A Boolean Analysis Predicting Industry Change: Innovation, Imitation & Business Models

The Winning Hybrid: A case study of isomorphism in the airline industry

Hvass, Kristian Anders

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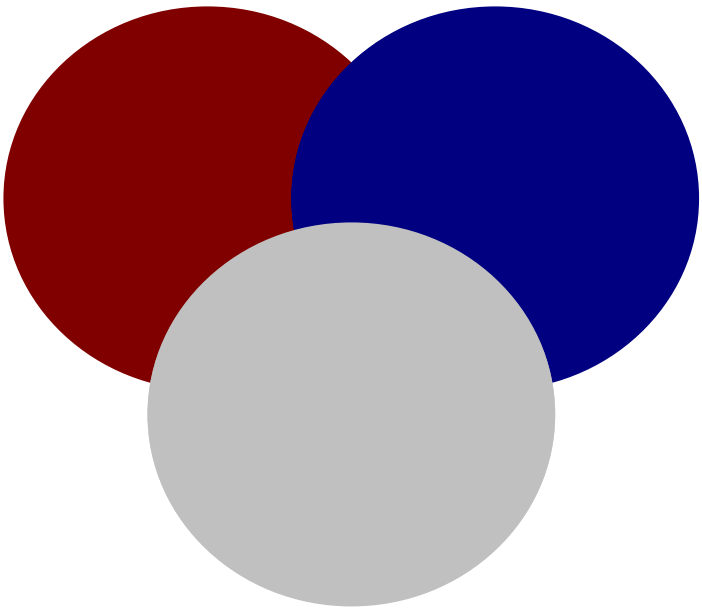

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ABSTRACT

The deregulated scheduled passenger airline industry is in a constant state of motion as managers continually adapt their business models to meet the challenging market environment. Such adaptation has led to a variety of airlines populating the industry; from the birth of low-cost carriers to the transformation of state-owned behemoths to lean and successful carriers. These dynamics challenge airline managers to continuously acclimate their business models and to understand industry evolution.

This doctoral dissertation addresses the issue of industry evolution and attempts to propose future airline business models based on airline behavior. The intention is to improve understanding of industry evolution, propose a method for constructing future business models, and aid airline management in future strategic decisions. Three central themes are raised in the research: business model heterogeneity and its impact on airline performance, innovation and imitation as a justification for business model heterogeneity, and future business models grounded on airline innovation and imitation. Each theme forms the basis for the project's three analyses. The research is categorized according to the customary industrial segmentation of full-service carriers, low-cost carriers, and regional carriers.

The findings show that business model heterogeneity is evident at varying degrees in the industry, and that there is a positive relationship between the level adherence to a strategic group's traditional business model and financial performance. This indicates that airlines that abide by their strategic group's traditional business model perform better than those that differentiate themselves form the traditional business model. The low-cost carrier group is the most heterogeneous while the full-service carrier group is the most homogenous, which one may attribute to the historical emergence of these two groups.

Results from a global survey distributed to airline CEOs show that business model differentiation is predicated on both innovation and imitation. The research shows that all airlines innovate, however business model changes based on this phenomenon may only afford an airline an advantage for a limited time period as imitation is prolific in the industry. Airline behavior indicates that airlines that populate the periphery of their strategic group are more prone to imitate other strategic groups. In addition, it is shown that airlines that closely adhere to their strategic group's traditional business model are more likely to imitate airlines populating their own strategic group.

The final analysis is based on the presence of innovation and imitation in the industry and incorporates these concepts in algebraic analyses which determine the unique combinations that continuously lead to a positive operating margin. The business model results suggest that the clear, historical distinctions between the strategic groups in the industry are becoming blurred, and that a winning hybrid may emerge.

