_0	SCOPE	0.768	0.006**
H4-7_0	SKILL	0.244	0.471

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

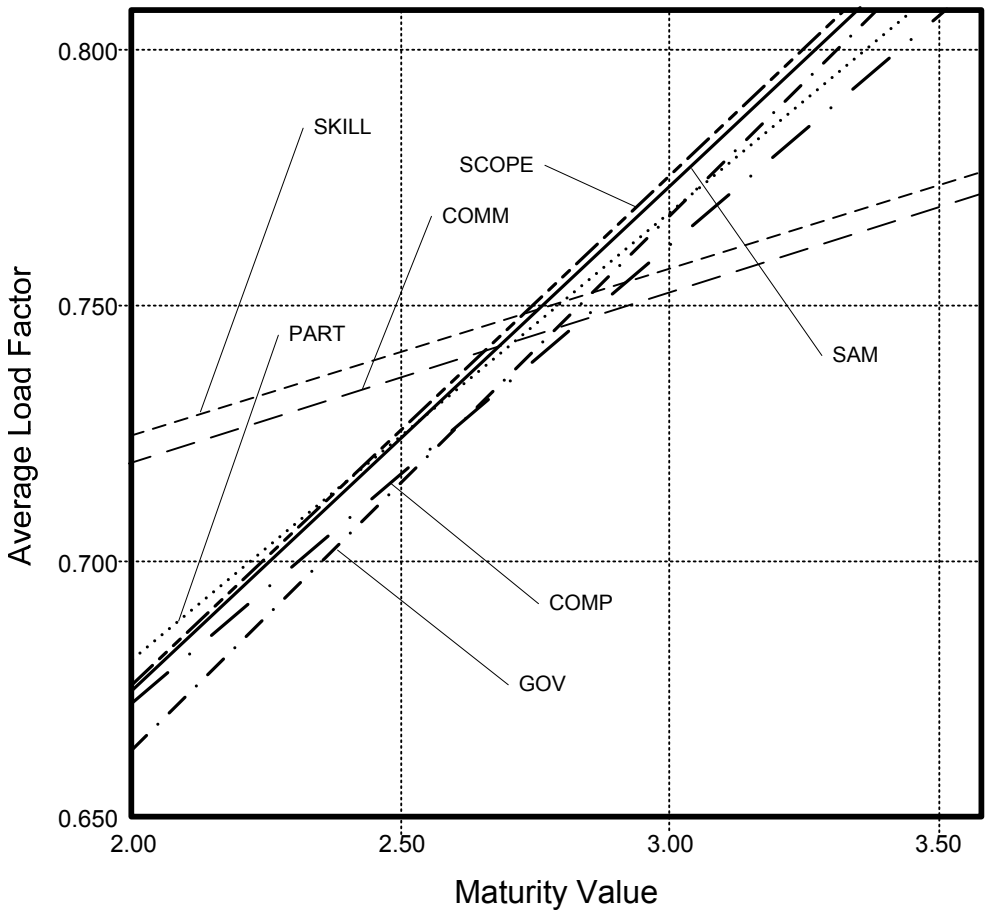

Figure 4. Aircraft Load Factor Versus Maturity Components

Strategic Alignment Maturity and Annual Operating Revenue (RQ5)

The purpose of RQ5 is to examine the relationship between an airline's strategic alignment maturity level (derived from the questionnaire) and its annual operating revenue (derived from public records). A Pearson's correlation (*r*) was applied to the data collected for RQ5 as they related to each of hypotheses listed in Table 24. The Pearson's correlation and the resulting statistical significance (*p*) are summarized in Table 25. None of the cases provided a statically significant result (i.e., $p < 0.05$); therefore, none of the null hypotheses associated with RQ5 can be rejected. Figure 5 provides a graphical representation of calculated correlations between an airline's annual operating revenue and the SAM level criteria. Since the results were not statistically significant this graph can only be used to indicate a possible trend.

Table 24. *Research Question-5 Hypotheses*

$H5\text{-}1_0$	There is no significant correlation between an airline's strategic alignment maturity level and the airline's annual operating revenue.
$H5\text{-}1_A$	There is a significant correlation between an airline's strategic alignment maturity level and the airline's annual operating revenue.
$H5\text{-}2_0$	There is no significant correlation between an airline's communications maturity and the airline's annual operating revenue.
$H5\text{-}2_A$	There is a significant correlation between an airline's communications maturity and the airline's annual operating revenue.
$H5\text{-}3_0$	There is no significant correlation between an airline's competency and value maturity and the airline's annual operating revenue.
$H5\text{-}3_A$	There is a significant correlation between an airline's competency and value maturity and the airline's annual operating revenue.
$H5\text{-}4_0$	There is no significant correlation between an airline's governance maturity and the airline's annual operating revenue.
$H5\text{-}4_A$	There is a significant correlation between an airline's governance maturity and the airline's annual operating revenue.
$H5\text{-}5_0$	There is no significant correlation between an airline's partnership maturity and the airline's annual operating revenue.
$H5\text{-}5_A$	There is a significant correlation between an airline's partnership maturity and the airline's annual operating revenue.
$H5\text{-}6_0$	There is no significant correlation between an airline's scope and architecture maturity and the airline's annual operating revenue.
$H5\text{-}6_A$	There is a significant correlation between an airline's scope and architecture maturity and the airline's annual operating revenue.
$H5\text{-}7_0$	There is no significant correlation between an airline's human resource skills maturity and the airline's annual operating revenue.
$H5\text{-}7_A$	There is a significant correlation between an airline's human resource skills maturity and the airline's annual operating revenue.

Table 25. *Annual Operating Revenue Correlation With SAM Criteria (RQ5)*

Hypothesis	SAM Criteria	*r*	*p*
$H5\text{-}1_0$	SAM	0.712	0.712
$H5\text{-}2_0$	COMM	0.053	0.876
$H5\text{-}3_0$	COMP	-0.023	0.496
$H5\text{-}4_0$	GOV	-0.209	0.538
$H5\text{-}5_0$	PART	-0.235	0.487
$H5\text{-}6_0$	SCOPE	-0.154	0.652
$H5\text{-}7_0$	SKILL	0.099	0.772

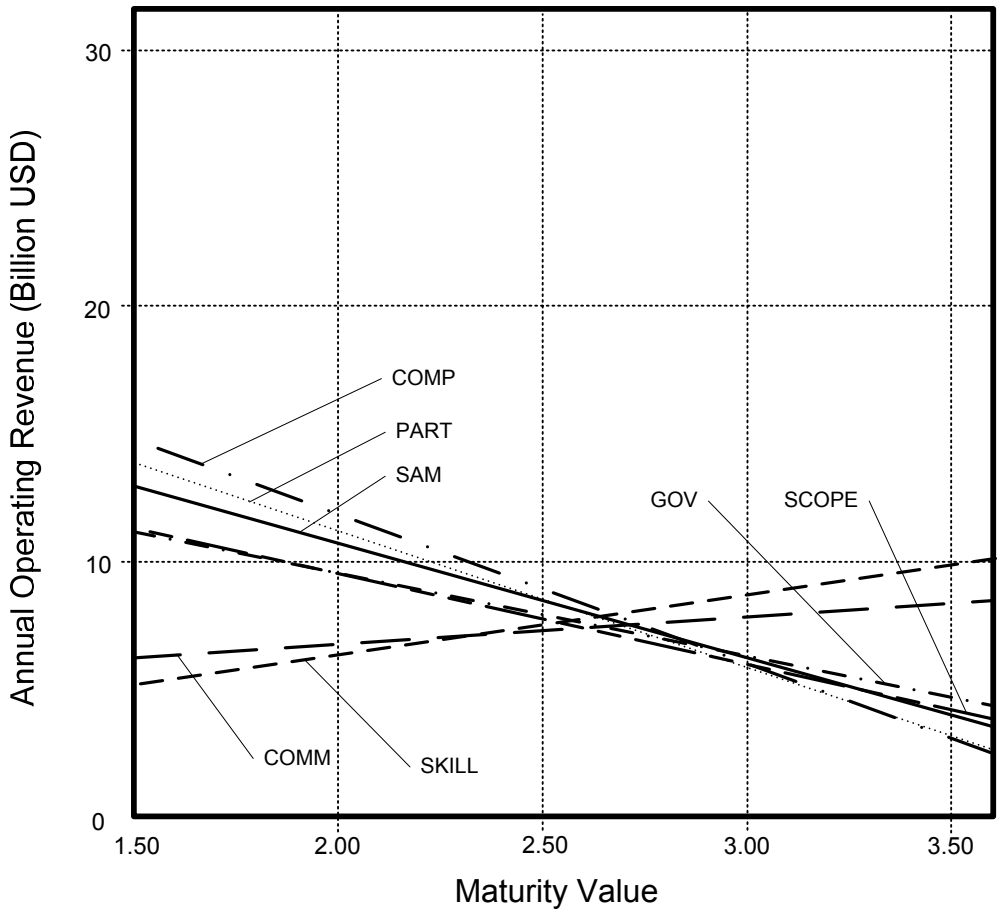

Figure 5. Annual Operating Revenue Versus Maturity Components

CHAPTER 5. DISCUSSION, IMPLICATIONS, RECOMMENDATIONS

This last chapter provides the final discussion and recommendations linked to this study. Starting with a short summary, this section reviews the problem statement, literature reviewed, methodology used, and the findings from this study. A discussion then follows which will place the results in context with the existing body of knowledge. Finally, conclusions and recommendations are provided, based on the relevance of the findings associated with this research.

Summary

A brief overview of this entire study is provided in this section. This summary includes a restatement of the problem, a concise examination of the relevance of the types of literature reviewed as part of this study, and the methodology used. This summary concludes with a synopsis of the findings associated with this research.

Restatement of the Problem

During the period from 1978 to 2008, more than 200 commercial airlines in the U.S. alone were forced to merge, cease operations, or file for bankruptcy protection. While some of these failures can be attributed to unique circumstance, strategic decision making was certainly a contributing factor in many cases. It has been proposed that an airline's general operational and financial performance, as well as some basic operational characteristics, will correlate with its level of strategic alignment maturity. The purpose

of this quantitative study was to evaluate the global commercial airline industry from an IT-business alignment perspective and correlate the alignment maturity level of each airline with its respective performance metrics.

Relevance of Literature Reviewed

A considerable amount of literature exists on the subject of IT-business alignment, much of which was discussed earlier in this study. The earliest works trace back to Chandler (1962) who first began to examine the relationship between the structure of the organization and the strategies that management chose for that organization. Contingency theory has played an important role in the evolution of Chandler's work. Previous research has demonstrated the relationship between strategic fit and the environment (Ensign, 2001; Xu et al., 2006), governance (Goll et al., 2006; Peteraf & Reed, 2007), managerial skills (Barth, 2003), organizational climate (Burton et al., 2004), planning processes (Bloodgood, 2007), knowledge management (Kearns & Sabherwal, 2006), and market conditions (Geiger et al., 2006) to name just a few. This wide range of conditional elements has lead to the current view of strategic fit (Henderson & Venkatraman, 1993). This theory of strategic fit involves the notion that the environment in which any organization operates contains both internal and external domains which are frequently acting in opposing directions. The contingency view suggests that any given environment will present multiple strategy options which are dependent on both the internal and external environments (March, 1999). This line of research culminated in the development of the strategic alignment maturity (SAM) model by Luftman and Brier (1999). In its current form, the SAM assessment instrument

consists of five levels of maturity, each evaluated on six criteria. The alignment of IT and business objectives involves an assessment of how well business and IT are in agreement with these six criterion. This agreement offers a unique lens through which researchers cannot only examine how IT and business regard the effectiveness of each individual category, but also provides insight into the how they view the relative importance placed on each category (Luftman, 2003b).

Methodology

The purpose of this quantitative correlational study was to evaluate the global commercial airline industry from an IT-business alignment perspective and correlate the alignment maturity levels of each airline with their respective performance metrics. This study evaluated the IT-business strategic alignment maturity of major global commercial airlines and recruited the participation of those nations represented by the G-12 nations. This study was designed to evaluate each firm using the constructs which were evaluated as part of previous research using the SAM model survey (Sledgianowski et al., 2006). This survey has been applied to many different industries within the past five years (Luftman & Kempaiah, 2007; Sledgianowski & Luftman, 2005). The SAM survey instrument was used to gather information involving the perception of both the business and IT elements within each airline on six key IT-business alignment criteria: (a) communications maturity, (b) competency/value maturity, (c) governance maturity, (d) partnership maturity, (e) scope and architecture maturity, and (f) human resource skills maturity (Luftman, 2003b). Operational performance data, financial performance data,

and basic airline characteristics parameters were all used to correlate with the maturity levels of each airline.

The most notable strength of this approach is the use of a survey instrument which has been tested and validated across many industries. The techniques used for recruiting participants and distributing the survey were constructed in a manner which was intended to appeal to the professional nature of the respondents. These techniques provided each respondent with an assurance of anonymity and confidentiality. In addition, it provided a method with which to reach out to those who do not respond without compromising the anonymity of those who do respond.

One of the limitations associated with this survey format is the lack of personal contact with the respondents. This lack of personal contact, while giving the respondent a greater sense of anonymity, does not allow for any personal pressure to secure the respondent's participation. An additional limitation in this research design is the inability to generalize the results across other industries, or support generalization to the airline industry across national boarders. To help moderate this concern the sample population included airlines from G-12 nations only. This study was also limited to those air carriers with a minimum annual revenue of USD 20M, which may cause the results to lack a generalizing characteristics for smaller carriers. Finally, this study was limited to a short period in time and the results may not be sustained over time. A longitudinal study might provide different results as economic conditions change and technology evolves.

Summary of Findings

The following is a summary of the research findings. Table 26 provides an overarching summary of the major findings. A more detailed discussion of the findings is provided in the text which follows, with each research question being discussed independently. The acceptance or rejections of the hypothesis of each research question is presented with specific attention being given to those where significant statistical findings were identified.

Table 26. *Summary of Findings*

RQ1 SAM vs. Operational Performance	No correlations identified
RQ2 SAM vs. Financial Performance	Correlations identified at $p < 0.05$ with: • Strategic Alignment Maturity Level • Communications Maturity Criteria • Competency/Value Maturity Criteria
RQ3 SAM vs. Fleet Size	No correlations identified
RQ4 SAM vs. Average Load Factor	Correlations identified at $p < 0.01$ with • Governance Maturity Criteria • Scope and Architecture Maturity Criteria Correlations identified at $p < 0.05$ with • Strategic Alignment Maturity Level • Competency/Value Maturity Criteria • Partnership Maturity Criteria
RQ5 SAM vs. Annual Operating Revenue	No correlations identified

Research Question-1 states: *What relationship, if any, exists between an airline's strategic alignment maturity level and its operational performance as measured by the USDOT?* The data collected for RQ1 failed to identify a correlation between an airline's operational performance (collected from the USDOT data) and its level of strategic alignment maturity. The data also failed to identify any correlations between operational performance and any of the component criteria of SAM (i.e., communication maturity, competency and value maturity, governance maturity, partnership maturity, scope and architecture maturity, and human resource skills maturity). In all but two cases, the sample data set of 36 surveys was not sufficient to provide adequate statistical rigor.

Research Question-2 states: *What relationship, if any, exists between an airline's strategic alignment maturity level and its financial performance as measured using available public records and corporate filings?* The data collected for RQ2 identified a correlation, at $p < 0.05$, between an airlines financial performance and the overall strategic alignment maturity level—H2-1. A correlation, at $p < 0.05$, was also identified between an airlines financial performance and two of the SAM component criteria: (a) communications maturity—H2-2 and (b) competency and value maturity—H2-3.

This relationship between an airline's financial performance and its strategic alignment maturity is illustrated in Figure 6. The financial metric used to measure financial performance is derived from the aggregate sum of four secondary factors: (a) current ratio, (b) inverse debt ratio, (c) return on total assets, and (d) basic earning power ratio. In general, an increase in this financial measure is indicative of an airlines improved financial position in the market. The strategic alignment maturity level and its individual component measures are derived using the survey data provided by the 11

participating airlines. Based on data collected from these airlines, Figure 6 depicts a positive linear relationship between the aggregate financial metric and two of the strategic alignment component criteria: (a) communication maturity—COMM and (b) competency and value maturity—COMP. This graphic also shows a similar linear relationship with the overall strategic alignment maturity level (SAM). While there are certainly other factors which influence a firm's financial performance, these results contribute to the argument in which strategic alignment maturity is viewed as having a net positive affect on a firm's success.

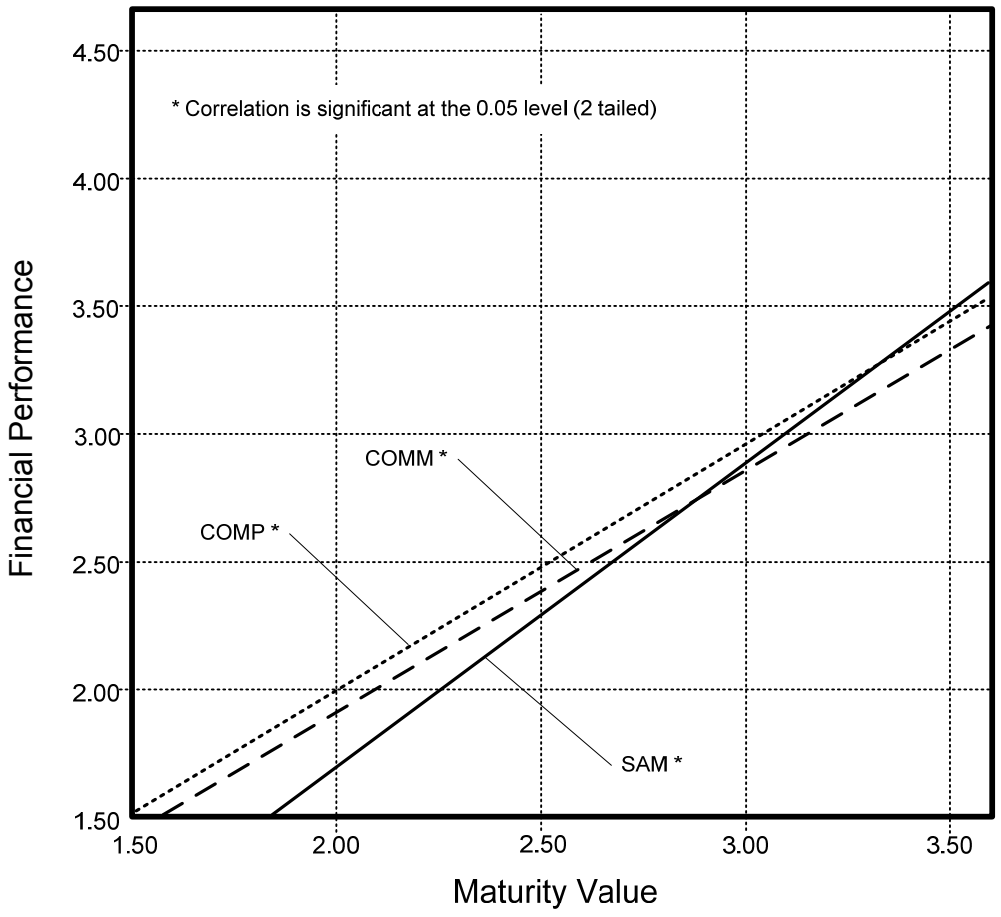

Figure 6. Correlation of Financial Performance With Maturity Components

Research Question-3 states: *What relationship, if any, exists between an airline's strategic alignment maturity level and the airline's fleet size, as measured by the number of aircraft supporting normal operations?* The data analysis, conducted in conjunction with RQ3, failed to identify a correlation between an airline's fleet size and its strategic alignment maturity level. The data also failed to identify any correlations between fleet sized and any of the component criteria of SAM.

Research Question-4 states: *What relationship, if any, exists between an airline's strategic alignment maturity level and the airline's average load factor?* The data collected for RQ4 identified a correlation, at $p < 0.05$, between an airlines average load factor and the overall strategic alignment maturity level—H4-1. A similar correlation, at $p < 0.05$, was identified between an airlines average load factor and two of the SAM component criteria: (a) competency and value maturity—H4-3 and (b) partnership maturity—H4-5. A more significant correlation, at $p < 0.01$, was identified between load factor and two other SAM component criteria: (a) governance maturity—H4-4 and (b) scope and architecture maturity—H4-6. The data did not identify any correlation between average load factor and communication maturity or human resource skills maturity.

This relationship between an airline's average load factor and its strategic alignment maturity is illustrated in Figure 7. Average load factor is the percentage of available seats which are occupied by revenue generating passengers for any given calendar month. The strategic alignment maturity level and its individual component

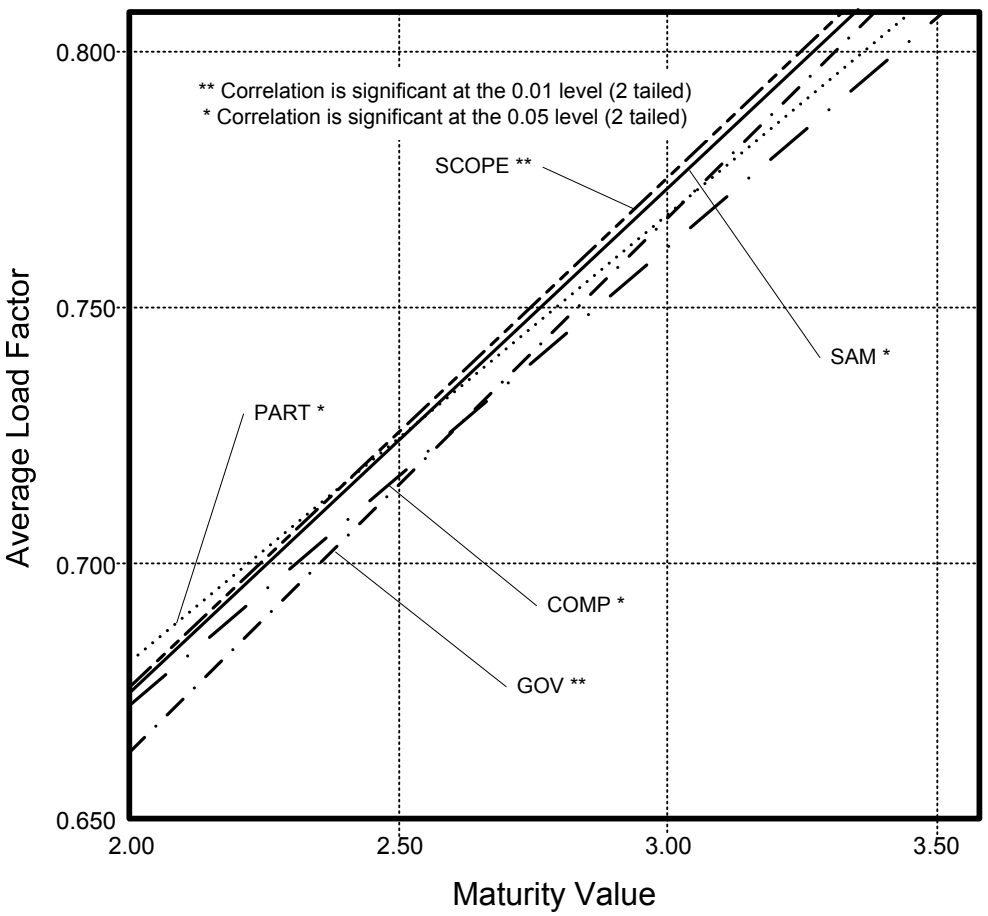

Figure 7. Correlation of Average Load Factor With Maturity Components

measures are derived using the survey data provided by the 11 participating airlines. Since average load factor represents a relationship between revenue and cost it is seen as having at least an indirect affect on an airline's profitability. Therefore, the positive correlation between load factor and strategic alignment maturity should be considered as an important relationship. Figure 7 illustrates that relationship between average load factor and four of the strategic alignment component criteria: (a) communication maturity—COMM, (b) partnership maturity—PART, (c) governance maturity—GOV, and (d) scope and architecture—SCOPE. This graphic also shows a similar linear relationship with the overall strategic alignment maturity level (SAM). As in the case of

financial performance, the link between strategic alignment maturity and load factor provides significant insight into the type of strategic environment necessary for an airline to be successful.

Research Question-5 states: *What relationship, if any, exists between an airline's strategic alignment maturity level and the airline's annual operating revenue?* The data collected for RQ5 failed identify a correlation between an airline's annual operating revenue and its strategic alignment maturity level. The data also failed to identify any correlations between annual operating revenue and any of the component criteria of SAM.