DANSK RESUME

Der er en konstant bevægelse i den del af luftfartsindustrien, der arbejder med passagertransport, da dens ledere bestandigt tilpasser deres forretningsmodeller til at imødekomme de krav, der stilles af markedet. Tilpasninger af denne karakter har ført til en mangfoldig industri og en række forandringer, fra fødslen af lavprisselskaberne til transformationen af statsejede giganter til strømlinede og succesfulde luftfartsselskaber. Disse dynamikker udfordrer ledere i luftfartsbranchen til konstant at akklimatisere deres forretningsmodeller og til at forstå udviklingen i branchen.

Denne ph.d.-afhandling behandler problemet om brancheudviklingen og forsøger at udpege fremtidige forretningsmodeller for luftfartsindustrien baseret på virksomhedsadfærd. Intentionen er at forbedre forståelsen af brancheudviklingen, foreslå en metode til fremtidige forretningsmodeller og styrke ledelsen af luftfartsselskaber. Tre centrale temaer rejses i forskningen: heterogenitet i forretningsmodeller og dens effekt på profit; innovation og imitation som en retfærdiggørelse af heterogenitet i forretningsmodeller; og fremtidige forretningsmodeller baseret på innovation og imitation. Forskningen er kategoriseret efter de sædvanlige brancheinddelinger af netværksselskaber, lavprisselskaber og regionale selskaber.

Resultaterne viser, at heterogenitet i forretningsmodeller i varierende grad er tydelig i industrien, og at der er et positivt forhold mellem niveauet af fastholdelse af en strategisk gruppes traditionelle forretningsmodel og økonomisk performance. Dette indikerer, at luftfartsselskaber, der står ved deres strategiske gruppes traditionelle forretningsmodel, performer bedre, end dem der adskiller sig fra den traditionelle forretningsmodel. Lavprisselskabs-gruppen er den mest heterogene, mens gruppen af netværksselskaber er den mest homogene, hvilket kan tilskrives den historiske tilsynekomst af disse to grupper.

Resultater fra en global spørgeskemaundersøgelse omdelt til topledere af luftfartsvirksomheder viser, at differentiering i forretningsmodeller tilskrives både innovation og imitation. Undersøgelsen viser, at alle flyselskaber innoverer, imidlertid giver forandringer i forretningsmodeller baseret på netop innovation kun et luftfartsselskab fordele i et begrænset tidsrum, da imitation knopskyder og udbredes i branchen. Adfærd blandt luftfartsselskaberne indikerer, at selskaber, der ligger i periferien af deres strategiske grupper, er mere tilbøjelige til at imitere andre strategiske grupper. Yderligere ses det, at luftfartsselskaber, der holder sig tæt til sine strategiske gruppers traditionelle forretningsmodel, er mere tilbøjelige til at imitere luftfartsselskaber, der tilhører egne strategiske grupper.

Den afsluttende analyse er baseret på tilstedeværelsen af innovation og imitation i luftfartsindustrien og inkorporerer disse koncepter i en algebraisk analyse, der bestemmer den unikke kombination, som kontinuerligt fører til en positiv driftsmargin. Resultaterne af forretningsmodellerne peger på, at den rene, historiske skelnen mellem de strategiske grupper i branchen er ved at blive udvisket, og at en vindende hybrid måske er under fremkomst.

ACKNOWLEDGEMENTS

A PhD dissertation appears as an insurmountable task in the distance, especially one researching a topic nearly everyone has an opinion on, namely the future of the airline industry; however, with the support of many I have been able to traverse the peaks and valleys through my journey and emerge at the other end with my sanity roughly intact. It has not been an unaided journey of one.

This PhD would not have seen the light of day without the support and advice of Lise Lyck, center director at the Center for Tourism and Culture Management at Copenhagen Business School. Her support and guidance throughout the process solidified my decision to commence with the PhD endeavor, and her encouragement to explore the unknown was refreshing.

While the TCM center invited me into the academic community it is SAS Denmark who is credited with making this PhD possible. Financial and informational support was provided by the airline, and without the input from various sources this research would not be as detailed. My supervisors, Søren Winther, Anders Hjalmarsson, Erik Vind, and the support of the Business Development and Route Development departments were a tremedous help. So many in the organization provided me with the ability to see the usefulness of my research in a practical realm which was invaluable.

My colleagues from University of California at Berkeley at the Haas School of Business were an inspiration, especially my compatriot, Associate Professor Natalia Martin Cruz. Her relentless guidance throughout the project is truly appreciated, and her joy for statistics is infectous. I hope I can be at least half as beneficial to those who follow me.

This dissertation may have a sole author, however it is a composition of many as my friends and family have supported me throughout. They feigned interest in my research to keep my spirits up, and celebrated my milestones and provided words of encouragement with less stellar performances. My wife deserves to be credited for continously bringing my head out of the clouds, and being a vicious and brutally honest reviewer; a true support.

This dissertation is dedicated to my mother and father who always taught me not to fear my ambitions.

Kristian Anders Hvass

Copenhagen
April 22, 2008

High Flight

- John Gillespie Magee Jr. –
No 412 squadron, RCAF
Killed 11 December 1941

Oh! I have slipped the surly bonds of Earth
And danced the skies on laughter-silvered wings;
Sunward I've climbed, and joined the tumbling mirth
of sun-split clouds, — and done a hundred things
You have not dreamed of—wheeled and soared and swung
High in the sunlit silence. Hov'ring there,
I've chased the shouting wind along, and flung
My eager craft through footless halls of air....
Up, up the long, delirious, burning blue
I've topped the wind-swept heights with easy grace
Where never lark nor even eagle flew—
And, while with silent lifting mind I've trod
The high untrespassed sanctity of space,
Put out my hand, and touched the face of God.

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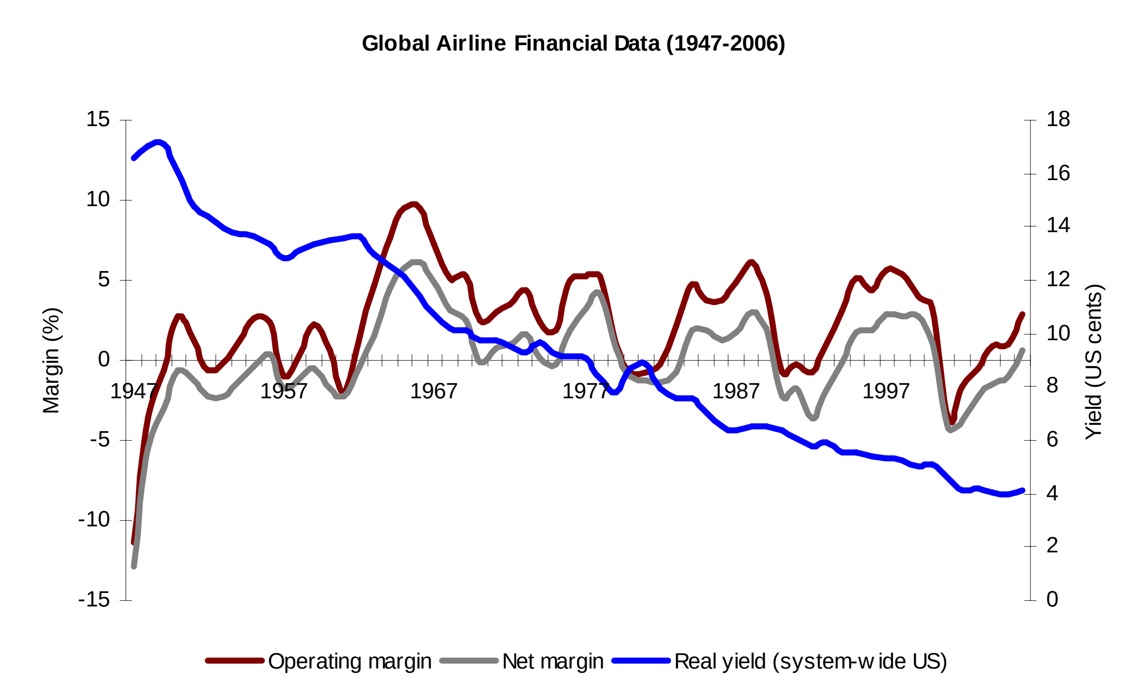
1. Introduction