Discussion of Results

Based on the results from this study a general characterization of the commercial airline industry can be made. When compared to the other 14 industries studied by Luftman and Kempaiah (2007), the average airline is positioned in the bottom quartile. The airlines examined in this study scored an overall average maturity level of 2.6 with a standard deviation of 0.4. The 95% confidence interval is 2.4 to 2.9, with individual airline scores ranging from 2.50 to 2.76. This level-2 IT-business alignment maturity score is indicative of an industry with an organizational commitment to promote and encourage IT-business alignment, but still lacks the flexibility and integration across functional units (Sledgianowski & Luftman, 2005). This is consistent with Barth's (2003) study of the airline industry, where he argued that highly mature and established industries were more apt to display reduced agility and increased corporate inertia within the IT and business units. This same lack of flexibility and the existence of

organizational structures which limited rapid response to market conditions have been identified by other recent studies of the airline industry (Forbes & Domm, 2004; Vasigh & Fleming, 2005). Achieving the third level of strategic alignment maturity will require the airlines to establish an alignment process where both IT and business units can work together to achieve specific business objectives. A further discussion follows relating the individual alignment maturity criteria with each dependant variable examined as part of this research.

Communications maturity. The effectiveness of IT-business *communications maturity* scores associated with the airlines studied averaged 2.59. Individual airlines scored between 1.69 and 3.36, resulting in the highest standard deviation among the six alignment maturity criteria—0.53. A level-2 communication maturity is indicative of an organization where there is limited understanding, by IT or business units, of each other's operational environments. Methods used by mid-level management to promote communications within the organization are usually informal (i.e., computer reports and group e-mails) as opposed to more formal techniques which might include elements such as training, e-mail, phone-mail, intranet, and department meetings. Communications between IT and business is moderately informal and generally originates from within the business unit. Level-3 organizations implement two-way communications between IT and business and are more formal in nature. Knowledge sharing between IT and business units (i.e., intellectual understanding and appreciation of the problems/opportunities, tasks, roles, objectives, priorities, goals, direction, etc.) was found to display an emerging structure around key functional unit processes. The IT and business units make use of

liaisons to transfer knowledge from one unit to the other, but these liaisons are seldom used to facilitate relationship development between IT and business units.

Competency and value maturity. The criteria associated with the *competency and value of IT maturity* scored an average of 2.76 within the commercial airline industry. Individual airlines scored between 2.06 and 3.42, with a standard deviation of 0.40. While this was the highest score of any of the six maturity criteria, it too indicates a level-2 maturity. The metrics and processes used to measure the contribution of the IT organization seem to focus equally on technical outcomes and cost efficiencies with limited formal feedback from these metrics. In contrast, business units were seen as more likely to use traditional financial measures across functional organizations and have formal feedback processes in place to utilize the information gained from these metrics. When asked to quantify the contribution of the IT function within the organization, most airlines were ambivalent. While both IT and business units embrace the use of metrics, these measures were rarely integrated for the purpose of improving overall enterprise objectives. Service level agreements were found to exist between the IT and business units across the industry. A significant number of the airlines studied use these agreements to support both technical and customer satisfaction objectives. As one might expect, the airlines that participated in this study characterize themselves as occasionally engaging in formal benchmarking exercises, but rarely do they take action based on those benchmarked results. When asked to describe how they assess and review IT investments, most airlines indicated a trend toward more routine examinations and modest support for improvement practices.

Governance maturity. The average *governance maturity* score was 2.73 for the industry as a whole. Individual airline scores ranges from 1.76 to 3.33, with a standard deviation of 0.47. While this level-2 score indicates an appreciation for the value of strategic planning by the individual IT and business units, there is only a moderate level of inter-organizational planning, resulting in plans which are more tactical in nature. An examination of IT budgeting activities found these activities to be confined to functional organizations with a tendency toward the treatment of some projects as investments. Nevertheless, IT was still viewed as a tool for increasing productivity and efficiencies within the enterprise. Steering committees, which are capable of fostering greater alignment between IT and business units, were mostly used on an as-needed basis. In a similar manner, the prioritization of IT projects were generally part of the business unit domain with a somewhat neutral view of the ability of the IT unit to react and respond quickly to the needs of the business units.

Partnership maturity. The average *partnership maturity* score was 2.67 for the industry as a whole. Individual airlines scores ranges from 1.92 to 3.44, with a standard deviation of 0.44. This signifies of view of IT as an asset that can be used to enable business processes. IT takes most of the risk with little reward. This results in an IT-business relationship which is managed on more of an ad-hoc basis rather than one with programs which are designed to foster a partnering relationship. While most of the participating airlines viewed the IT-business relationship as an arm's length interaction, there was a significant group that described IT as a valued service provider with both IT and business sponsors/champions at the functional unit level.

Scope and architecture maturity. *Scope and architecture maturity* is the fifth alignment maturity criteria. In this area the industry also score a level-2 maturity—2.64. Individual airlines scores ranges from 1.97 to 3.40, with a standard deviation of 0.44. The airlines that participated in this study generally characterized their organizations in the following terms: (a) transaction oriented IT systems, (b) standards which are defined and enforced at the functional unit level, (c) business or IT changes are transparent at the functional level only, and (d) flexibility and integration across functional units as an emerging trait.

Human resources skills maturity. The final alignment maturity criteria, *human resources skills maturity*, scored an average of 2.50 among the airlines studied. Individual airlines scores ranges from 1.95 to 3.26, with a standard deviation of 0.42. The human resources skills of a level-2 organization is differentiated by (a) a moderate encouragement of innovation and entrepreneurialism, (b) an IT decision making process which is predominantly confined to the corporate level, (c) emerging change readiness programs, (d) limited career and educational crossover opportunities, and (e) IT hiring practices focused on technical expertise only. Interpersonal interaction across IT and business units was described by most airlines as an arm's length transactional style, however, those airlines which scored high in this maturity characteristics all described a air of trust and confidence between IT and business.

Operational performance. This synopsis of the alignment maturity survey results can be used to help understand the relationships, or lack of relationships, observed in the analysis. The metrics collected by the USDOT for those airlines representing at least 1% of the industry's revenue (RQ1) are important to the consumer, but they seem to

be used by individual airlines in more of a reactionary manner. This is demonstrated by the lack of correlation with alignment maturity on any of the individual criteria.

Airline fleet size. Based on the data collected, expanding or contracting an airline's fleet size seems unlikely to be a true indicator of alignment maturity, except as it impacts average load factor. This is consistent with a recent study of the U.S. airline industry conducted by Goll et al. (2006). While the authors identified changing markets as playing a significant role in the competitive strategies chosen by various airlines, they found that the size of an airline had only a moderating effect on this type of strategies chosen by any airline. In contrast, the airline's fleet size seemed to influence the strategy chosen by the airline when dealing with environmental conditions. The implication associated with the study by Goll et al. and the results found in this study seem to confirm a lack of correlation between fleet size and strategic alignment maturity.

Average load factor. Average load factor, which is indirectly related to fleet size, did show a correlation with an airline's overall strategic alignment maturity level, as well as four of the six IT-business strategic alignment criteria: (a) competency and value maturity (b) governance maturity, (c) partnership maturity, and (d) scope and architecture maturity. Governance maturity and scope and architecture maturity both indicated the strongest correlation. The seeming contradiction of strategic alignment maturity correlation with fleet size and load factor could be attributed to the manner in which airline operations change as they become larger. Larger airlines are presented with a larger array of options when considering strategic options. By assigning each airline to a tier within the industry, based on their fleet size, future researchers may find to a resulting data to be better behaved.

Annual operating revenue and financial performance. Operating revenue can be viewed in a similar light to that of fleet size. The data collected seems to indicate that operational variations associated with the size of an airline can make it difficult to correlate this indicator with alignment maturity levels. More specifically, the use of the term *operating revenue* within available public records is sometimes misleading. The aggregate characteristic of this type of indicator is not always successful in identifying key components which would allow for airline-to-airline comparisons of operating revenue. Some of the difficulties identified in this study include (a) subsidiary operations, (b) variations in how accounting rules are applied, (c) break-out of one-time expenses, (d) the role of alliances and partnerships, and (e) differences in accounting rules across national borders. The broader financial metric, however, did show a definite correlation: (a) current ratio, (b) debt ratio, (c) return on total assets, and (d) basic earning power ratio. This positive correlation was associated with an airline's overall alignment maturity, as well as two of the six IT-business strategic alignment criteria: (a) communication maturity and (b) competency and value maturity.

Geographical factors. This study recruited airlines from the 13 nations that make up the G-12 nations. The airlines that responded were identified with four countries (i.e., Germany, Japan, Spain, and U.S.) from three different continents (i.e., Asia, Europe, and North America). It was not an objective of this study to examine cross-nation relationship, nor did the number of respondents provide an opportunity to explore this element from a statistically rigorous position. Nevertheless, there were two observations that are worth noting. First, European airlines seemed to exhibit a higher overall SAM level than their counterparts in Asia or North America. Second, governance

maturity, partnership maturity, and scope and architecture maturity were each noticeably lower within the Asian airlines than with any of the other airlines studied. This study is not able to substantiate these observations as being statistically meaningful, but they do bring into question the roll that cultural environment might have on strategic alignment maturity. This line of questioning might also be applied to the survey instrument used in this study, since it has not been subjected to any tests to determine the existence of cultural biases.

Summary of discussion. The purpose of this final discussion section is to address some of the lessons learned with respect to the various correlational affects examined in this study. One of the dependant variables used in this study was airlines size, which is defined as the number of aircraft used in the airline's operations. This metric proved to be somewhat misleading and may be responsible for the absence of any correlation with the SAM criteria. While the number of aircraft associated with an airline's operations is indicative of the level of IT required, a large regional with the same number of aircraft as a large international carrier cannot be compared. A high degree of correlation was noted with regard to an airline's average load factor. Since load factor is calculated with the use of available seat miles, this might be a better indicator of an airline's size.

In a different area, two difficulties were identified with the data collection effort as it related to annual operating revenue. First, many airlines are subsidiaries of larger airlines or assets in the portfolio of equity management funds and other holding companies. Still other airlines are privately held. These aspects of ownership make it difficult to accurately extract operating revenues. Secondly, accounting rules vary

somewhat from nation-to-nation making it difficult to compare similar revenue numbers, even within the same industry. Even within a single nation the definition of operating revenue can vary from airline-to-airline. As air carriers expand their core business into other non-aviation related areas (e.g., sales onboard the aircraft, credit cards, luggage fees, etc.) it becomes more difficult to compare one firm's operating revenue with another. The use of a financial metric calculated as an aggregate of various financial ratios proved to be a more useful method for overcoming some of the concerns surrounding the use of operating revenue alone. The benchmarking characteristic of these ratios do not seem to be radically effected by differences in accounting rules or the migration away form a firm's core business.

Conclusions

Conclusions can be drawn from this study, which are valuable to both the scholar and the practitioner. From a practitioner's perspective, a relationship has been demonstrated between a commercial airline's strategic alignment maturity level and specific financial metrics, as well as average load factor. Five of the six criteria indicated a positive correlation with either financial performance or average load factor. Both of these relationships directly influence the financial health and viability of the company. It is important to recognize that these conclusions are not intended to provide a one-size-fits-all solution, but rather provide the framework with which management can evaluate their own maturity level and focus their efforts in areas where a more immediate improvement is likely.

From a scholarly perspective, the data analysis associated with this study has provided additional insight into the connection between an organization's performance and management's ability to strategically align the IT and business organizations. IT-business strategic alignment maturity has been studied using many other industries. The addition of the commercial airline industry into this group will enable a broader discussion on why some industries demonstrate relatively high maturity levels while others do not. The inhibitors found in one industry versus another may provide insight into this question.

Recommendations

It has been suggested that larger organizations demands greater integration of IT and business on every level. The lack of a demonstrated correlation between an airline's strategic alignment maturity and fleet size provides an opportunity for future research. It is possible that airline operations are altered significantly as the size of the airline increases. For that reason this industry may be better studied as a collection of sub-industries. Future studies should consider controlling for fleet sizes within specific ranges.

Another suggestion for future research is found with the relatively small number of nations represented by this study's sample population. With 11 airlines representing four countries it is difficult to observe differences which might be present across national boundaries. These differences, if present, could have been a source of error in this research and is therefore recommended for further study.

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APPENDIX A. AIRLINE-1 SURVEY DATA

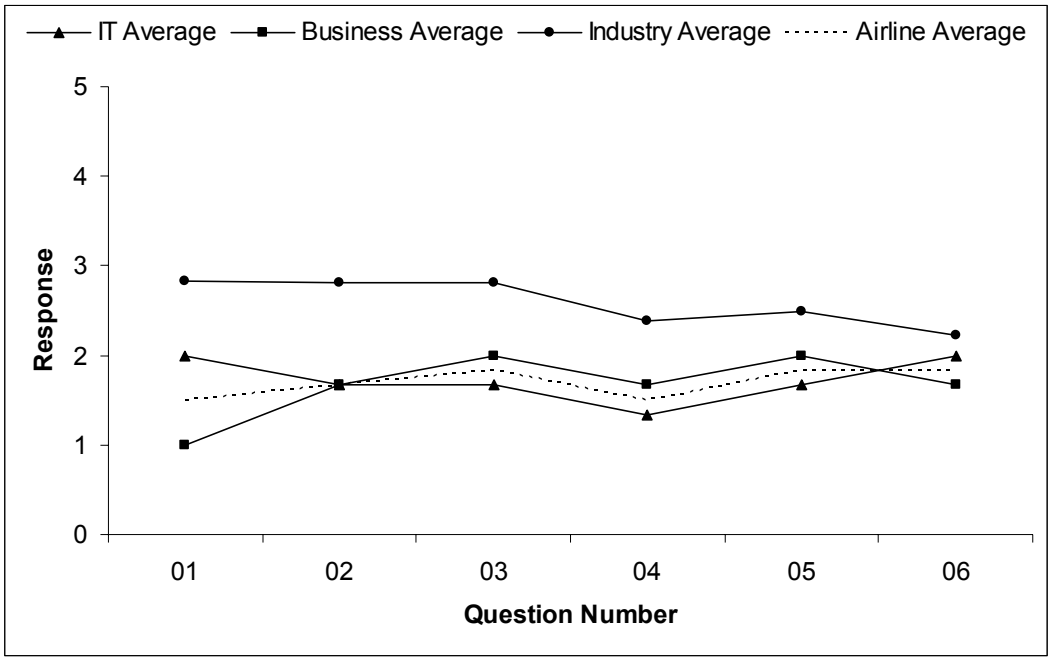


Figure A1. Airline-1 Survey Responses—Communications

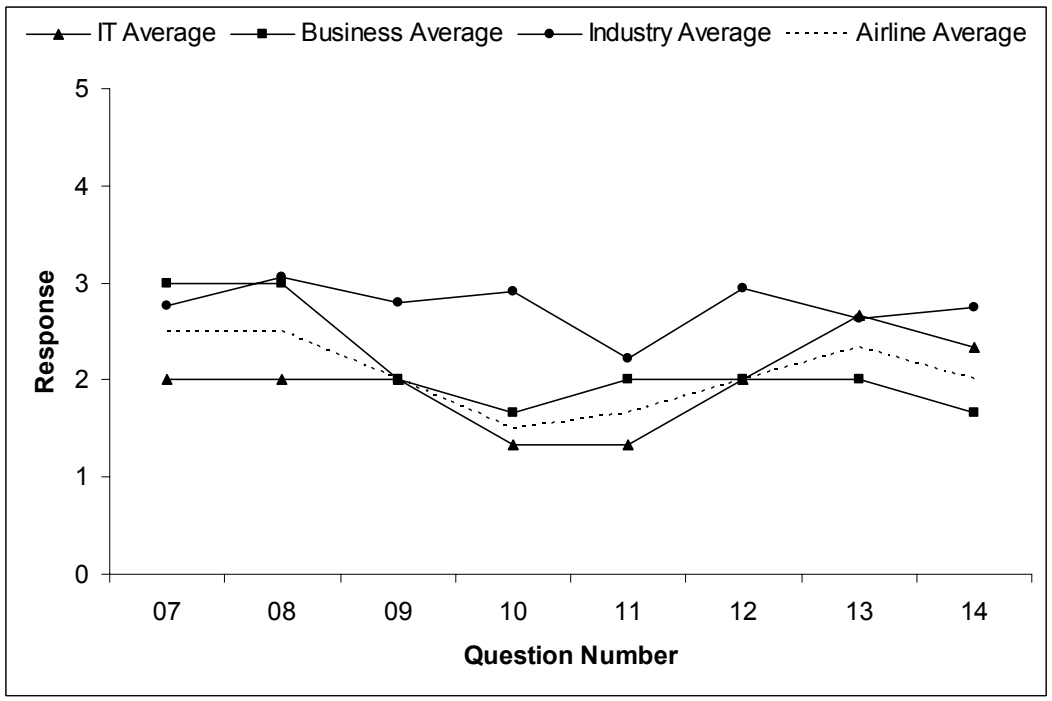
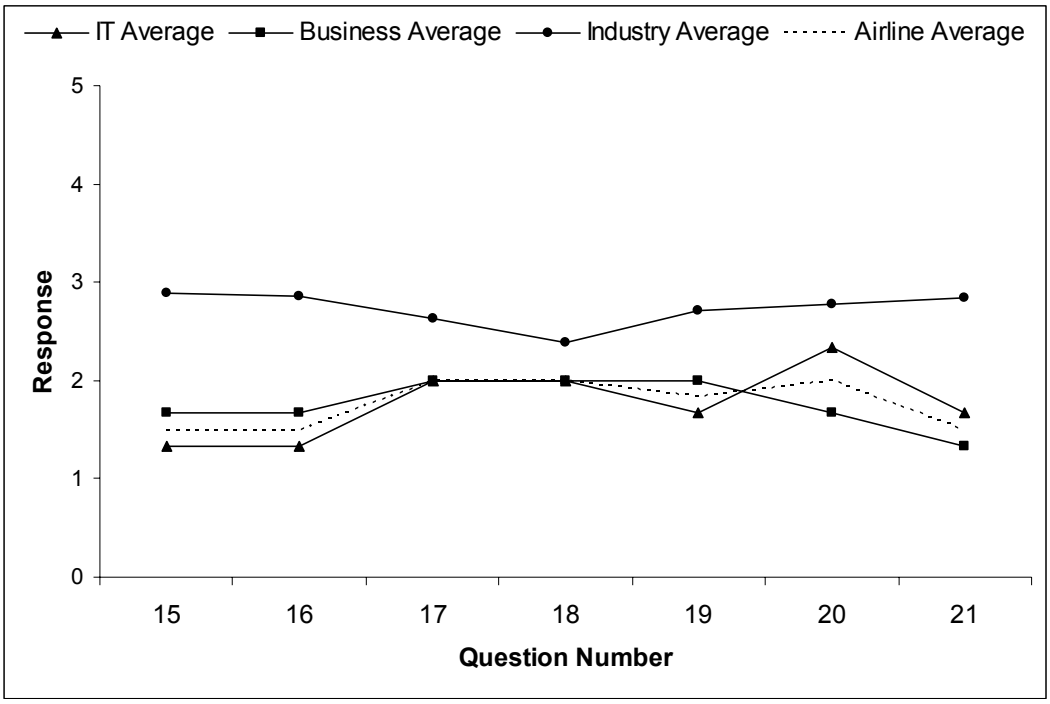


Figure A2. Airline-1 Survey Responses—Competency and Value



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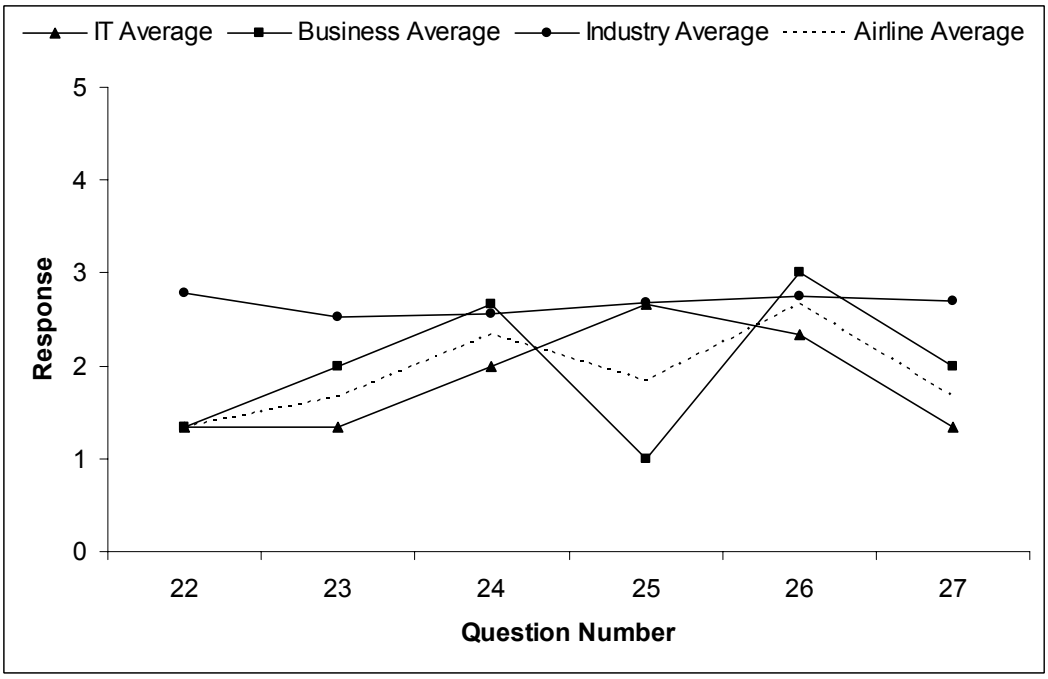


Figure A4. Airline-1 Survey Responses—Partnership

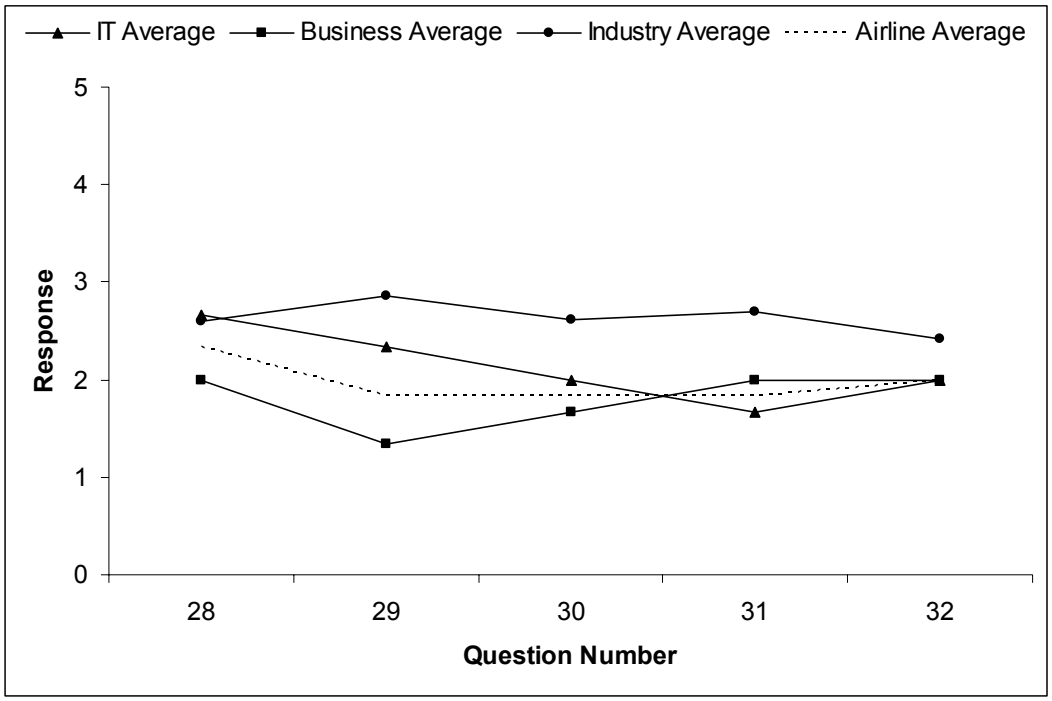


Figure A5. Airline-1 Survey Responses—Scope and Architecture

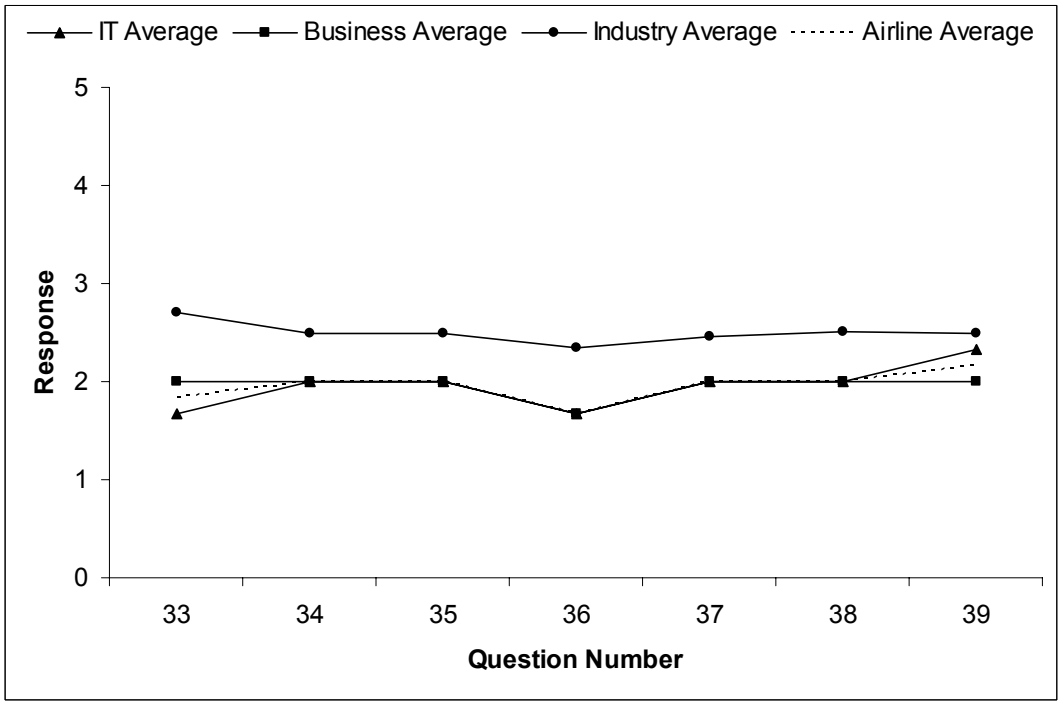


Figure A6. Airline-1 Survey Responses—Human Resource Skills

APPENDIX B. AIRLINE-2 SURVEY DATA

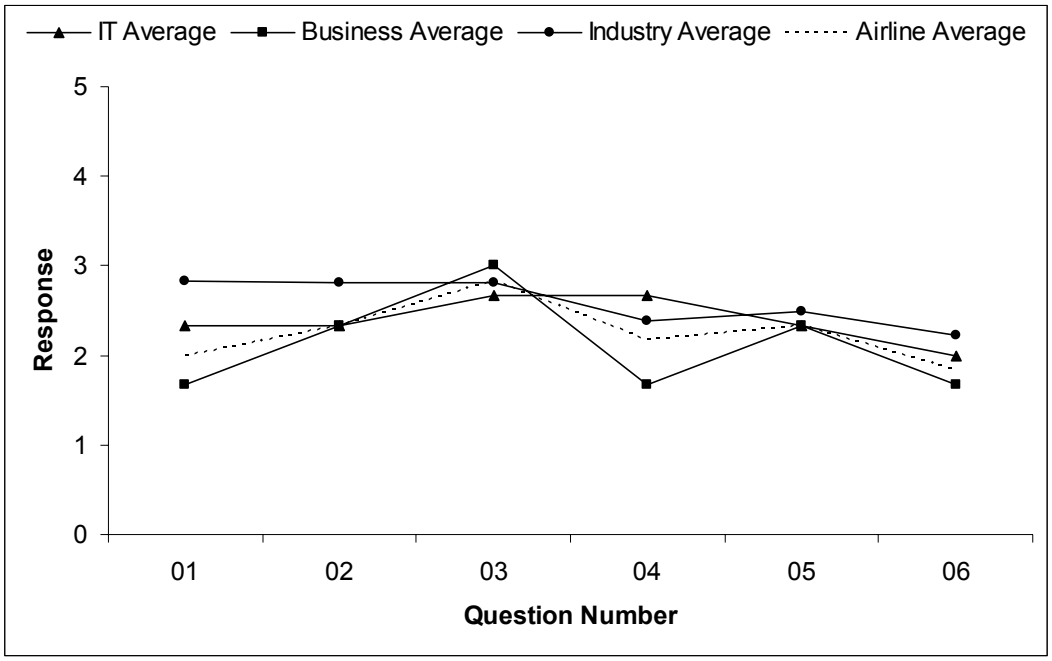
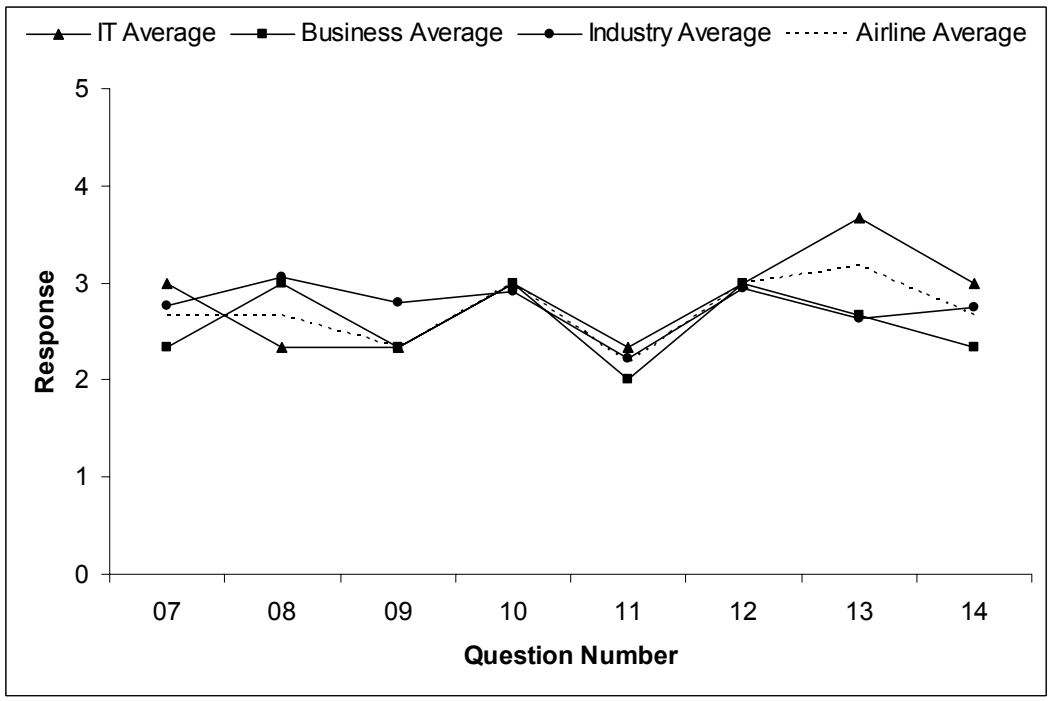


Figure B1. Airline-2 Survey Responses—Communications



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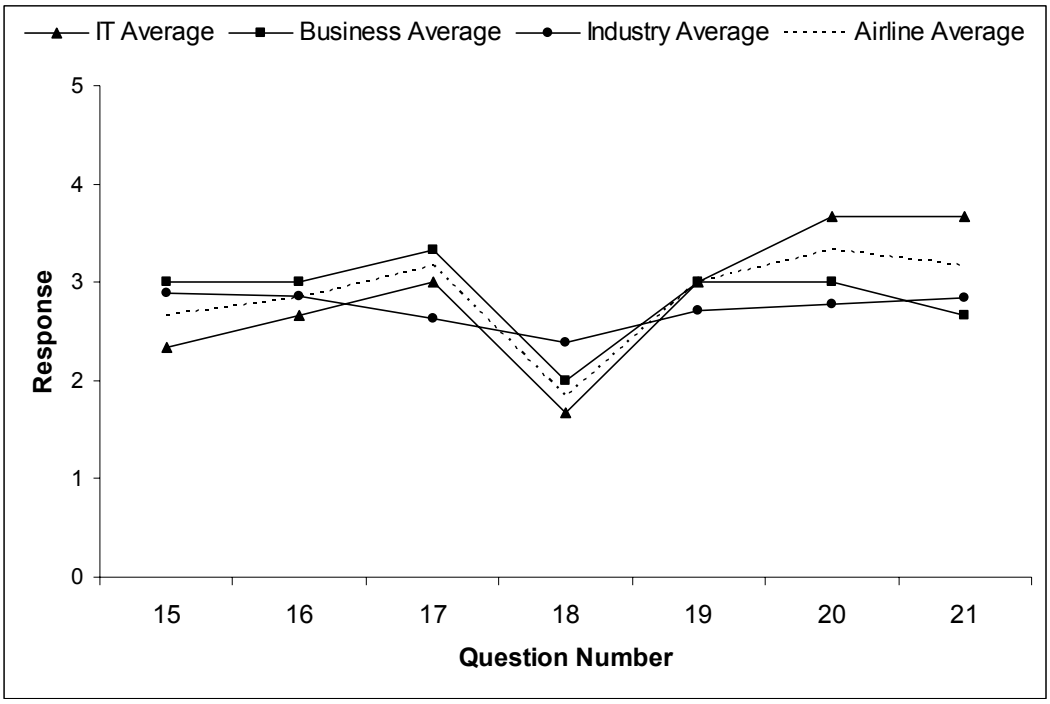

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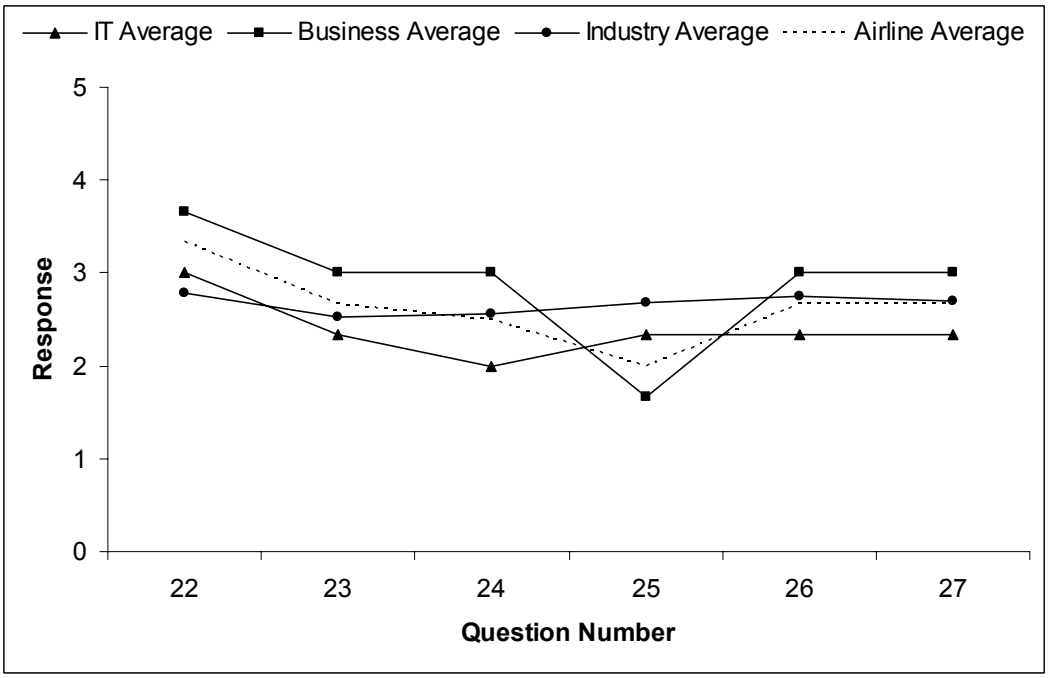

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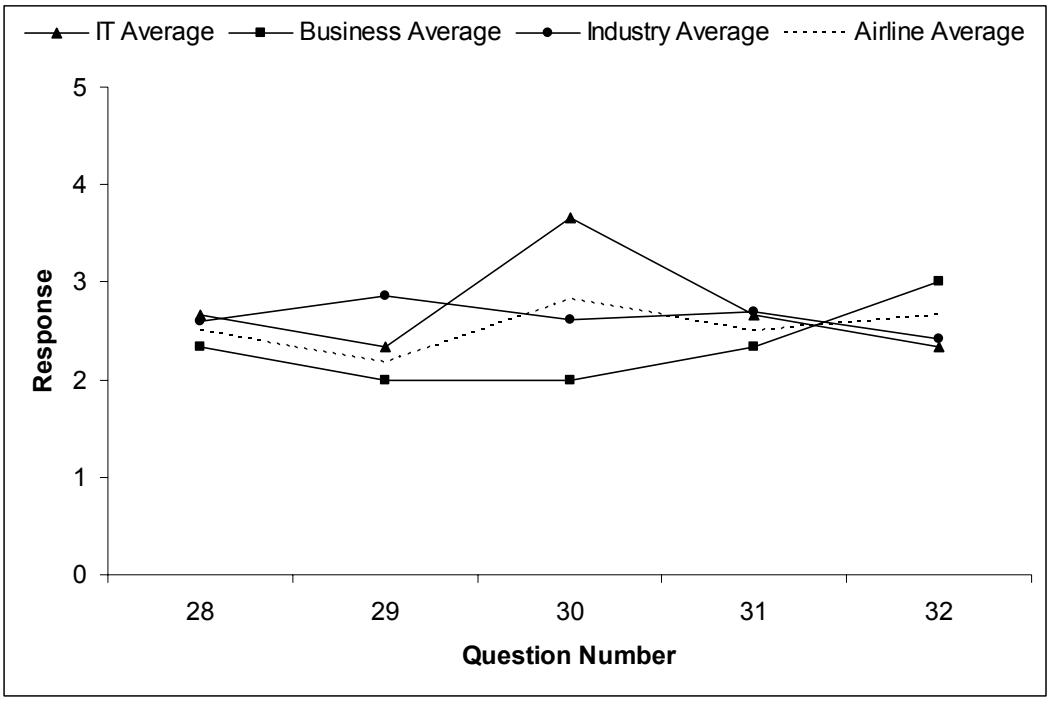