- The first heavier-than-air, powered flight occurred on December 17, 1903 and achieved a distance of 120 feet, less than the length of an average 747 economy section -

Strategic management of a firm attempts to strike a balance between supplying the market with a desirable product or service and the associated costs, and management is free to choose a strategy that best suits the firm's goals and implement a business model that strives to achieve the strategic aim. When the internal or external environments necessitate a change, management can adjust their short-term business model or their long-term strategy. Change, however, is hampered with the historical baggage of the industry and firm, the current competitive environment, and the future direction of the industry; in other words, past, present, and future. Past and current challenges can be dealt with systematically, while the latter is more difficult to chart precisely. Forecasting and predicting of industry developments are vital to management as they aid in the allocation of firm resources, but fortune telling is a difficult vocation; *"Forecasting is difficult, especially when it concerns the future,"* a French philosopher once said (Davies & Quastler, 1995 pg. 165). Strategic success depends partly on a firm's ability to indentify emerging trends in the business environment and to act accordingly at the proper moment (Georgantzas & Acar, 1995). Would the respective industries have evolved differently than today if competitors could have predicted Wal-Mart's success in retailing, Toyota's lead in hybrid vehicles, Skype's achievement in communication, Apple's performance in computers and design, or Southwest's lead in air travel? These examples show that both manufacturing and service industries are evolving, and that today's winners may be tomorrow's losers; it is no longer Sears Roebuck, General Motors, AT&T, IBM, or Pan-Am that grace front page headlines. Leading firms of today benefit from keeping a watchful eye on both near and far competitors, lest they be toppled. This omnipresent competition forces firms to innovate or imitate their product or service, leading to industry evolution (Bolton, 1993; Reinganum, 1985; Segerstrom, 1991). Such change may be grounded in technological advances, such as Skype's voice-over IP software, or in new management practices, as Wal-Mart's retail model shows. Industry evolution may shift between the two, as shown in the aviation era. In its childhood technology was a key driver for industry change, however in the most recent decades management practice has been an evolutionary catalyst.

Historical perceptions of the airline industry are often glamorous and envious, yet this era was under the protection of industry regulation. Today, free market forces prevail in many regions, which have led to revolutionary changes. In the past, technological advances propelled industry change. The introduction of the jet engine in the de Havilland Comet and the Boeing 707 in the 1950s, and the Boeing 747 in 1970 brought faster, further, more reliable, and less expensive air travel to the masses. While today's technology in the industry is rooted as far back as 1903 and the Wright brothers' first flight (Jakab, 1990; Wright & Wright, 1903), management has only been allowed to experiment with new styles since deregulation, a mere four decades ago, and even later in some regions. Government regulation restricted airline management to industry norms and practices, and factors, such as price, schedule, capacity, and even service levels, were controlled (Gidwitz, 1980). The 1978 Airline Deregulation Act in the US brought about a flurry of activity in the United States and the rest of the industry, and a slew of new airlines and strategies were introduced. These new management styles have led to a categorization of different types of airlines within the industry which frequently lead to competitive battles in the marketplace. Competition is fierce and the following figure shows the cyclical nature of the global scheduled passenger airline industry's financial performance.