Figure B5. Airline-2 Survey Responses—Scope and Architecture

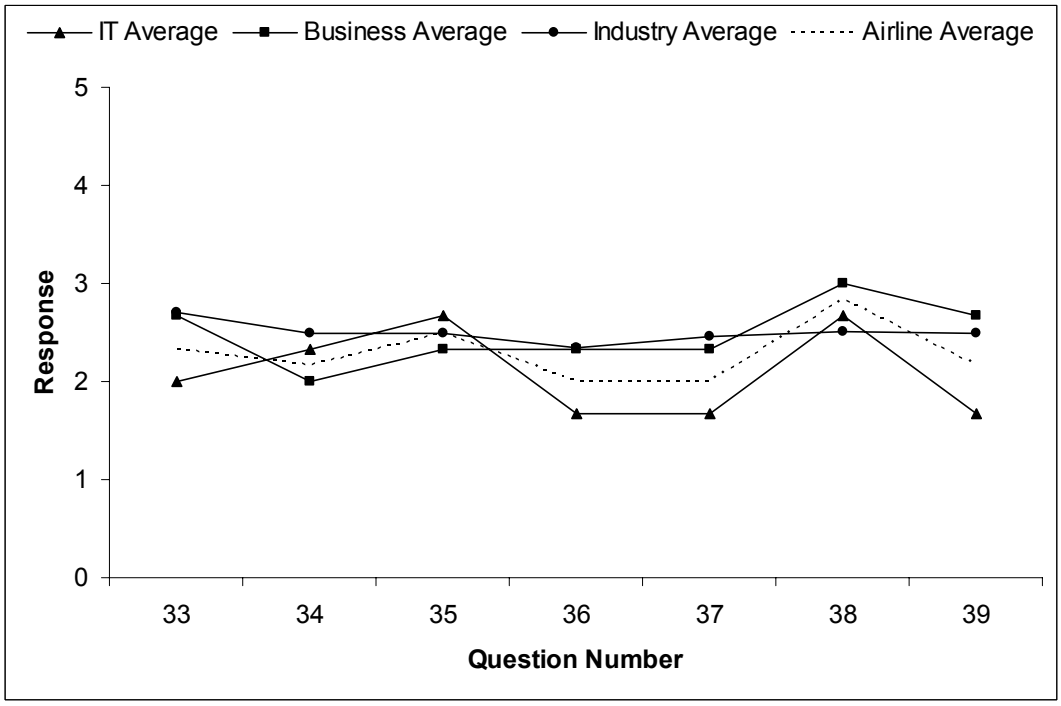

Figure B6. Airline-2 Survey Responses—Human Resource Skills

APPENDIX C. AIRLINE-3 SURVEY DATA

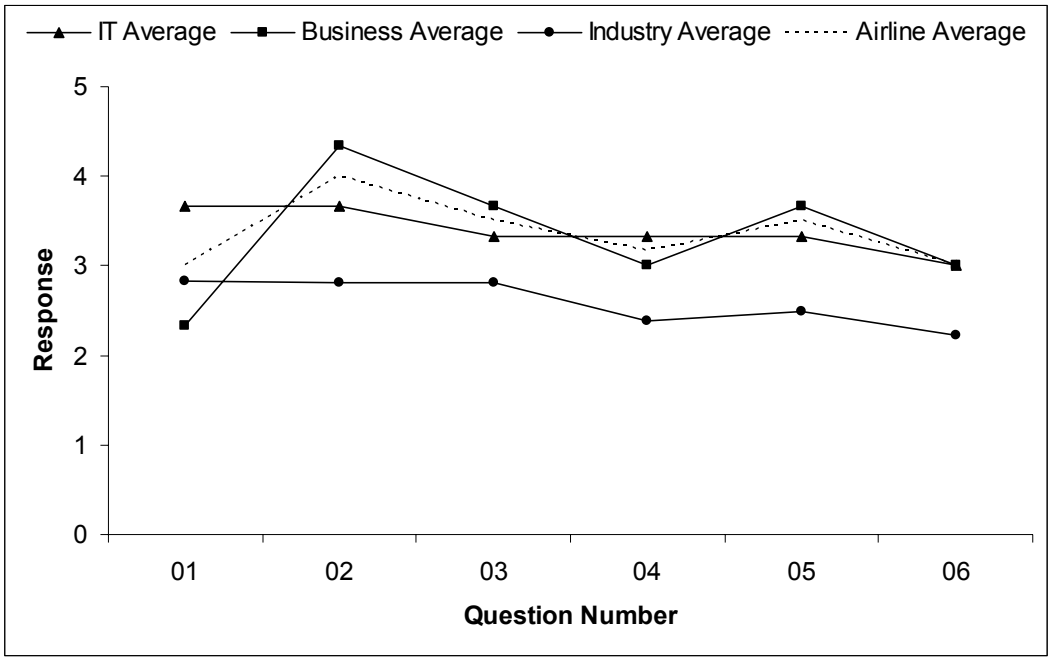

Figure C1. Airline-3 Survey Responses—Communications

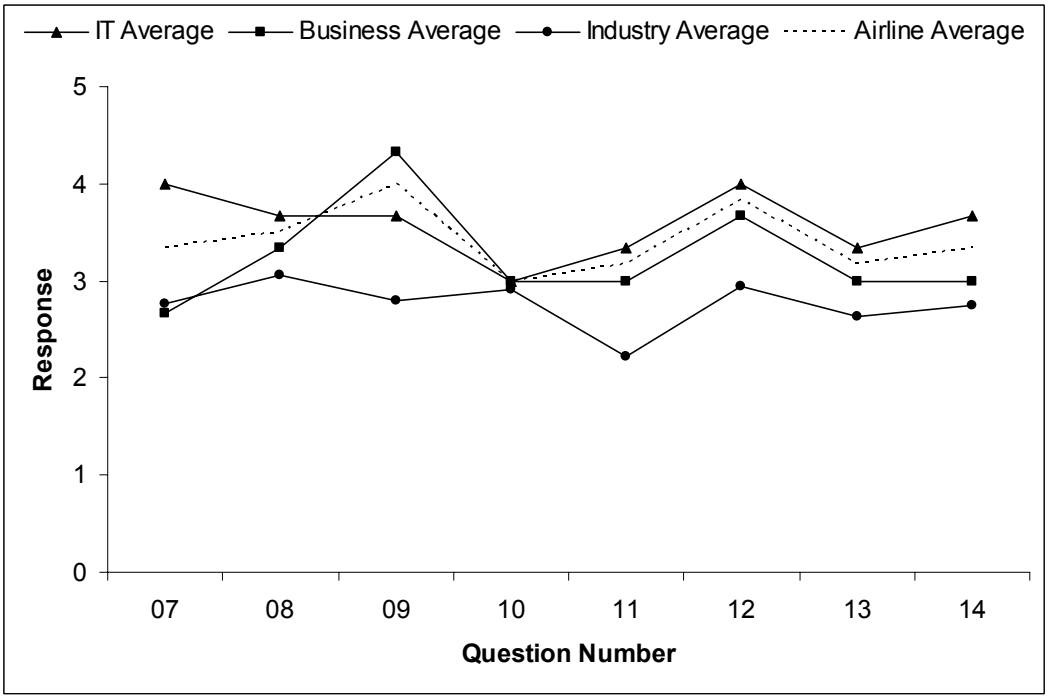

Figure C2. Airline-3 Survey Responses—Competency and Value

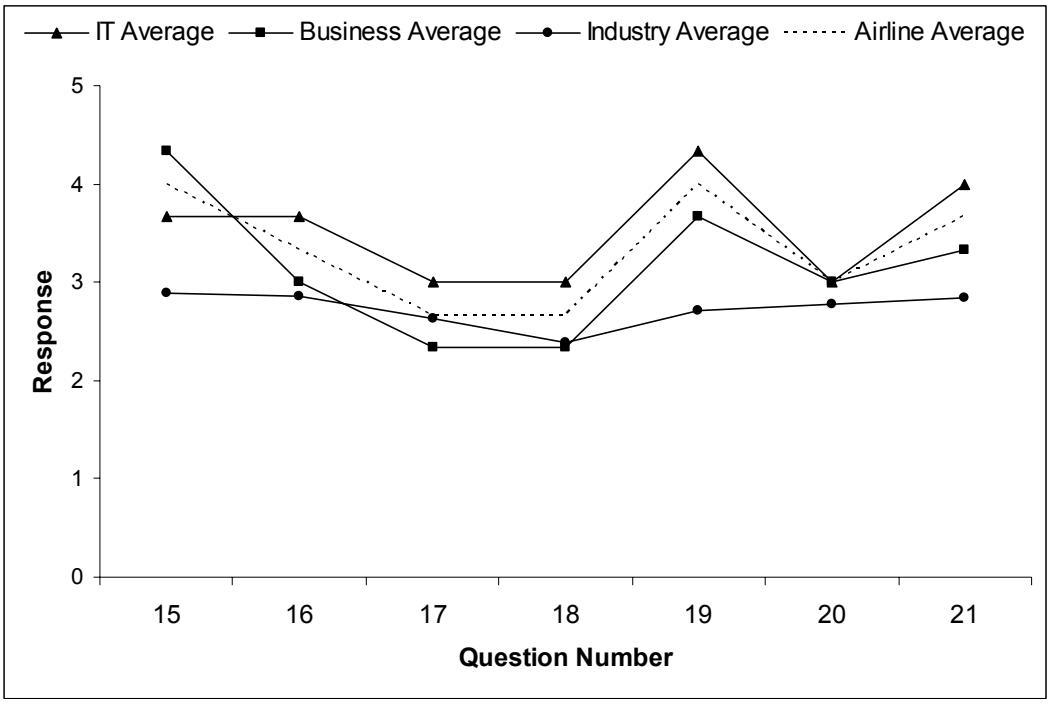

Figure C3. Airline-3 Survey Responses—Governance

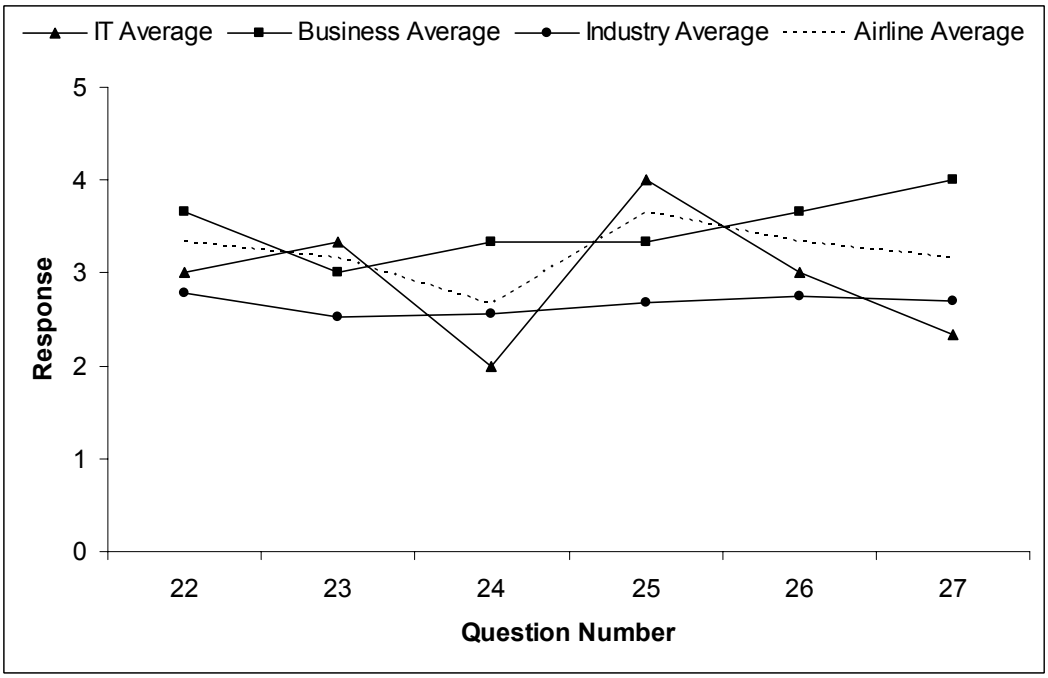

Figure C4. Airline-3 Survey Responses—Partnership

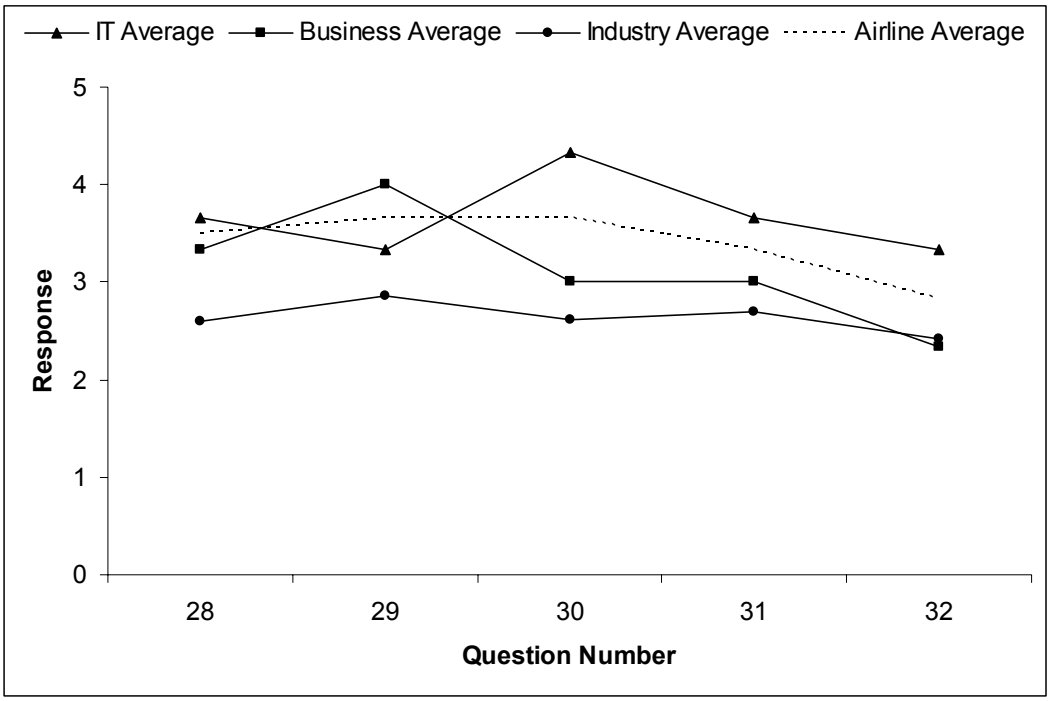

Figure C5. Airline-3 Survey Responses—Scope and Architecture

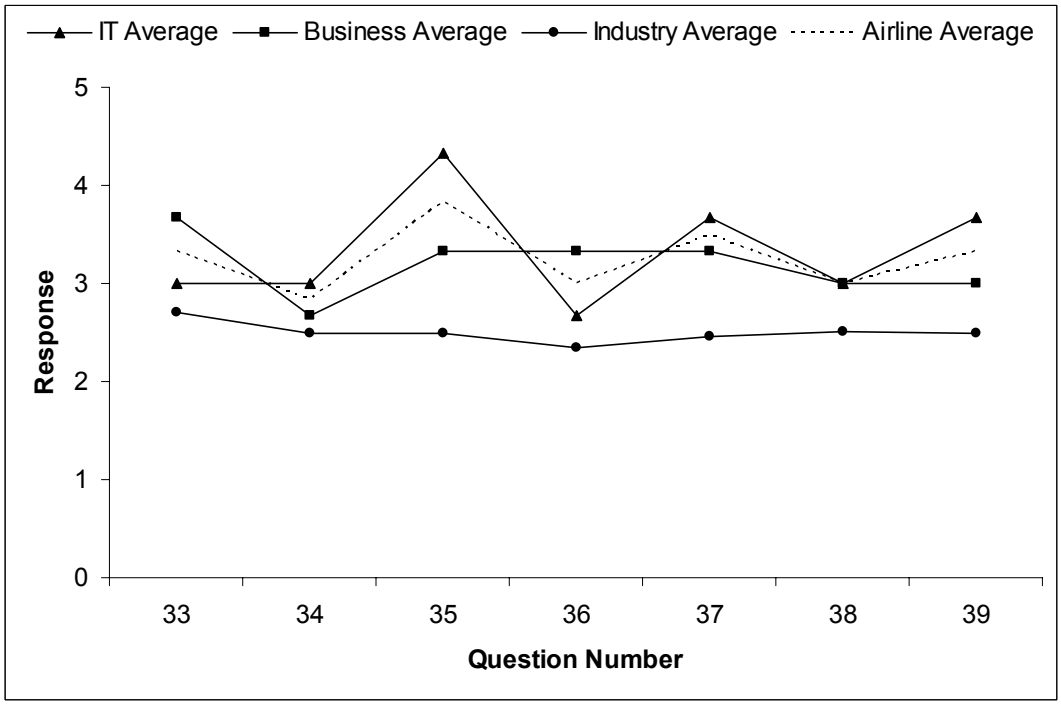

Figure C6. Airline-3 Survey Responses—Human Resource Skills

APPENDIX D. AIRLINE-4 SURVEY DATA

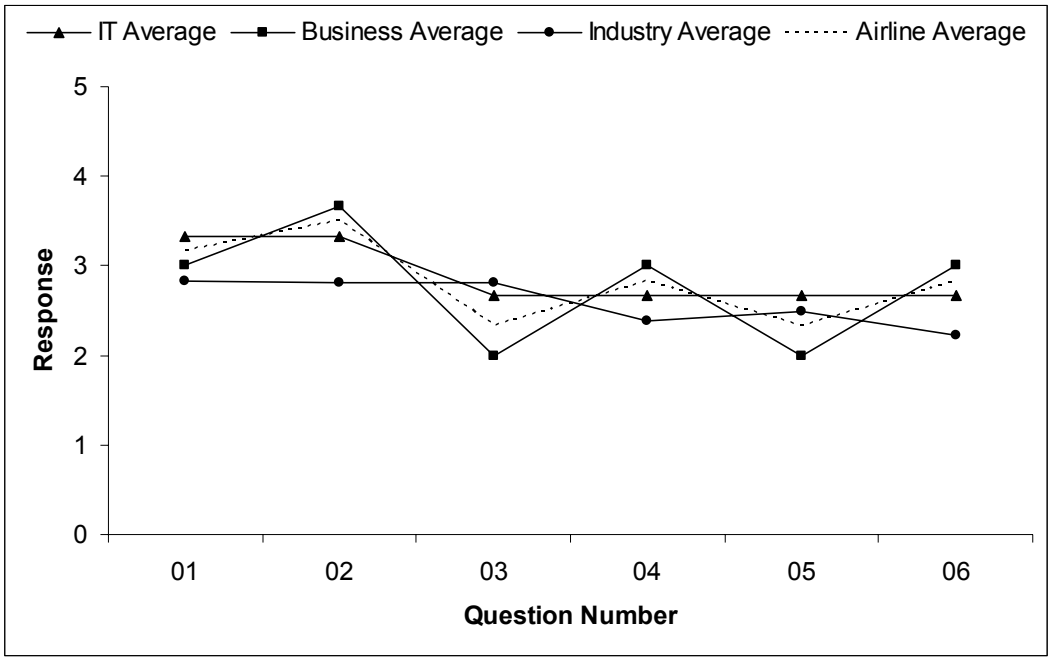

Figure D1. Airline-4 Survey Responses—Communications

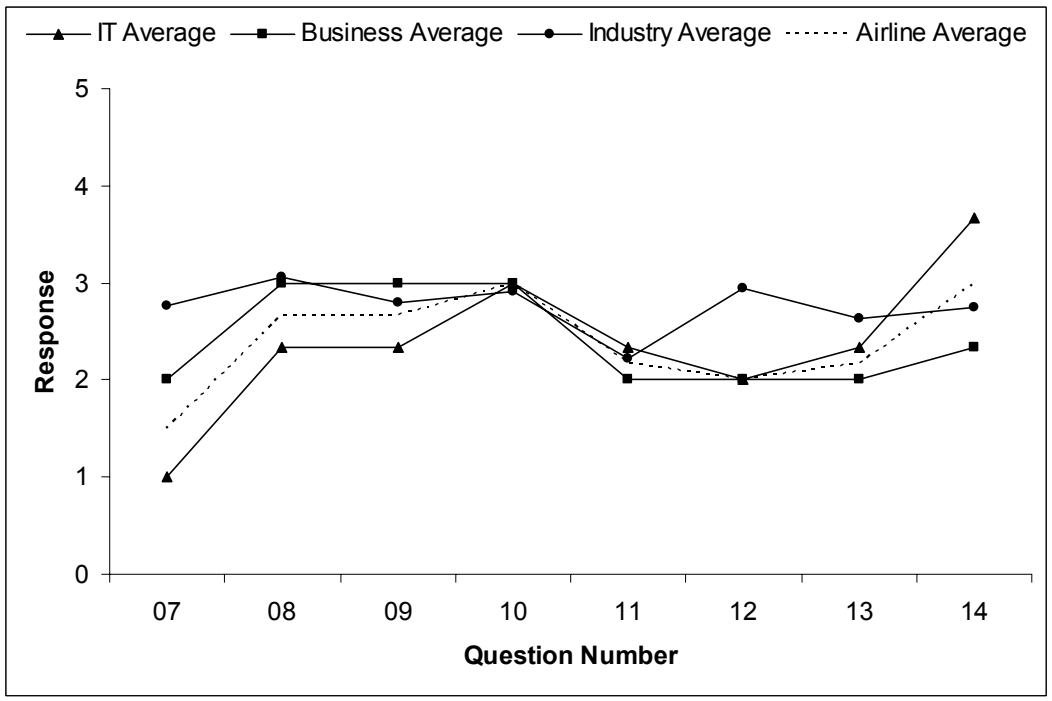

Figure D2. Airline-4 Survey Responses—Competency and Value

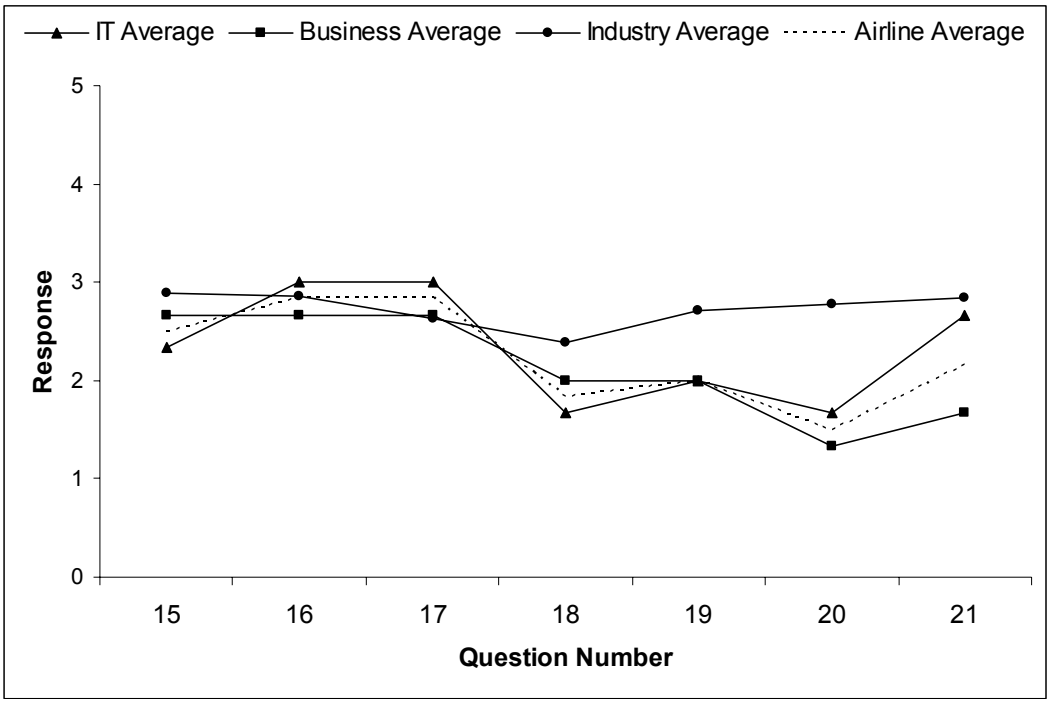

Figure D3. Airline-4 Survey Responses—Governance

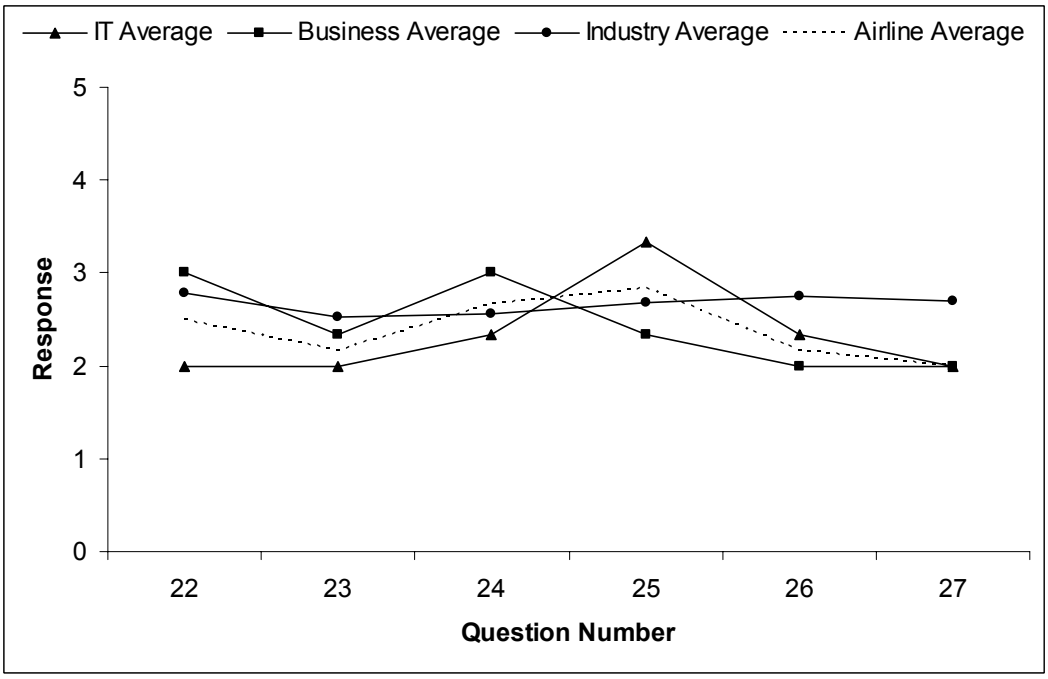