Figure 1.1: Global airline financial data 1947-2006



Source: Air Transport Association (2007)

The operating and net margins shown in figure 1.1 depict an industry that is challenged to earn a profit; occasionally the mere operation of the airline results in losses[1]. The average margins for the entire period are 2.3% and 0.06%, operationally and net respectively. The highly successful investor, Warren Buffett, famously quipped if he had been in Kitty Hawk in 1903, the best thing he could have done for investors would have been to shoot down Orville Wright, since the airline industry had, at least up to 1990, lost more money than it earned for equity investors[2] (Rosa, 2006). The graph shows that the industry is highly cyclical and follows the pulse of economy, emulating recessionary and other crises[3] (National Bureau of Economic Research, 2001). The real yield line shows the average annual airfare adjusted for distance and inflation for US carriers[4], domestically and internationally aggregated. Although not a global average, the trend is repeated in numerous markets throughout the world's regions (K. J. Mason, 2005): progressively falling yields. Together, these three graphs show a highly competitive

[1] An investigative report by CNBC provides an inside look at American Airlines (CNBC, 2007) that concisely portrays the challenges facing the industry by showing that flight AA001, New York to Los Angeles, the airline's flagship route, on that particular day of filming operated a fully-loaded Boeing 767 that contributed a mere US $200 to the airline's operating results. Revenues were US $53,000 (ticket sales plus $300 in freight and $800 in food, headset sales, and excess baggage) and expenses US $52,800. Contrast this with an intrastate Texas flight from Dallas to Hartford that profited the airline with US $8,400.

[2] The global industry has posted a cumulative net profit of 731 million USD between 1947 and 2006 (Air Transport Association, 2007)

[3] This reflects the income elasticity of demand apparent in the industry (O'Conner, 2001)

[4] Historical global average yield data is not obtainable

industry. However, not all airlines are suffering equally. Rankings according to 2006 passenger figures, displayed in table 1.1, show that the largest carriers report varying levels of operating success.

Table 1.1: Largest carriers' operating margin (2006)

Rank[1]	Full-service carriers	Operating margin	Low-cost carriers	Operating margin
1	Delta Air Lines	0.3%	Southwest Airlines	10.3%
2	American Airlines	4.7%	Ryanair	21.1%
3	Air-France-KLM	5.4%	easyJet	7.3%
4	United Airlines	2.3%	AirTran Airways	2.2%
5	Japan Airlines	1.0%	Air Berlin	4.0%

[1]: Passengers carried (2006)
Source: Airline Business (2007b)

This performance rift within the industry pressures management to seek new ways of organizing their business model. New strategies may come from innovating their existing business or change through peer inspiration, together these forces drive industry evolution. Management's challenge is to predict which strategic elements are deserving of innovative resources or should be imitated from industry rivals. The industry and research community has yet to propose a method addressing this issue.

1.1 Research question

The airline industry, as with so many others, struggles with future uncertainty. Predictions grounded in accepted methods may aid managers in preparing future strategies.

Until this point the broad term, *strategy*, has been used, however convergence of the topic is desired. Strategy often portrays the broad aim of a firm, while a *business model* refers to a short-term perspective of how a firm conducts business. From this point forward the terms will not be used interchangeably but with their own distinct definitions. While some researchers see no difference (M. E. Porter, 2001), others are careful to make a distinction (Markides, 2006; Osterwalder, 2004).

The aim of this research is threefold:

1. Propose and introduce a research method which may enable research in future scenario planning, both within the scheduled passenger airline industry and others.
2. Inspire and guide airline managers in business model areas that should be innovated or imitated.
3. Propose and describe the future business models within the scheduled passenger airline industry.

Research methods within future studies continue to develop and one of this project's aims is to present a new method which may be applied to various industries. This method distinguishes itself from others by extrapolating future business models in an industry based on past firm behavior using algebraic methods. The proposed research method is intended to complement the field of business model change and, more specifically, aviation researchers in their attempt to grasp future developments. Research in firm and industry group behavior suggests that firm and industry changes are inevitable, yet there is no sound method of analyzing what changes may take place. The second aim is to provide a level of guidance to airline executives, consultants, policy makers, and practitioners in how to adapt their business model to the changing environment. Industry practitioners and actors may benefit from this research by restricting limited resources to those areas of the business model that are important. Finally, new business models for the scheduled passenger airline industry are proposed, which may provide foresight into how the competitive landscape may develop. The main question of the research project is:

What will be the successful future airline business models?