Figure D4. Airline-4 Survey Responses—Partnership

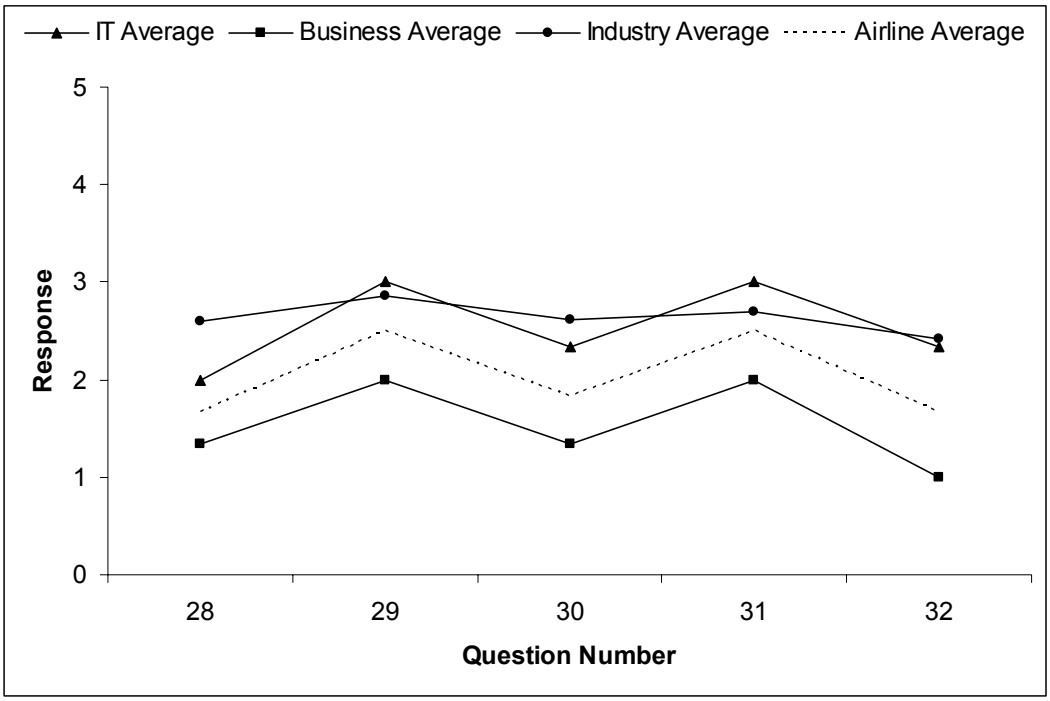

Figure D5. Airline-4 Survey Responses—Scope and Architecture

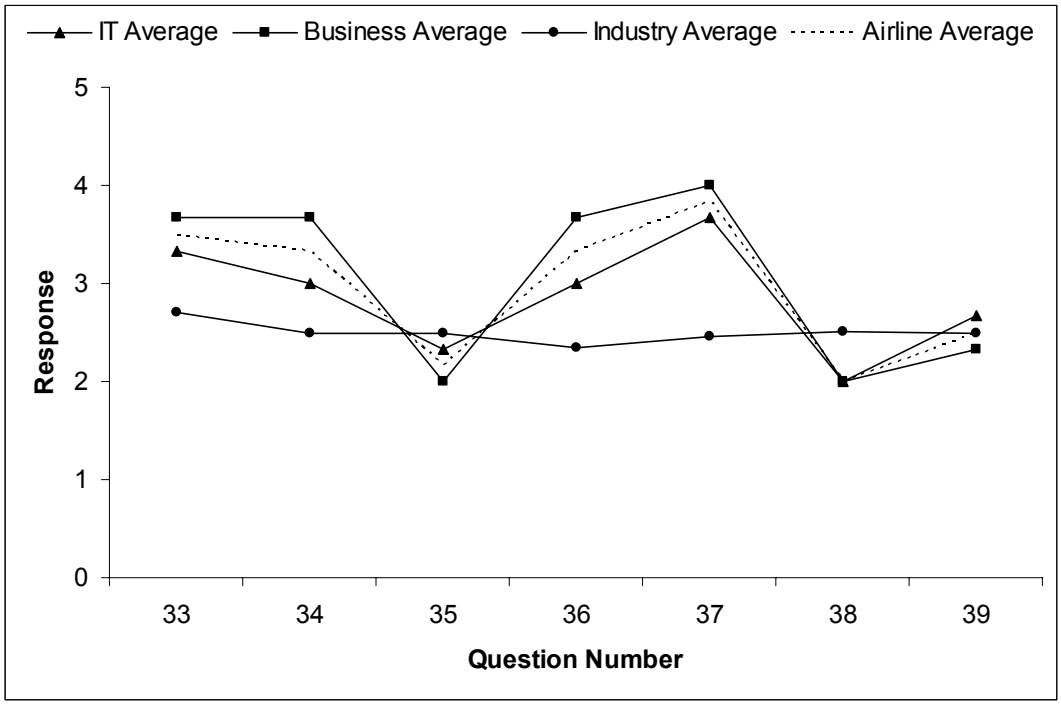

Figure D6. Airline-4 Survey Responses—Human Resource Skills

APPENDIX E. AIRLINE-5 SURVEY DATA

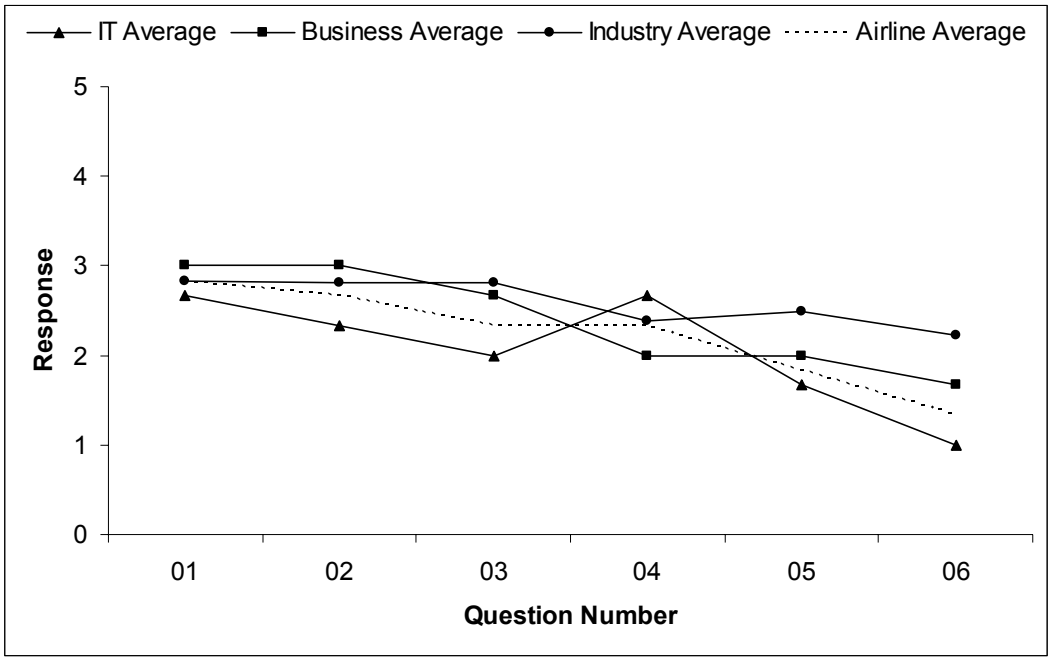

Figure E1. Airline-5 Survey Responses—Communications

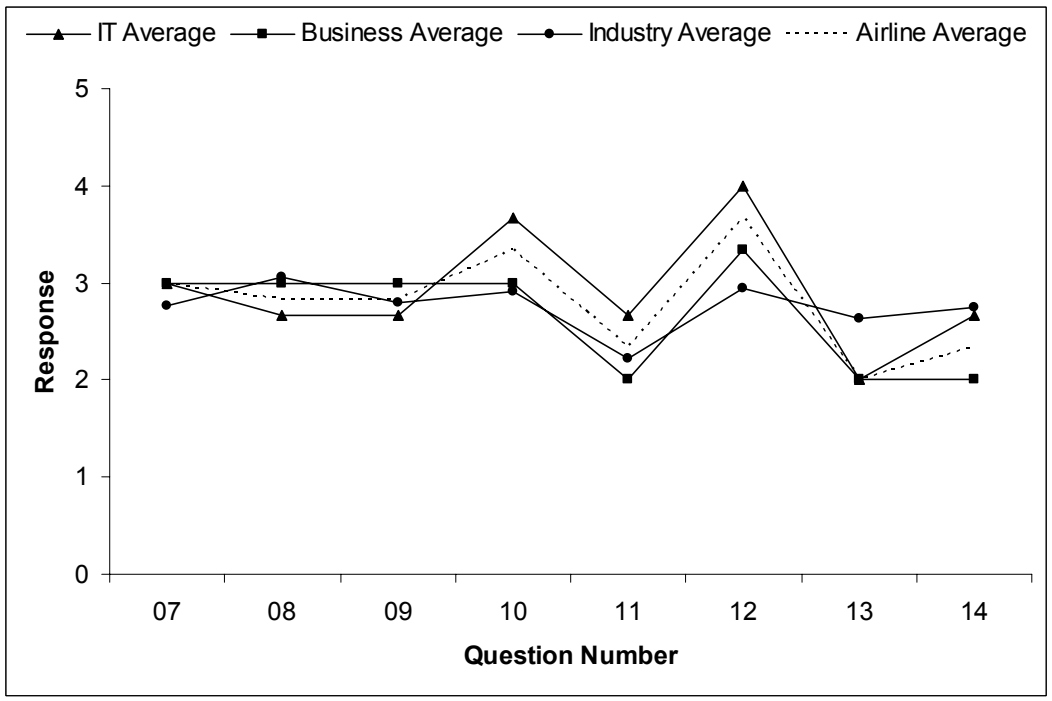

Figure E2. Airline-5 Survey Responses—Competency and Value

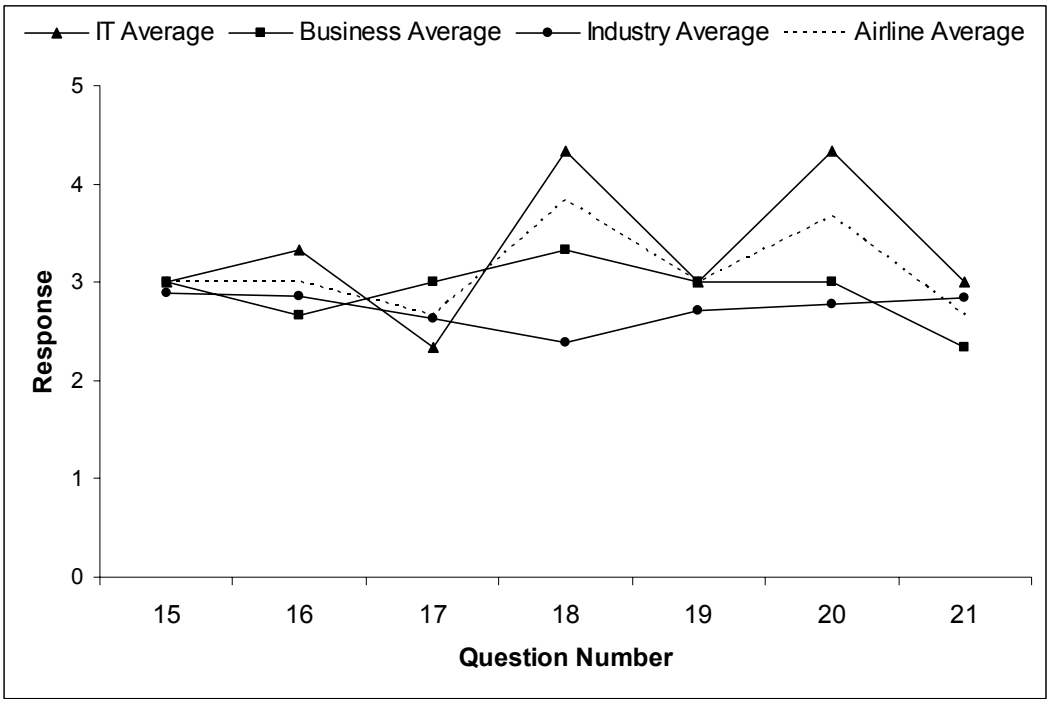

Figure E3. Airline-5 Survey Responses—Governance

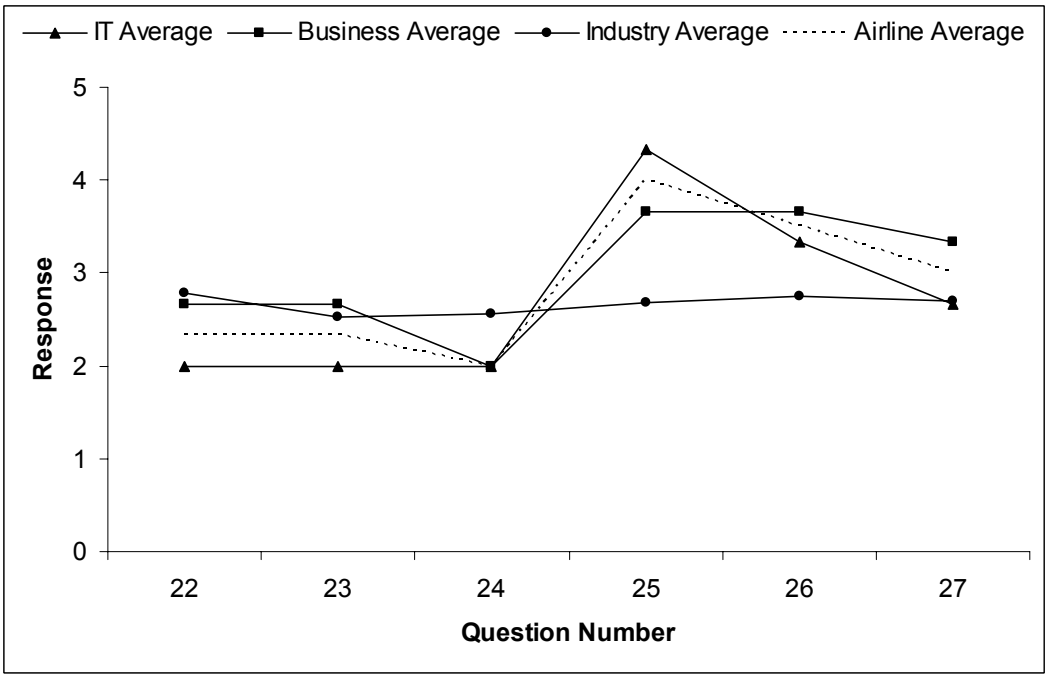

Figure E4. Airline-5 Survey Responses—Partnership

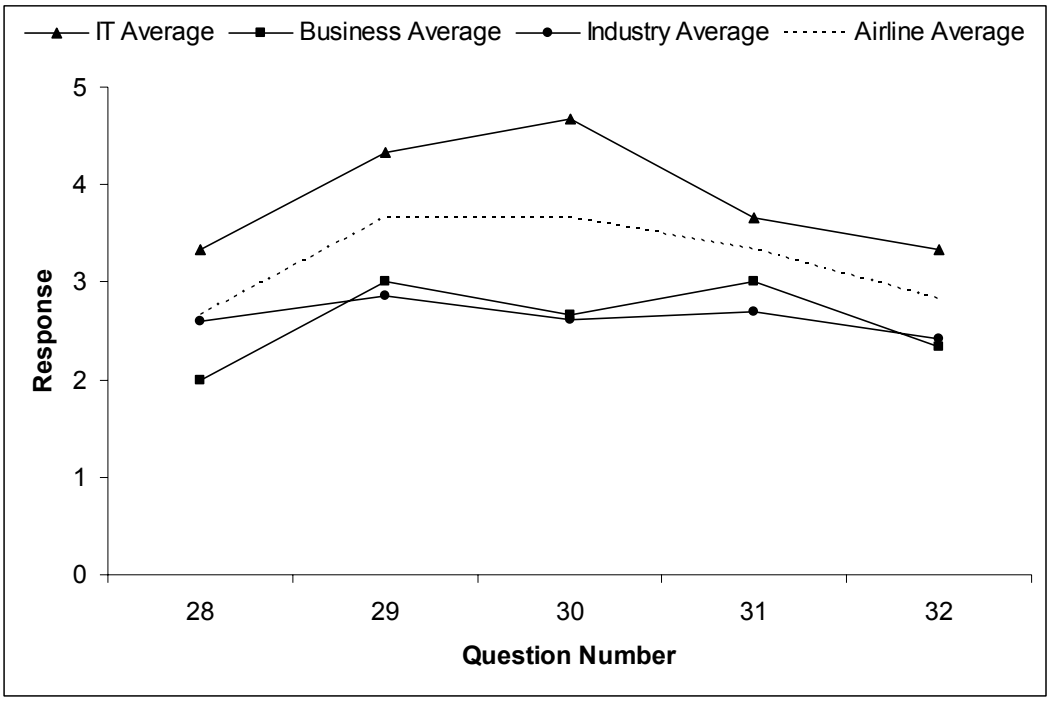

Figure E5. Airline-5 Survey Responses—Scope and Architecture

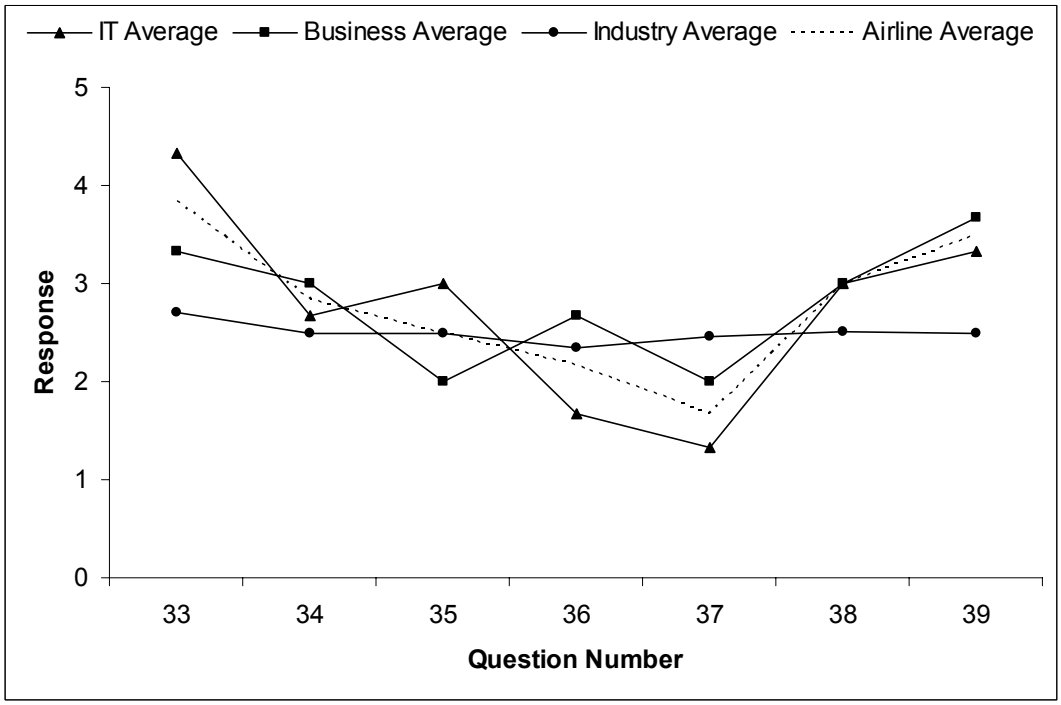

Figure E6. Airline-5 Survey Responses—Human Resource Skills

APPENDIX F. AIRLINE-6 SURVEY DATA

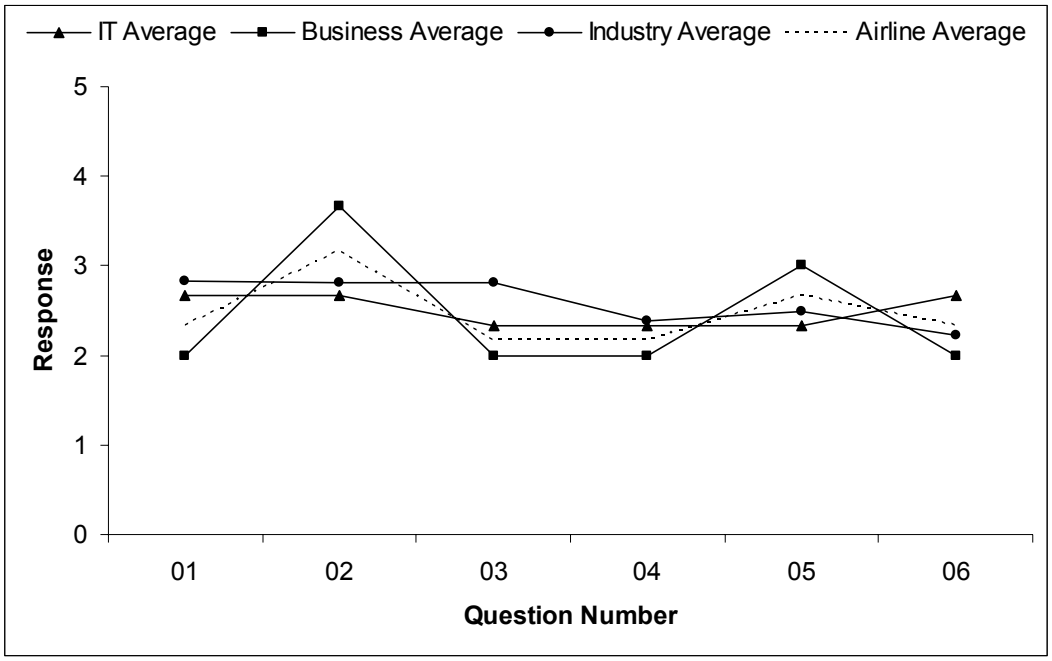

Figure F1. Airline-6 Survey Responses—Communications

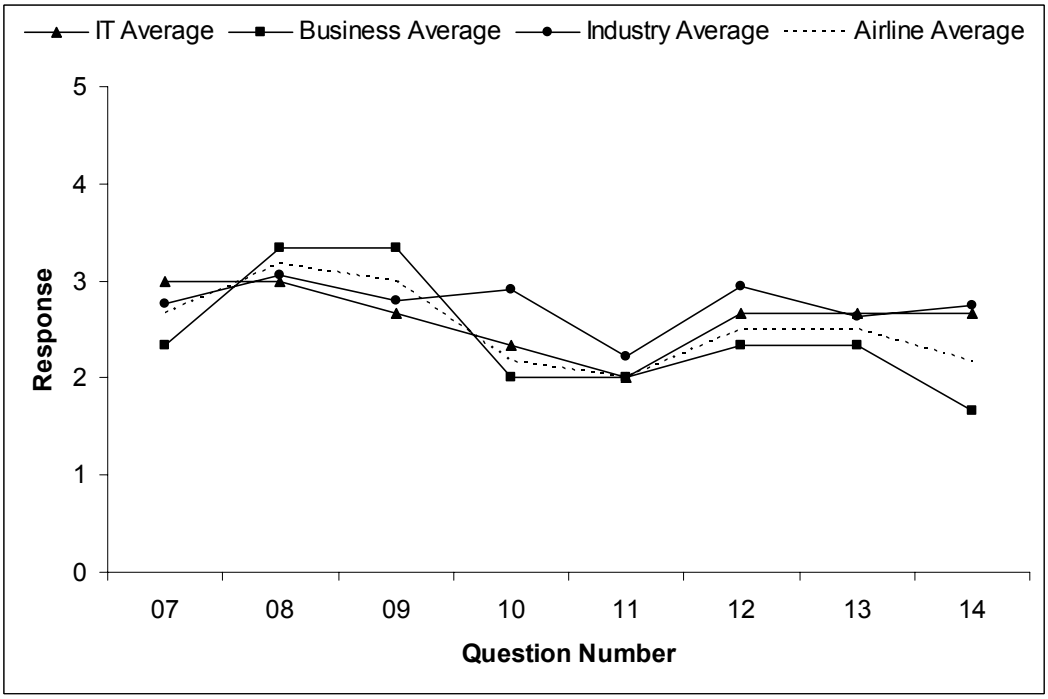

Figure F2. Airline-6 Survey Responses—Competency and Value

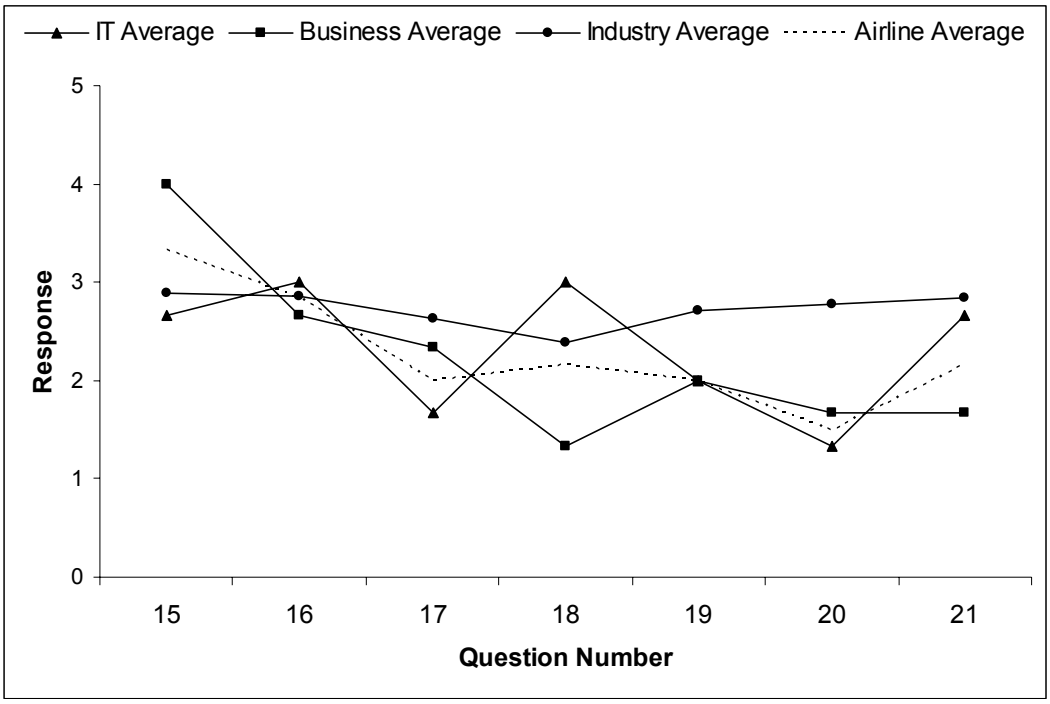

Figure F3. Airline-6 Survey Responses—Governance

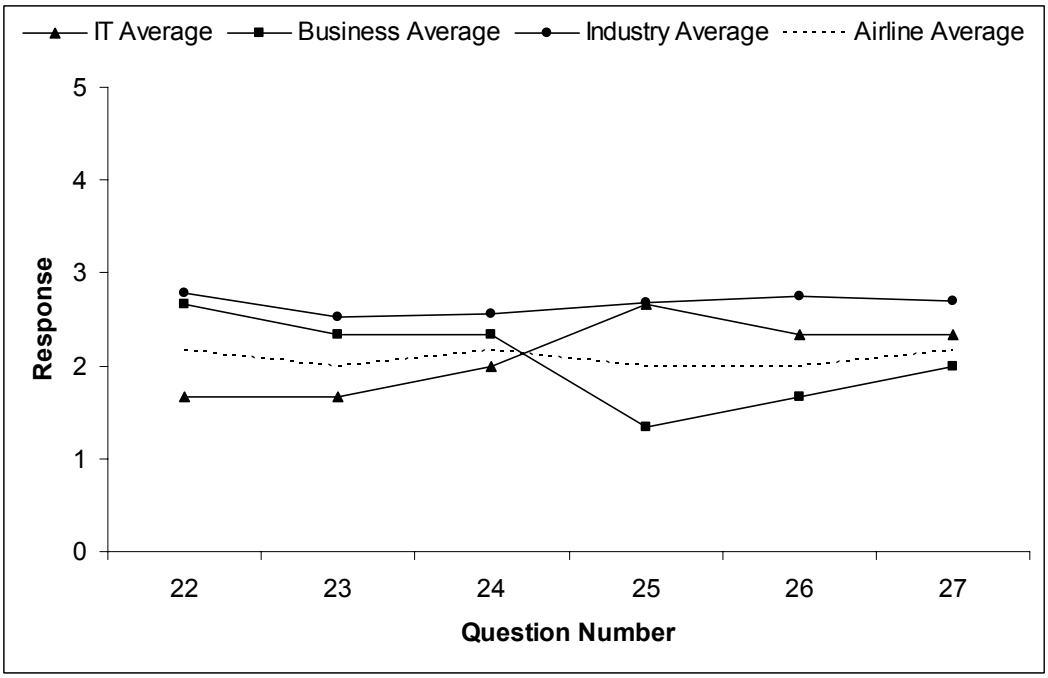

Figure F4. Airline-6 Survey Responses—Partnership

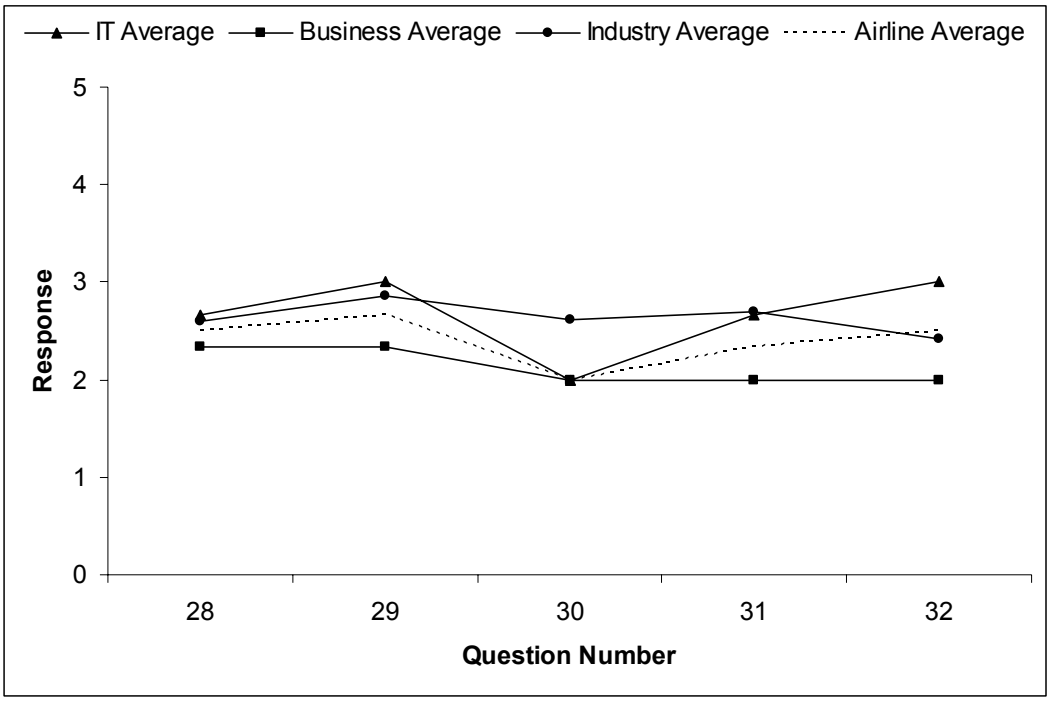

Figure F5. Airline-6 Survey Responses—Scope and Architecture

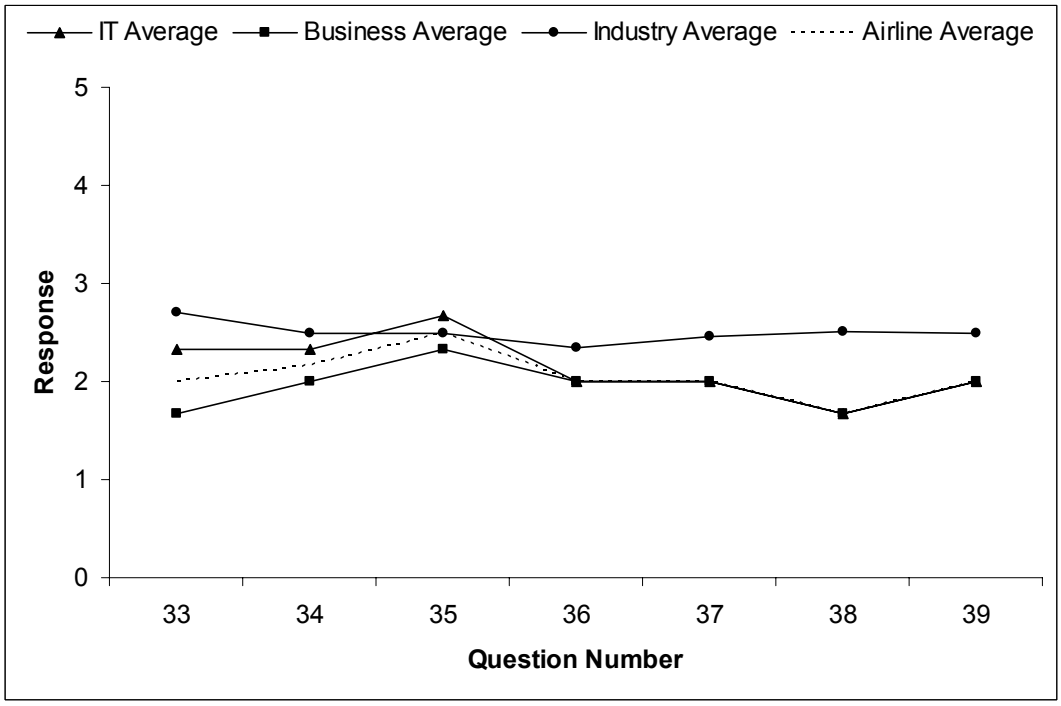

Figure F6. Airline-6 Survey Responses—Human Resource Skills

APPENDIX G. AIRLINE-7 SURVEY DATA

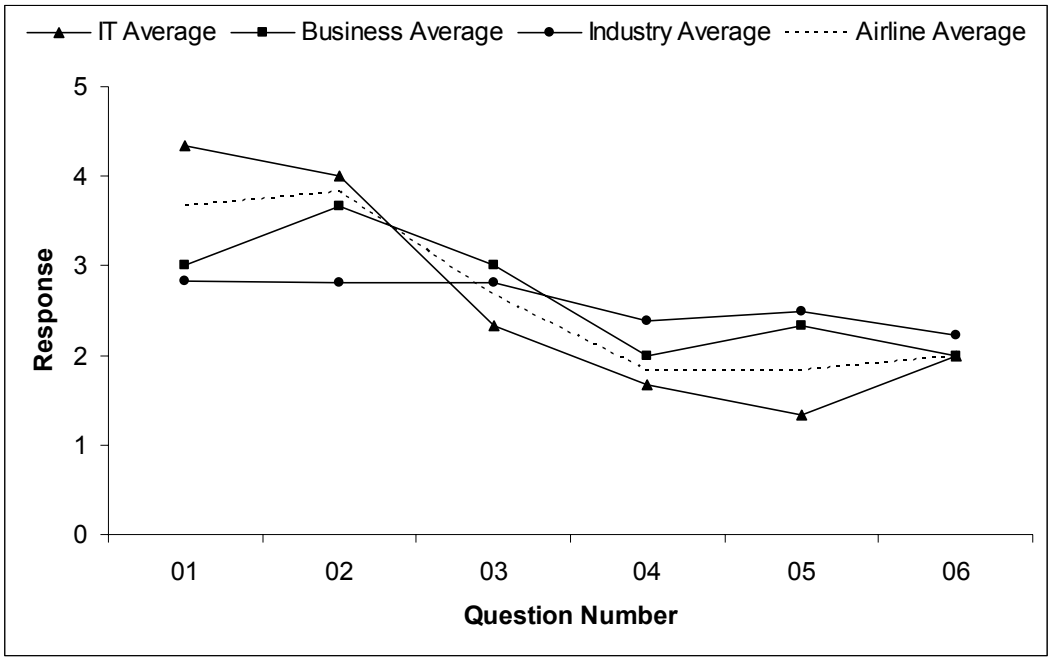

Figure G1. Airline-7 Survey Responses—Communications

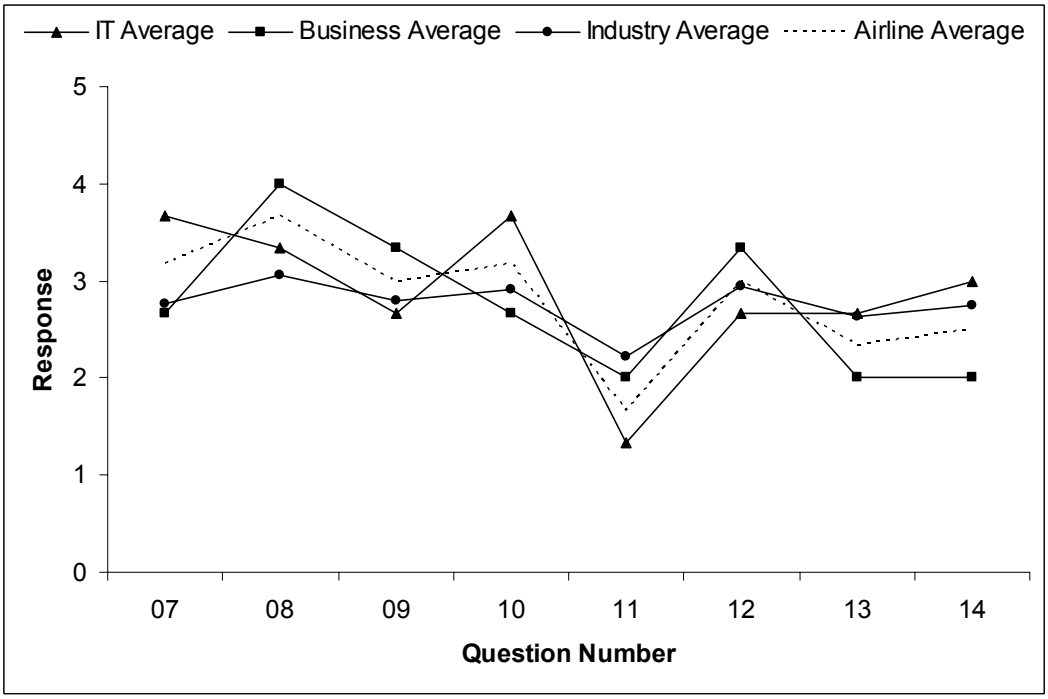

Figure G2. Airline-7 Survey Responses—Competency and Value

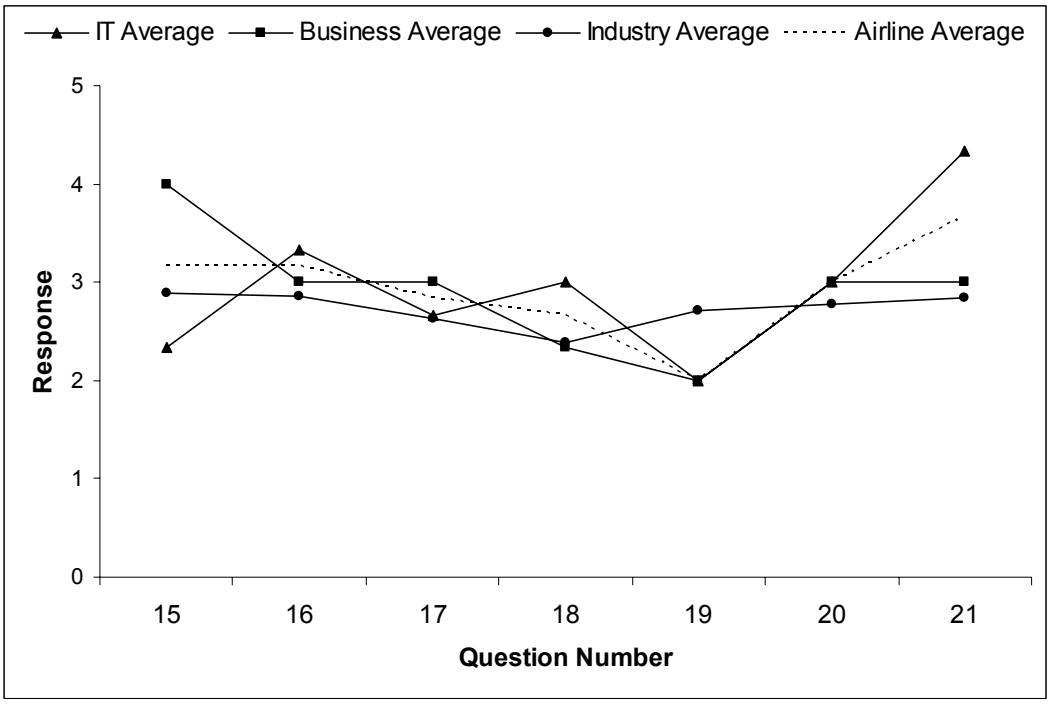

Figure G3. Airline-7 Survey Responses—Governance

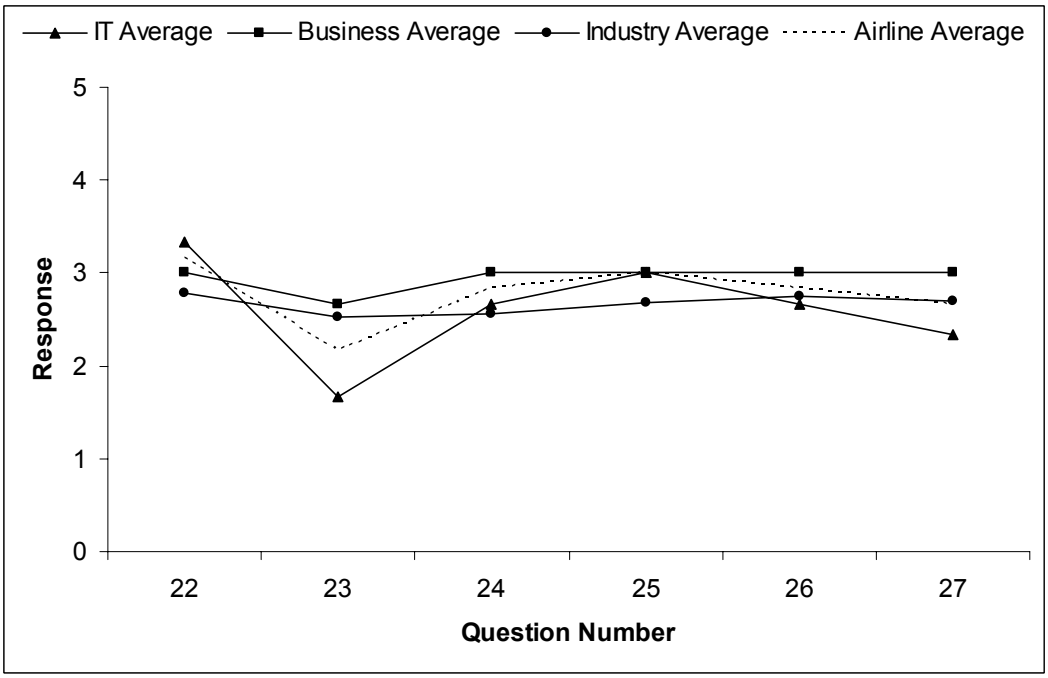

Figure G4. Airline-7 Survey Responses—Partnership

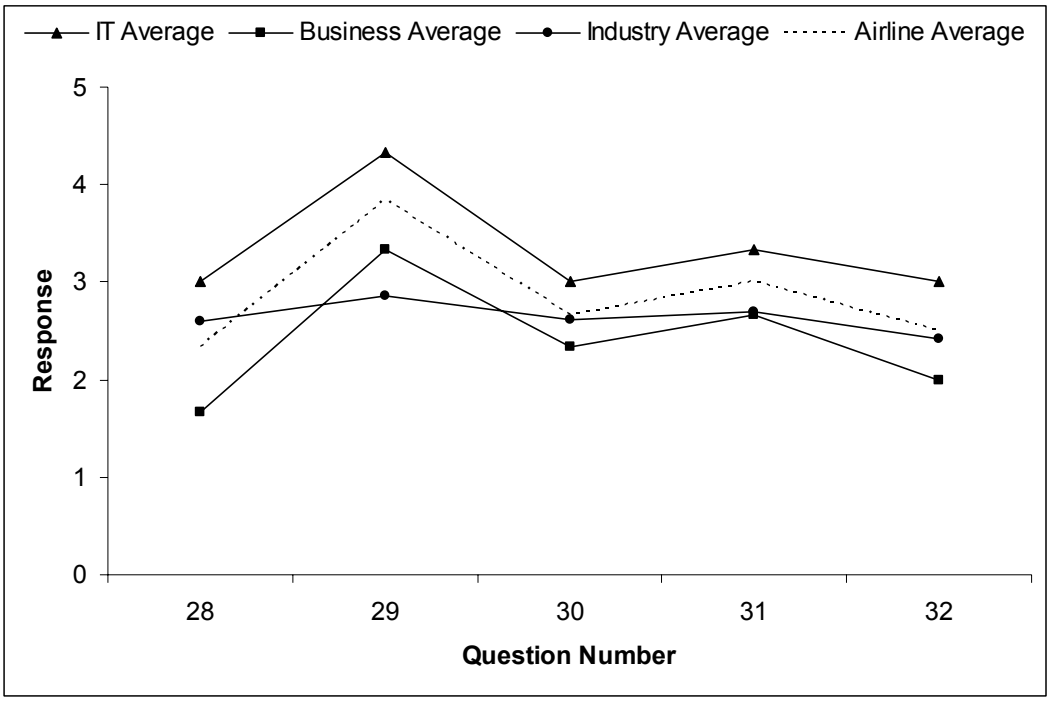

Figure G5. Airline-7 Survey Responses—Scope and Architecture

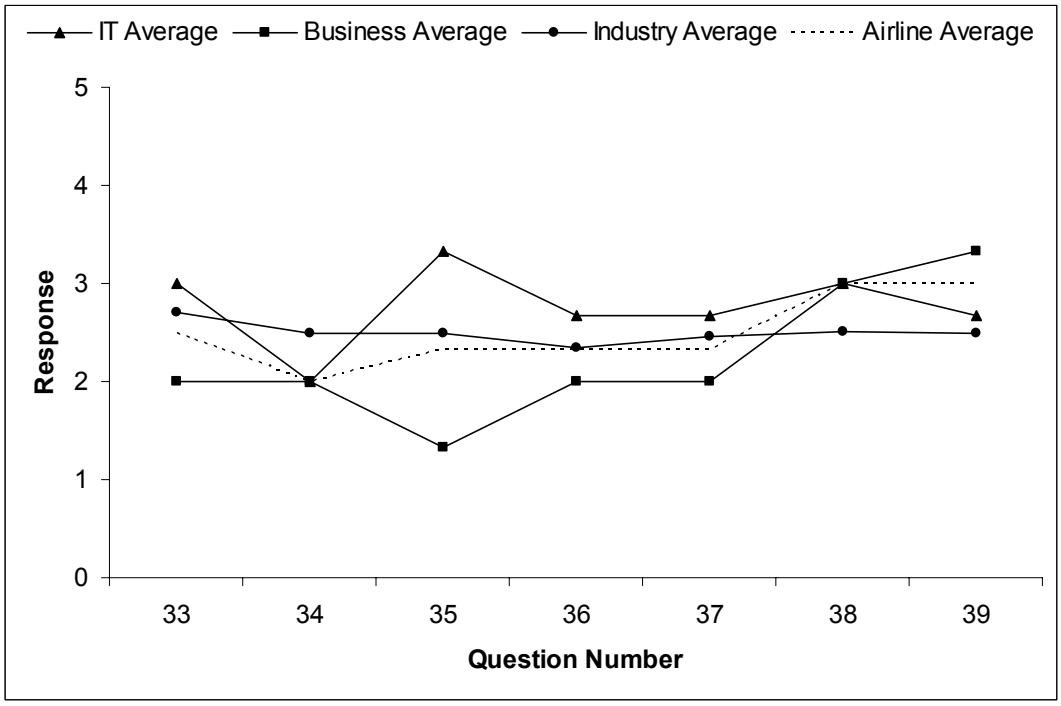

Figure G6. Airline-7 Survey Responses—Human Resource Skills

APPENDIX H. AIRLINE-8 SURVEY DATA

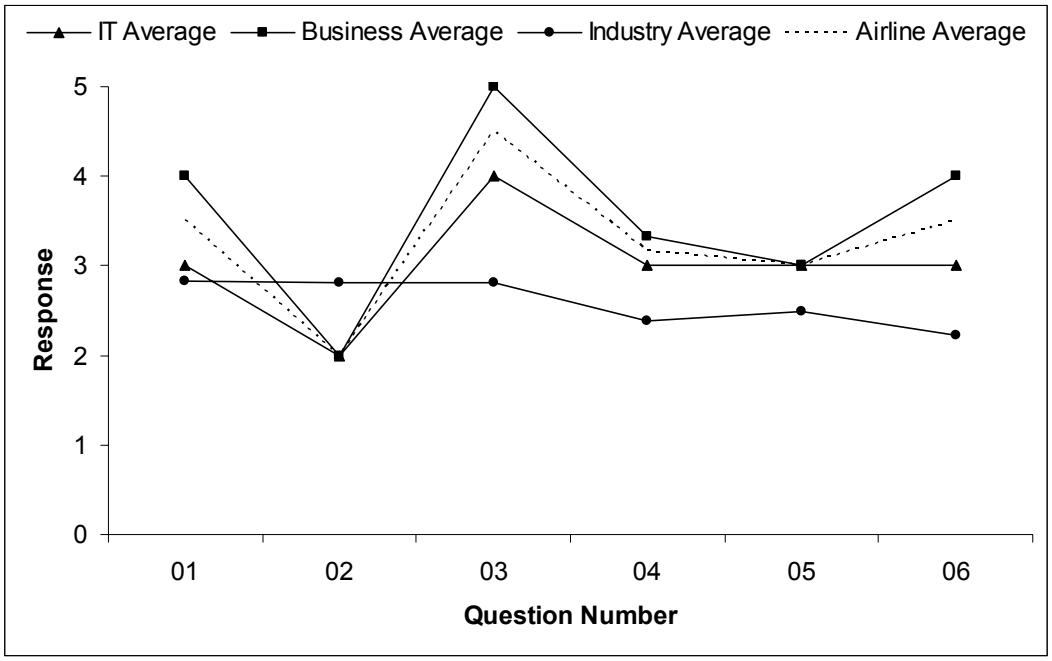

Figure H1. Airline-8 Survey Responses—Communications

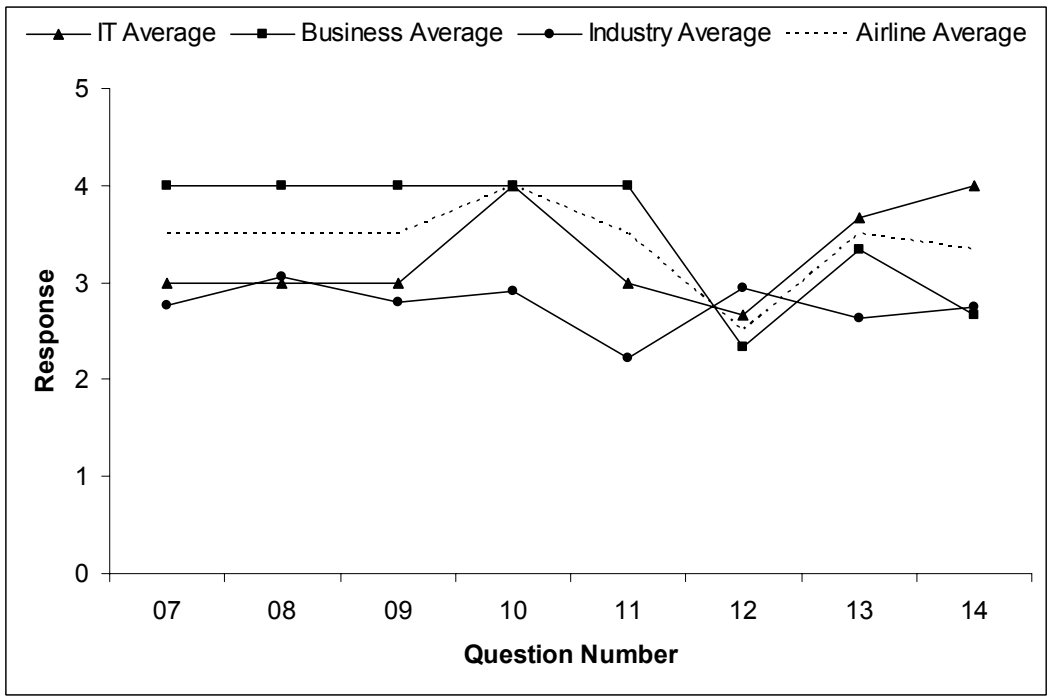