This main question is answered by incorporating three complementing and supporting, subset questions:

1. How does the variation of airline business models affect profit?
2. Why is there variation in airline business models?
3. What future airline business models can be proposed?

1.2 Limitations

As with all research this project has its limitations. It is focused exclusively on the scheduled passenger airline industry, although parallels may be drawn to similar service industries. Examples of these are presented at the conclusion of the report. The main question incorporates two subjective terms, success and future, which require definitions. Success of a firm can have many facets. Some may relate it to market share, product line, number of employees, or patents. This research defines success as profit margin, and more specifically, annual operational profit margin. This metric is used in strategic studies to measure success, and is touted as a measurement of value creation (M. E. Porter, 1985; Stewart Thornhill, 2007). It is often used to measure performance within the airline industry (Alamdari & Fagan, 2005). The time in question is the year of 2006, and this research is a lateral snapshot of the industry. The future, on the other hand, is an even greater fluid concept, it may begin at the next sentence on this page; mere seconds away. Or, it could be within the next century. This report proposes industrial developments in the future, which in the realm of the airline industry the researcher has limited to take place in the next five to ten years. The further one moves from the present the more subjective and inaccurate the analyses and results. There are numerous external factors, for example technological or regulatory, which shape the industry, yet are not integrated in this research; complexity reduces simplicity. The final limitation of this research is related to the three subset questions. These questions are stand-alone research topics which support the main research question. Although they can be read as separate chapters in the research project they do complement each other in sequential order.

1.3 Project background

This Doctor of Philosophy manuscript is submitted under the Industrial PhD[5] initiative by the Danish Ministry of Science, Technology and Innovation. It is a collaborative project between the Center for Tourism and Culture Management[6] at Copenhagen Business School and Scandinavian Airlines Danmark A/S[7]. The overall goals of the Industrial PhD program are to educate researchers within commercial aspects and to create links between academic and practical regimes.

The goal of this research project is to investigate future developments within the scheduled passenger airline industry, which can aid SAS in developing future business models and strategies. The industry develops at such a pace that it challenges airline managers to envision future developments, and the intention is to provide decision makers with predictions grounded in industrial strategic decision making behavior. Although this project is supported by the airline its findings are applicable to the entire industry and can be of benefit to all carriers. The following chapter introduces the reader to the methodological underpinnings of the research.

[5] Information about the ErhvervsPhD initiative can be found at http://fist.dk/site/erhvervsphd-ordningen
[6] Information about the Center for Tourism and Culture Management can be found at http://www.cbs.dk/tcm
[7] Information about SAS Danmark can be found at http://www.sas.dk and about SAS Group at http://www.sasgroup.net

2. Methodology

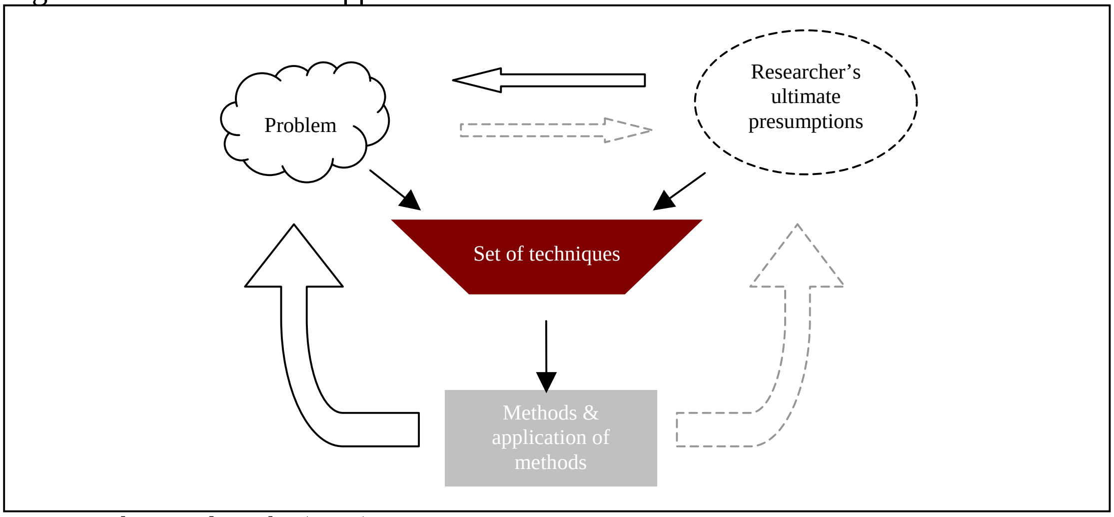
- The diameter of a GE-90-115B turbofan engine found on Boeing 777-200LR and 777-300ER models is 11 feet and 3 inches, while the cabin diameter of a new 737 is 11 feet and 7 inches, only 3% greater -