Figure H2. Airline-8 Survey Responses—Competency and Value

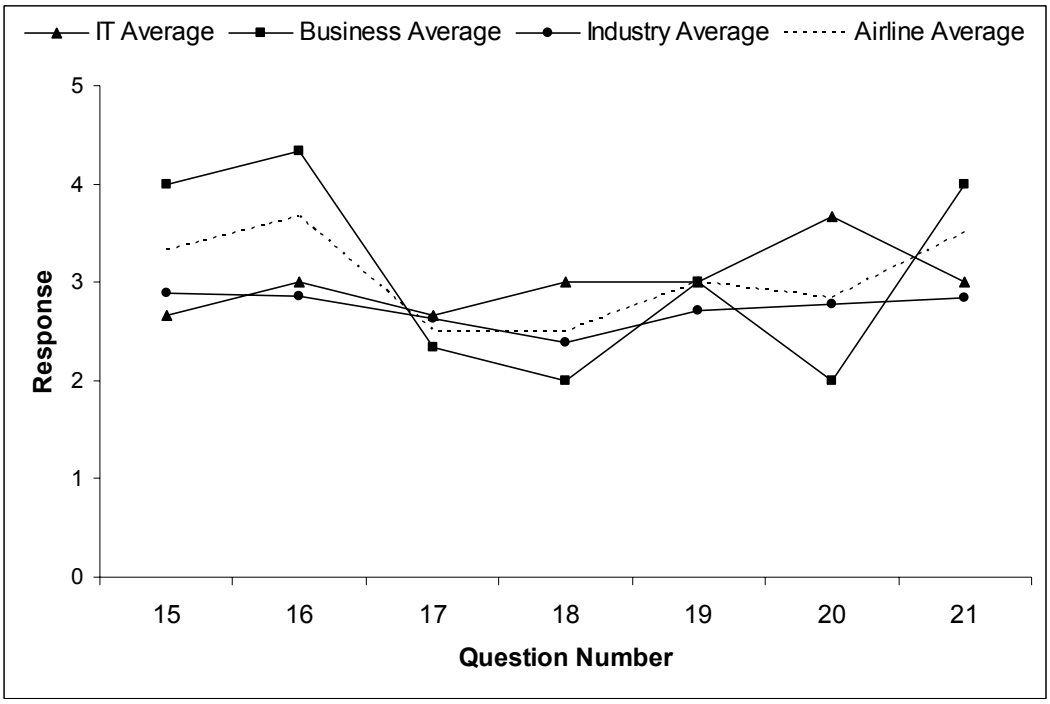

Figure H3. Airline-8 Survey Responses—Governance

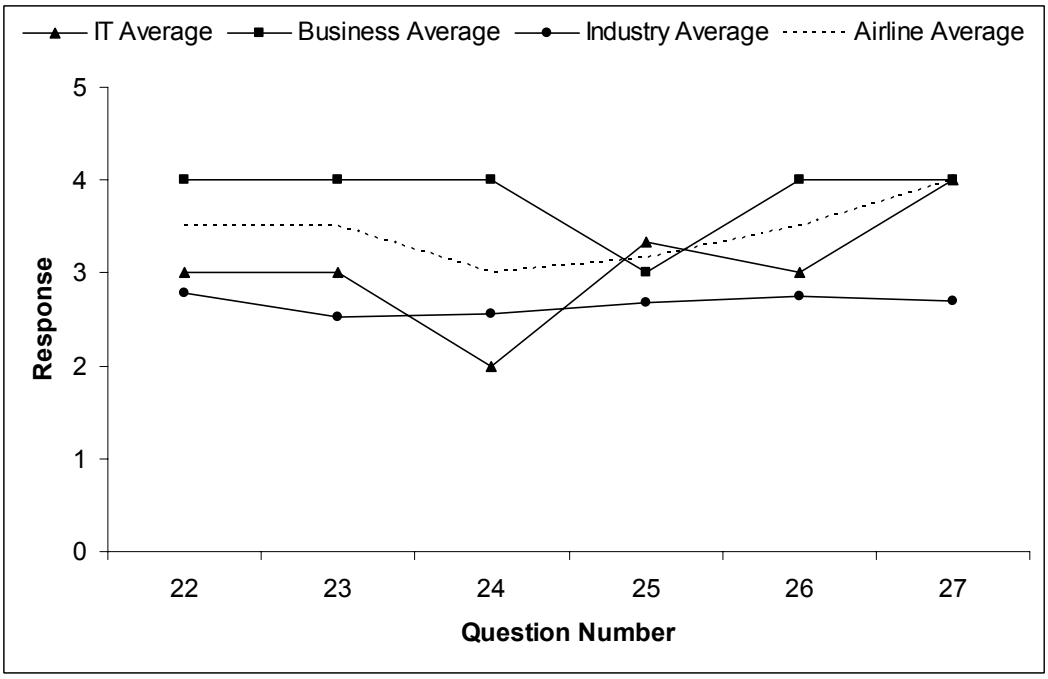

Figure H4. Airline-8 Survey Responses—Partnership

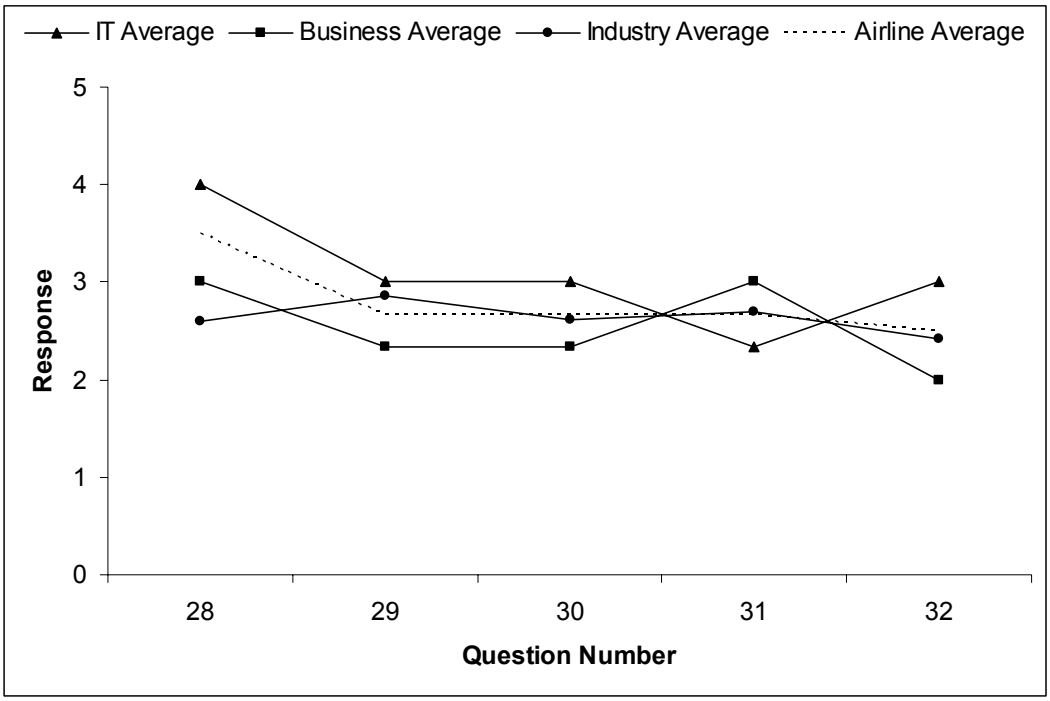

Figure H5. Airline-8 Survey Responses—Scope and Architecture

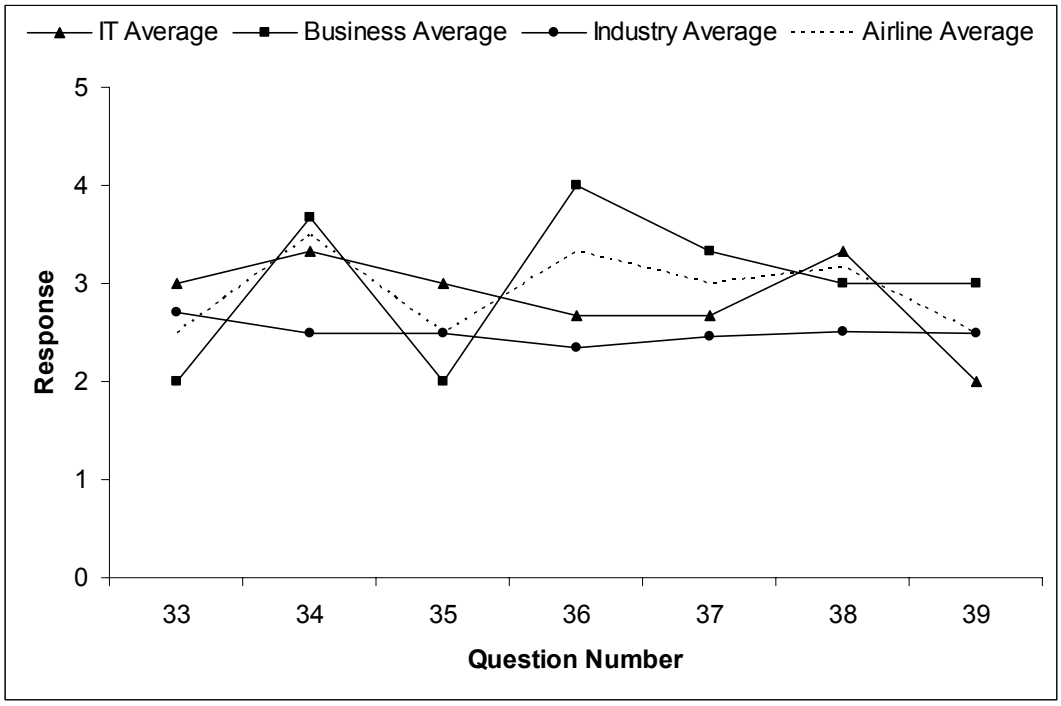

Figure H6. Airline-8 Survey Responses—Human Resource Skills

APPENDIX I. AIRLINE-9 SURVEY DATA

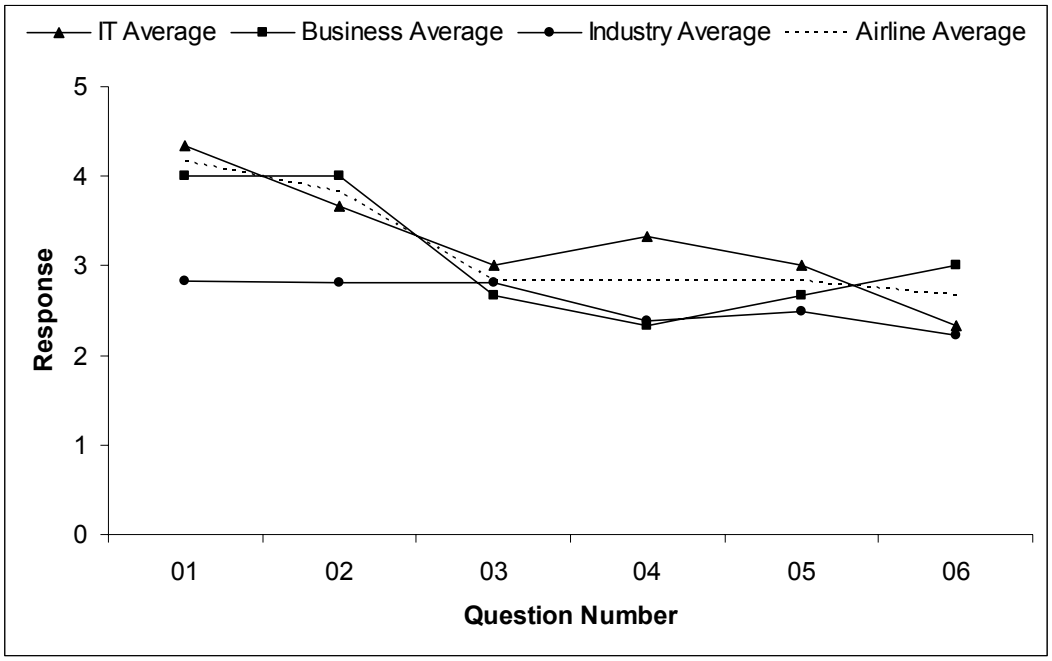

Figure I1. Airline-9 Survey Responses—Communications

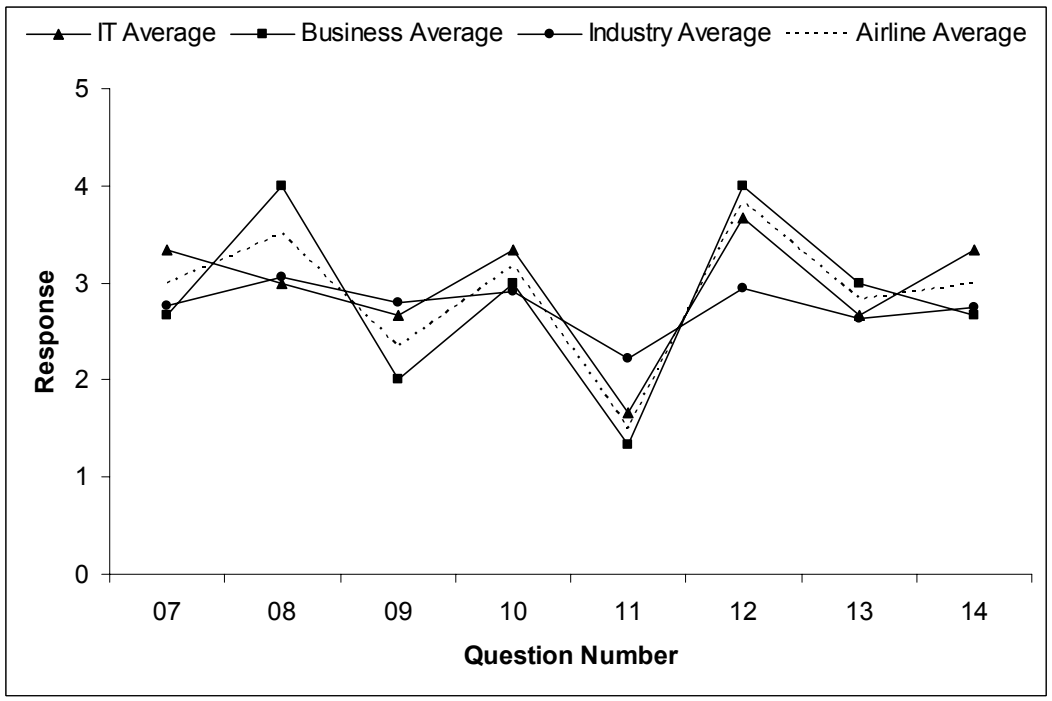

Figure I2. Airline-9 Survey Responses—Competency and Value

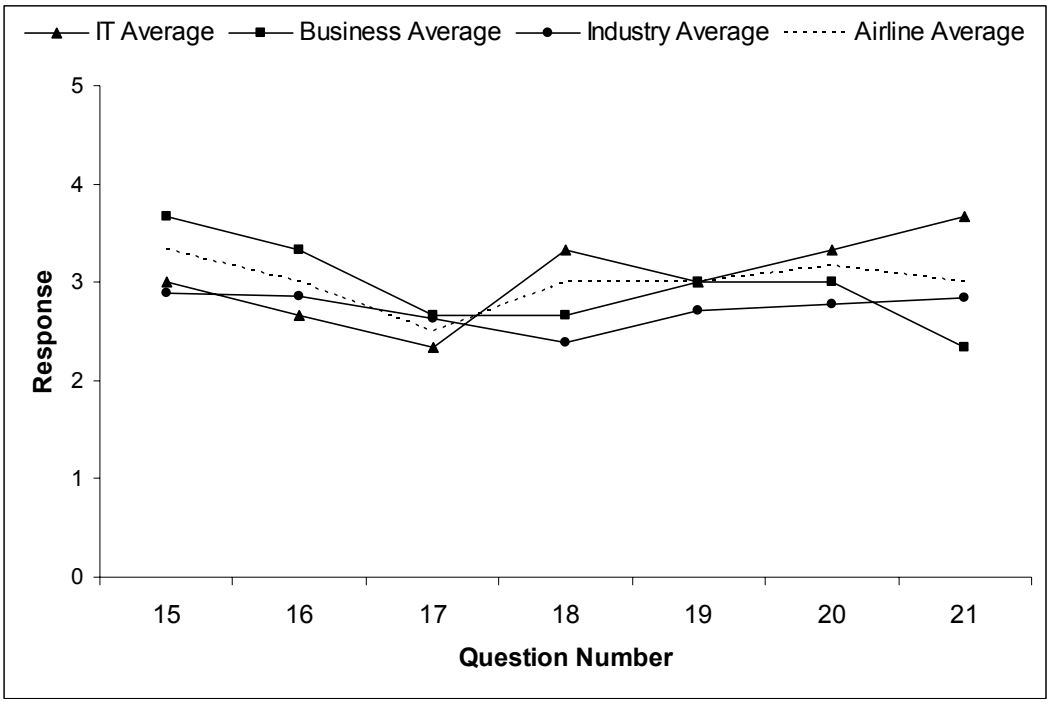

Figure I3. Airline-9 Survey Responses—Governance

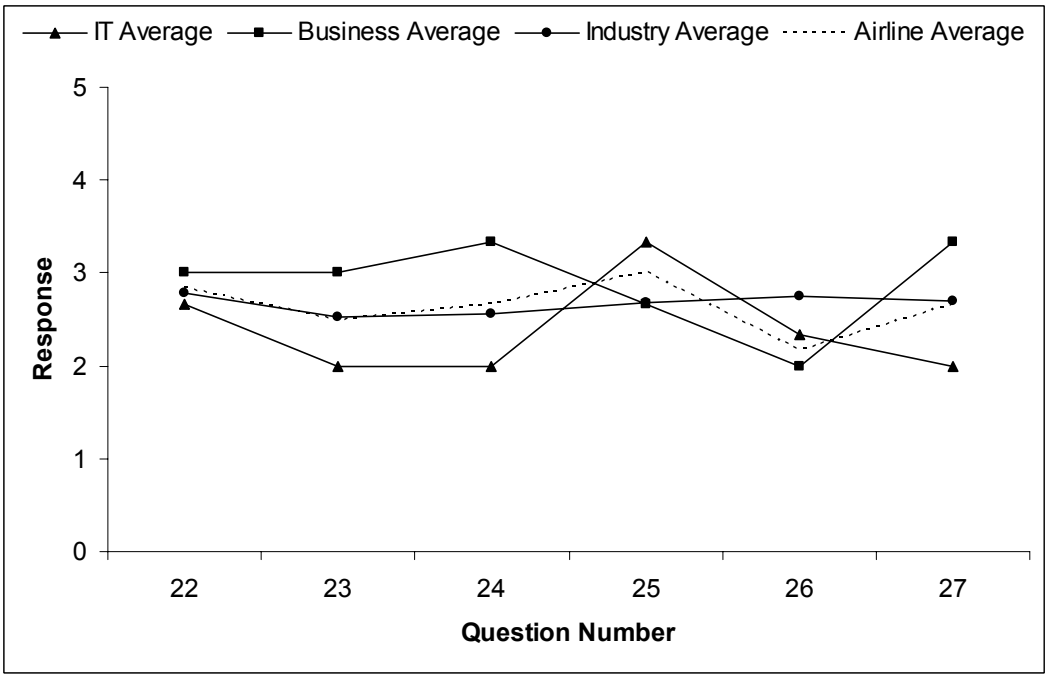

Figure I4. Airline-9 Survey Responses—Partnership

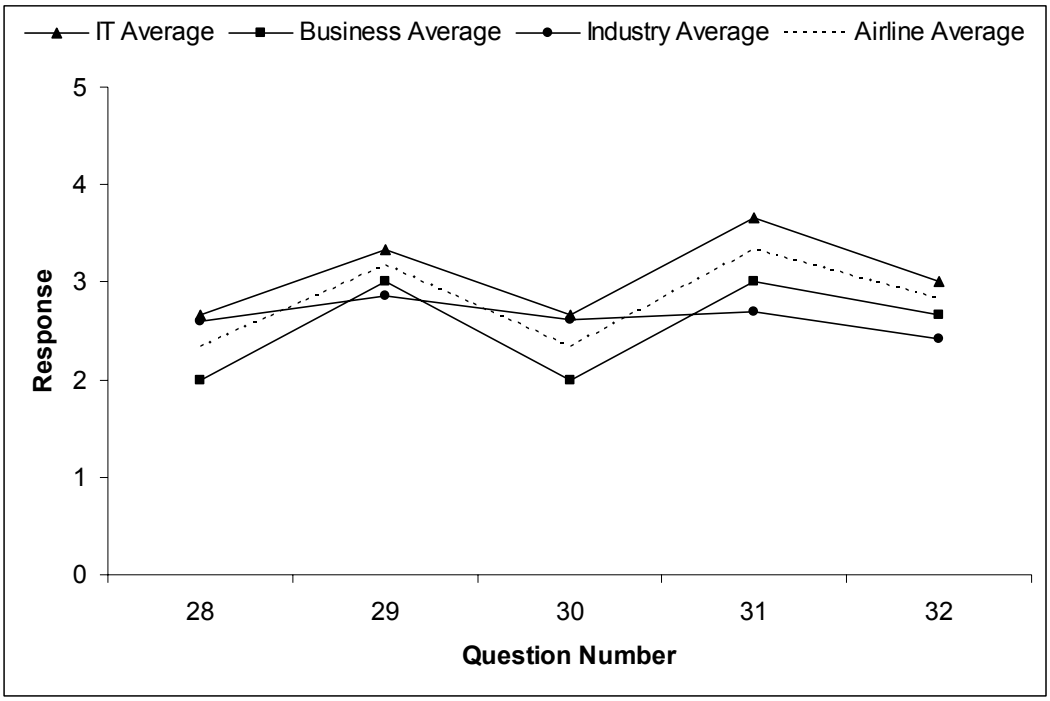

Figure I5. Airline-9 Survey Responses—Scope and Architecture

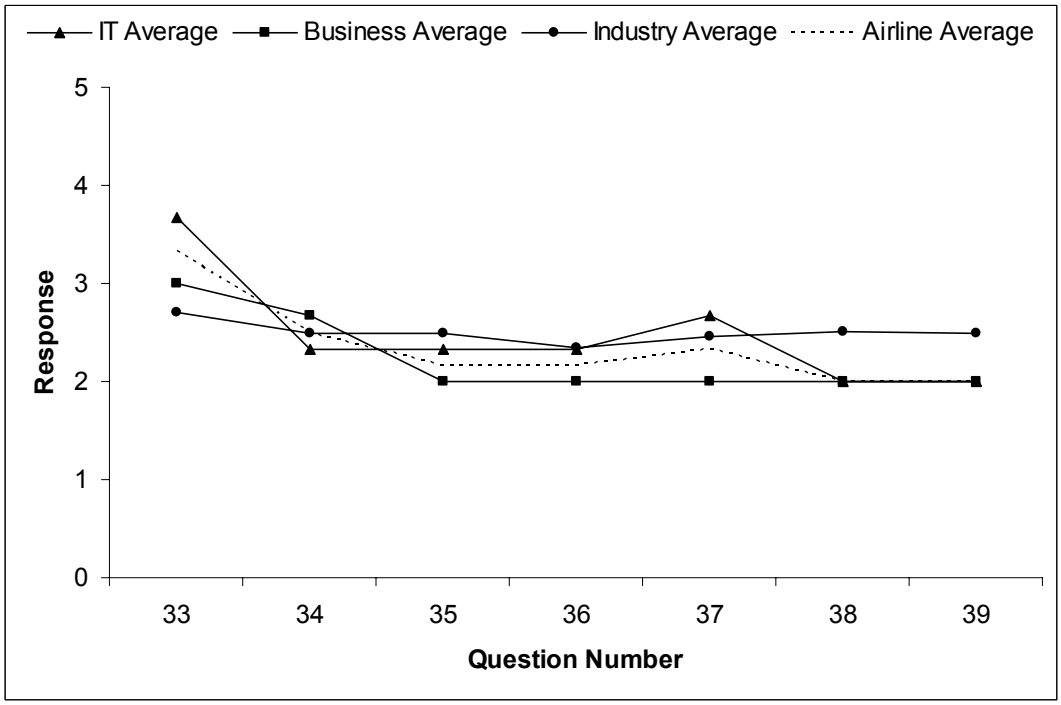

Figure I6. Airline-9 Survey Responses—Human Resource Skills

APPENDIX J. AIRLINE-10 SURVEY DATA

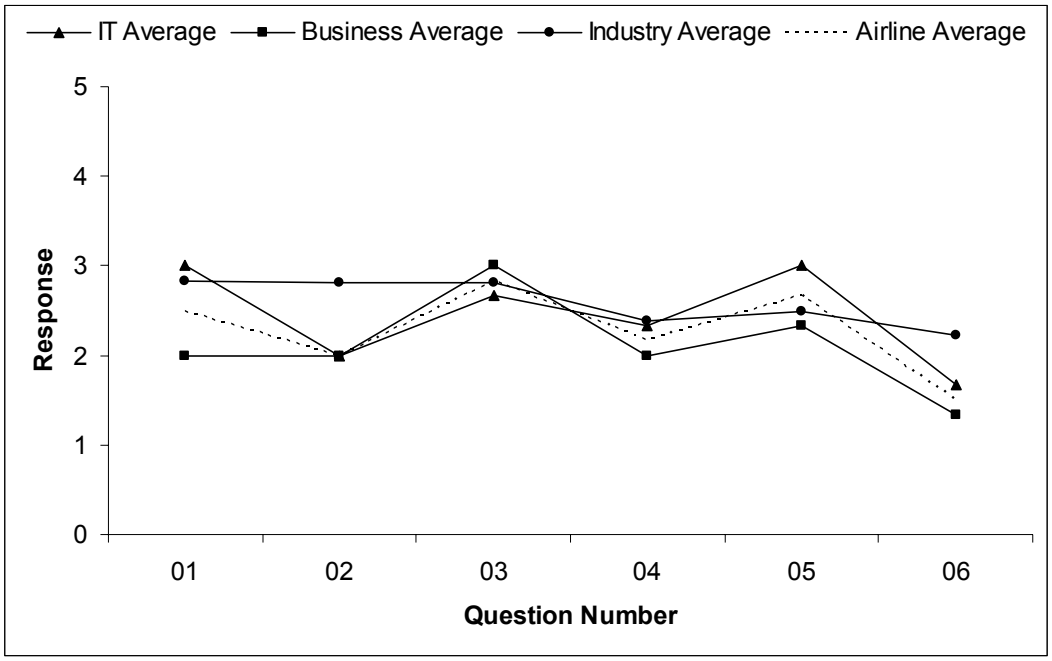