A research project's methodology shapes how a topic is interpreted, carried out, and analyzed. It offers the underlying principles that guide a researcher throughout the journey of initial research to conclusion, and makes assumptions about reality (Arbnor & Bjerke, 1996). Methodology differs from *methods*, which is a sub-set of *methodology*. Methodology can be understood as the supporting structures that consist of theories, frameworks, concepts, a researcher's approaches and individual interpretations of subject matter, and the collection of methods that are employed. Methods are the tools that allow a researcher to analyze and generate conclusions from the gathered data. This chapter will review the three sub-sets of the methodology employed in this particular research topic. It will commence from a macro level and review the paradigm and realms in which the researcher is operating. The meso level will briefly introduce the theories that are utilized in this project; however they will be explained in greater detail in the subsequent theoretical chapter (Chapter 3). Finally, at the micro level, an introduction to the particular methods employed will be mentioned. To improve clarity the methods will be explained in greater detail in Chapter 5. The aim of this chapter is to illuminate from which perspective the researcher interprets the research topic, and to make the reader aware of how the analyses were conducted. This knowledge will allow for improved understanding of how a result was obtained and the logic supporting each element.

2.1 Philosophy of science

While researching a topic a researcher's chosen rationale and philosophical assumptions that underlie the framework have an influence on how a topic is interpreted; rather than a theoretical lens that shapes the worldview, this is the uncorrected vision of the researcher. A paradigm contains the ultimate presumptions of the researcher (Kuhn, 1970), while methodological approaches attempt to convey the researcher's reality assumptions and provide a framework for how data should be collected, categorized, and presented (Arbnor & Bjerke, 1996). Figure 2.1 shows the relationship between the various forces acting within a research project (Arbnor & Bjerke, 1996). The solid block arrows indicate how the ultimate presumptions and methods directly influence the research problem, while the dashed block arrows show how researchers and their presumptions are also influenced by these two factors. Both the problem and the researcher's presumptions impact the set of techniques available, which result in a collection of methods and their applicability.

Figure 2.1: Methods and application of methods



Source: Arbnor and Bjerke (1996)

2.2 Paradigms

A paradigm explains the preconditions or assumptions, either explicit or implicit, that a researcher has prior to conducting research. A paradigm is the meta-theory behind the theory that explains how the researcher's past experience and knowledge will influence not only how the problem is viewed but also how it is answered. During the research these conceptions become preconditions within the theoretical framework. It is important to note that each researcher has their own paradigm and that no two researchers view a problem in the same paradigm (Astley, 1985; Clark & Fast, 2002). Kuhn (1977) states that paradigms are what members of a scientific community, and they alone, share. Burrell and Morgan define a paradigm as:

> *"…meta-theoretical assumptions which underwrite the frame of reference, mode of theorizing and modus operandi of the social theorists who operate within them. It is a term which is intended to emphasize the commonality of perspective which binds the work of a group of theorists together in such a way that they can be usefully regarded as approaching social theory within the bounds of the same problematic"* (Burrell & Morgan, 1982 (1979) pg. 23).