Figure J1. Airline-10 Survey Responses—Communications

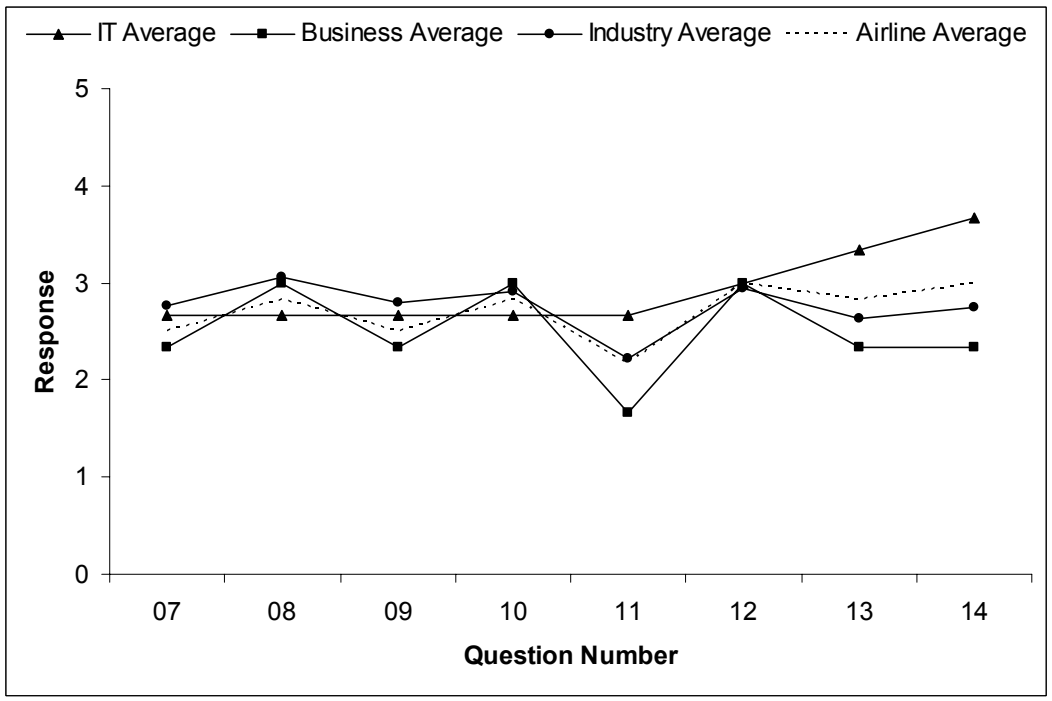

Figure J2. Airline-10 Survey Responses—Competency and Value

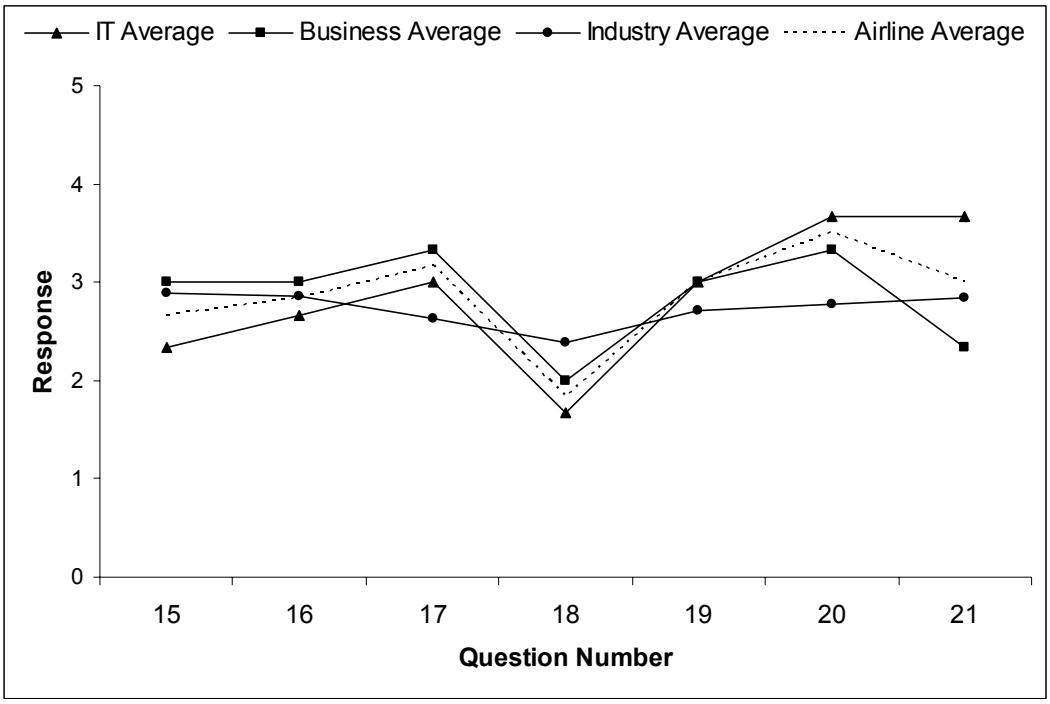

Figure J3. Airline-10 Survey Responses—Governance

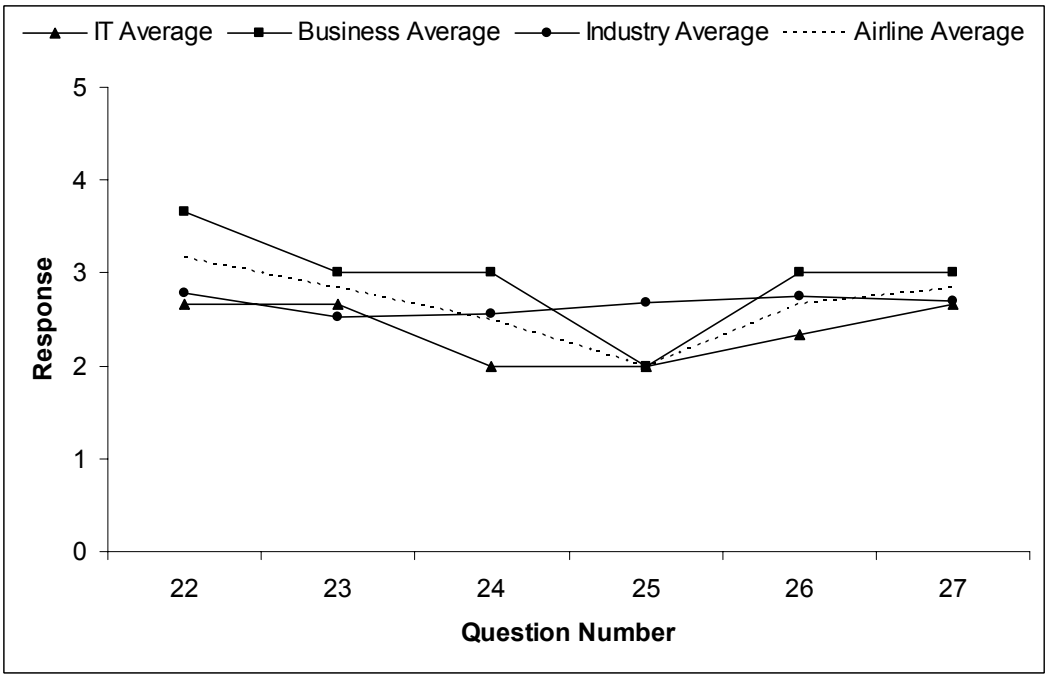

Figure J4. Airline-10 Survey Responses—Partnership

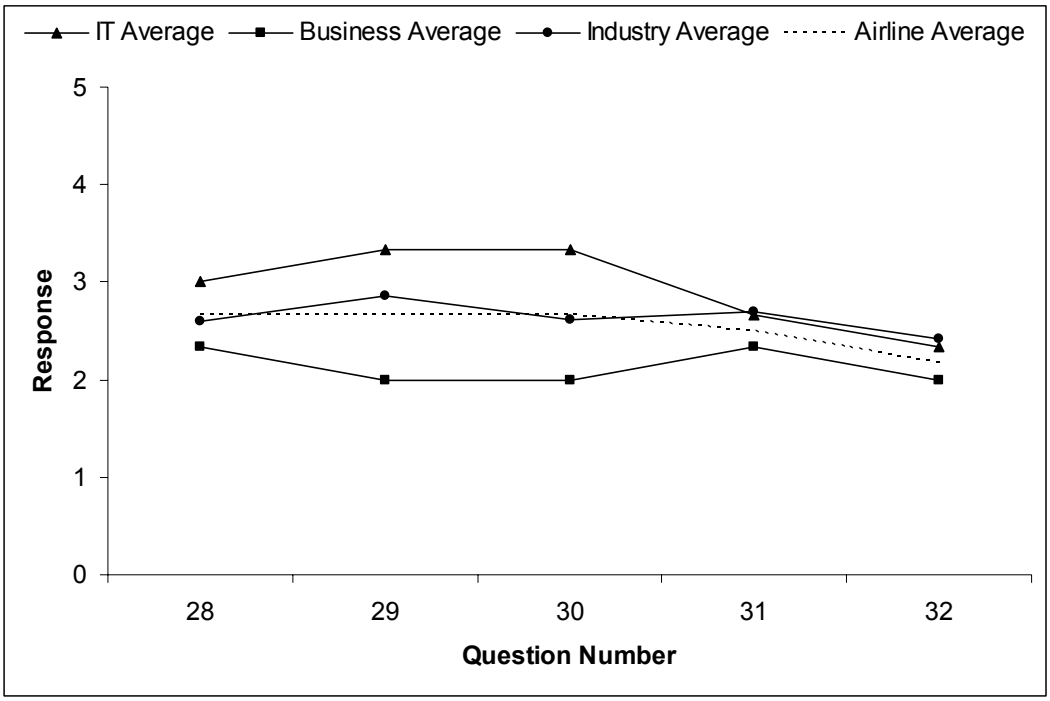

Figure J5. Airline-10 Survey Responses—Scope and Architecture

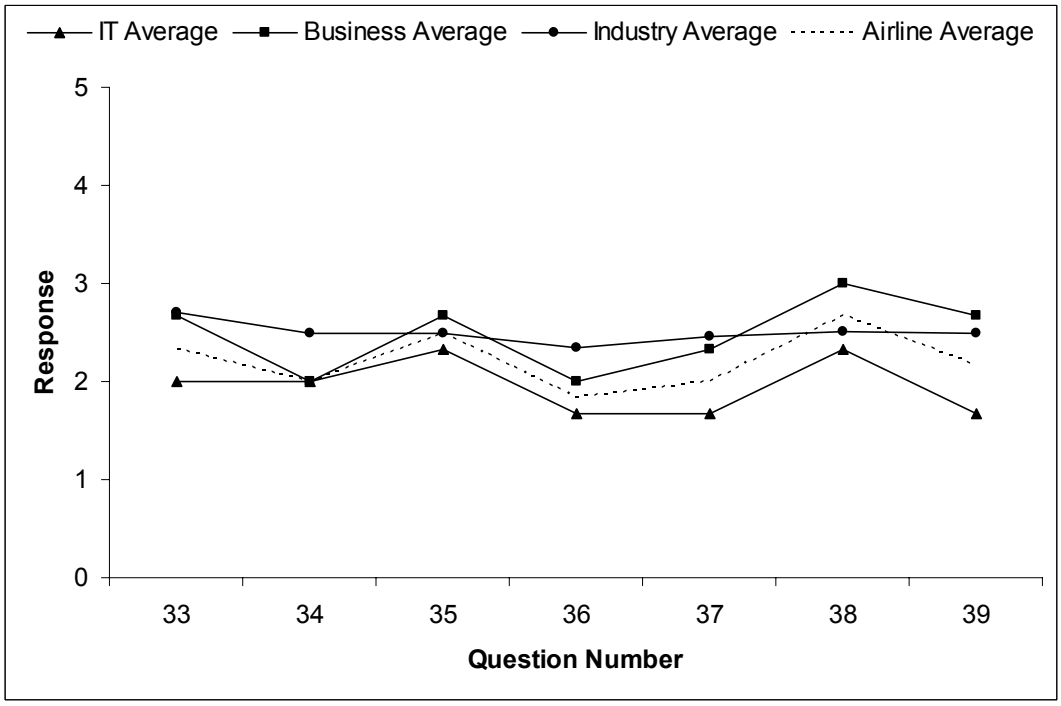

Figure J6. Airline-10 Survey Responses—Human Resource Skills

APPENDIX K. AIRLINE-11 SURVEY DATA

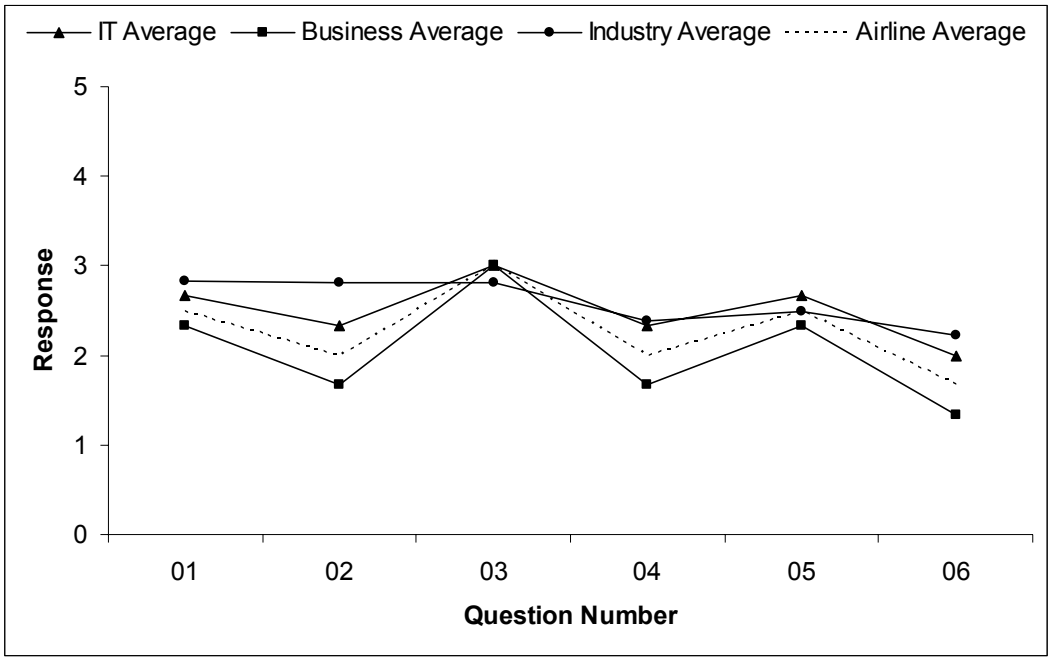

Figure K1. Airline-11 Survey Responses—Communications

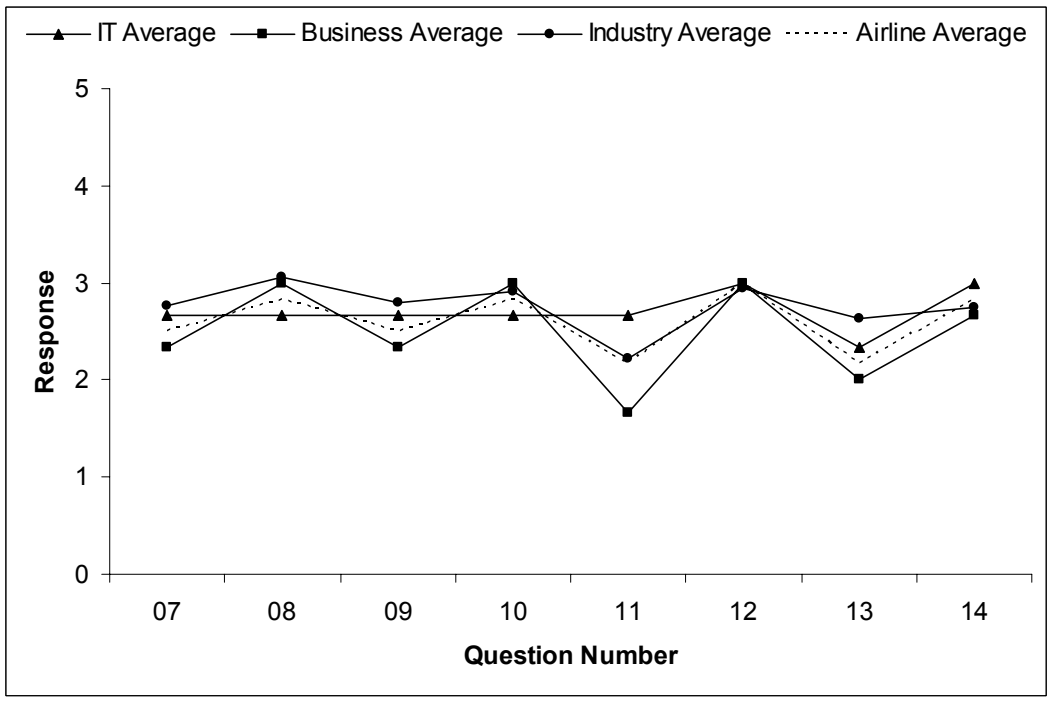

Figure K2. Airline-11 Survey Responses—Competency and Value

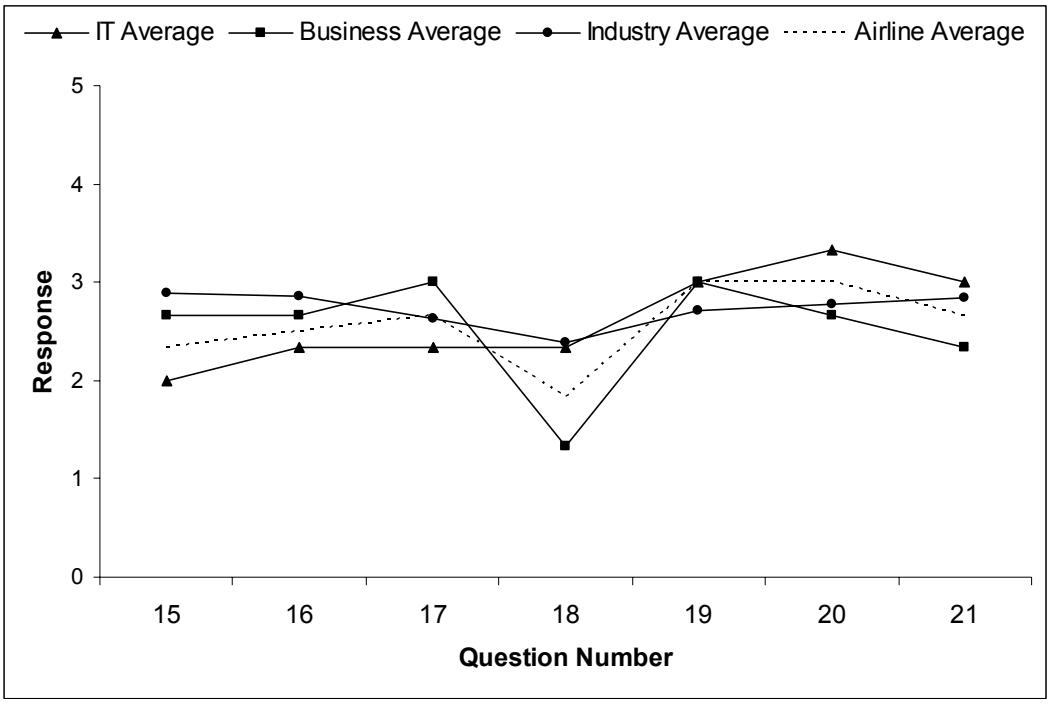

Figure K3. Airline-11 Survey Responses—Governance

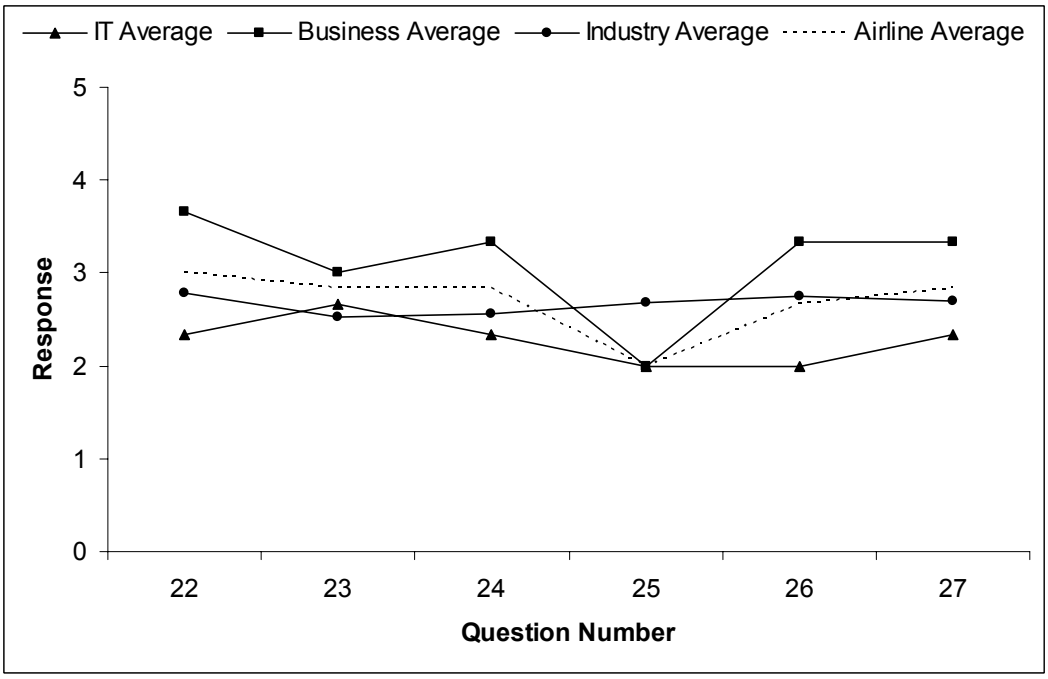

Figure K4. Airline-11 Survey Responses—Partnership

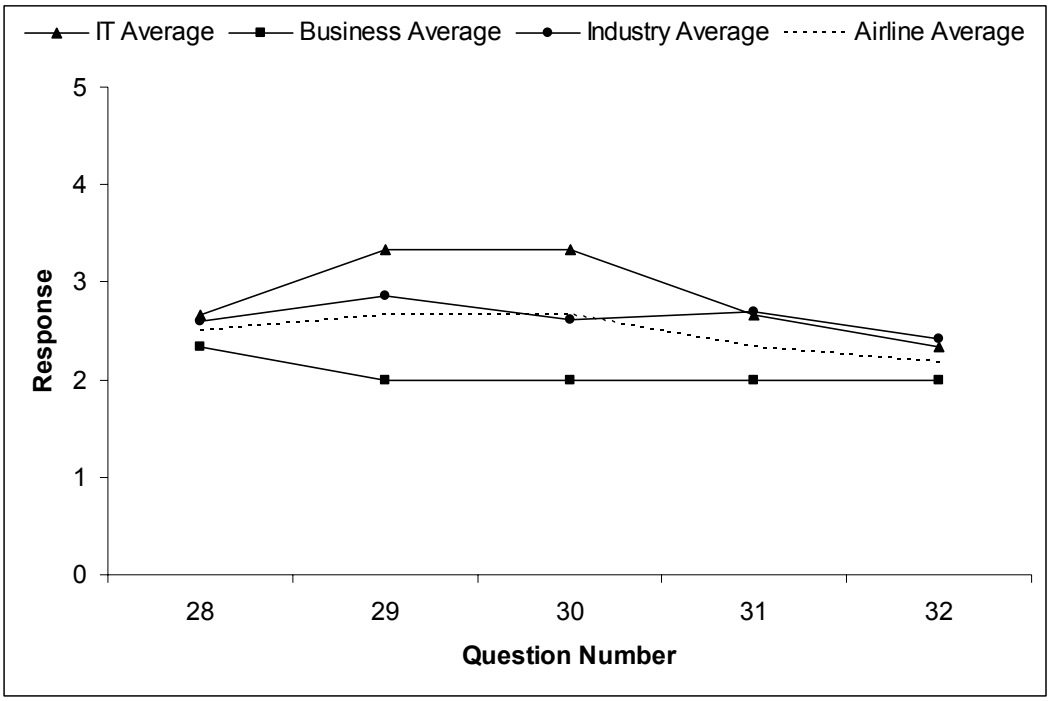

Figure K5. Airline-11 Survey Responses—Scope and Architecture

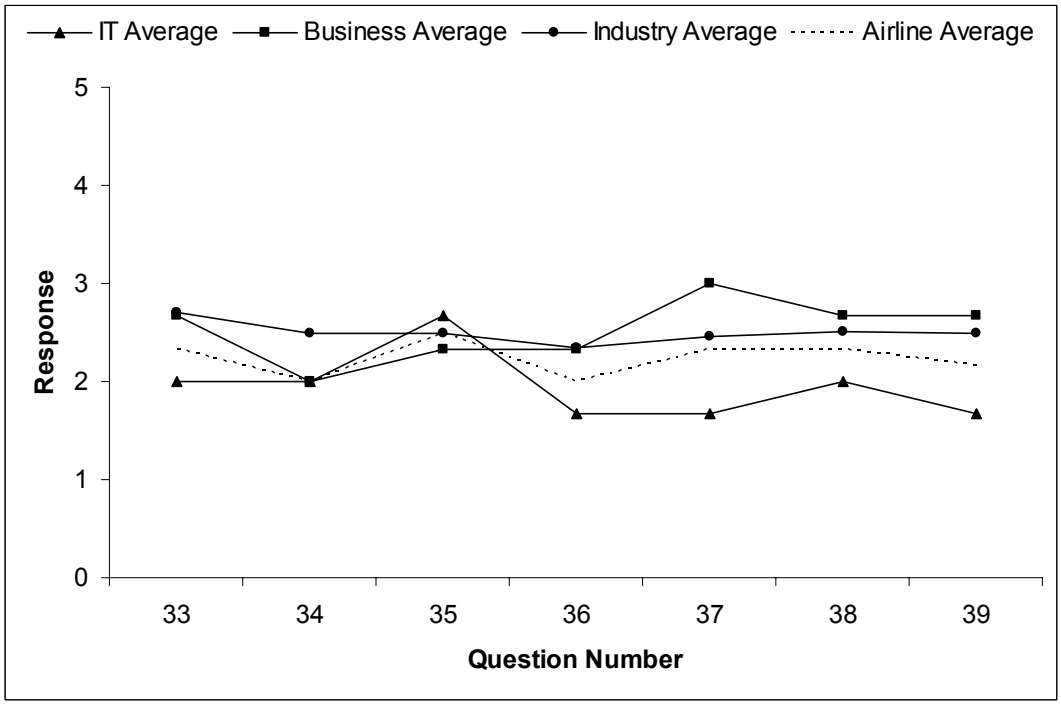

Figure K6. Airline-11 Survey Responses—Human Resource Skills