The American philosopher, Thomas Kuhn, has made significant contributions to scientific theory due to his work related to paradigms (Kuhn, 1970). Kuhn states that paradigms are constantly evolving as the scientific framework for paradigms changes with new observations and reinterpretations, which leads to a revolution and new scientific frameworks arise in the shape of new paradigms (Clark & Fast, 2002). Kuhn continues by stating that the difference between natural science and social science is that within natural science new paradigms replace the old ones, but within social science the old paradigms survive alongside the new paradigms (Astley, 1985).

There are two paradigms, the functionalist and interpretive, which represent opposite ways of conducting analyses and have different implications for how to study social phenomena (Clark & Fast, 2002). The paradigms represent alternative points of view of how reality is interpreted. They are mutually exclusive because one cannot operate within more than one paradigm at a time.

The functionalist paradigm is based on the idea that reality is objective and that there is only one concrete, real reality. This paradigm tends to focus on functionality and structures. Research is conducted through observation, as the social world is seen as existing independently from human beings, while offering predictions provides explanations. This objectivity is based on classical positivism and rationalism that searches for causal relations that is assumed to exist between various factors. It focuses on explaining, describing and even predicting events using quantitative scientific methods. The functionalistic paradigm is a value-free science and expects a researcher to keep a distance from personal values and interfering beliefs.

At the other end of the spectrum is the interpretive paradigm, or life-world tradition. In this spectrum it is believed that reality is subjective and reality occurs through inter-subjective experience between individuals. Reality is therefore constructed in the social world and society is understood from participation rather than observation. Therefore, there are multiple realities occurring within society. This subjectivity is based on idealism/subjectivism and neo-Kantianism that include such traditions as hermeneutics (Clark & Fast, 2002). Hermeneutics is a way that humans create knowledge through understanding, and assumes that people create knowledge by looking for meaning in their actions because they are interpretive beings that place their own subjective interpretation on reality. Hermeneuticists assert that there is a decisive difference between explaining nature and understanding or interpreting culture. For this reason, the natural science method of creating knowledge through explanatory means is deemed unsuitable for social science (Arbnor & Bjerke, 1996). Subjectivity views human beings as the constructors of the social world. Social reality is a product of three facets, the subjective, inter-subjective experience, and consciousness of individuals and is therefore a dynamic social process. When operating within a subjective dimension research is conducted by understanding humans and situations.

This research is conducted within the realm of the interpretive paradigm. This is bounded by the belief that the research questions are subjective phenomenon. Although quantitative methods are utilized to address a number of issues the variables are subjectively interpreted by the researcher. In other words, it is the interaction between the researcher and the subject matter that creates reality. It is not a value-free science, a tenet of the functionalist paradigm. It is highly likely that the subject matter of this report would not be studied in an identical manner by two researchers, and that relevant factors would be deciphered differently.

2.3 Methodological approaches

While paradigms describe the presumptions a researcher has regarding a problem, methodological approaches describe how a problem is categorized. Arbnor and Bjerke (1996) list three methodological approaches present in business research today, the analytical, systems, and actors approach. These approaches describe how the sub-sets of a problem relate to one another and to the problem as a whole; interactions between sub-sets are ignored. The analytical approach sums each sub-set of a problem to construct the whole. The systems approach investigates the synergy between the sub-sets to construct the whole; the whole is not always *equal* to the sub-sets. The final approach, the actors approach, studies the characteristics of each sub-set to understand the whole; this approach is interested in *social* wholes rather than explanations. This research focuses on the interaction and configuration of the sub-sets of the airline business model, lending itself to the systems approach.

The systems approach finds its first beginnings within the energy and technology fields. Here the approach was applied with vigor and it soon expanded to allow society to explain complex relations in general. Today, society discusses the hospital system, the educational system, the air traffic control system, or the production systems of a firm. A system is a set of sub-sets, or parts, and the relations among them. It will become apparent in subsequent chapters that a business model is comprised of a number of sub-sets, or components[8], that interact, either positively, negatively, or neutrally, to create a business model system. Within systems thinking a number of concepts are given *a priori*, just as this project utilizes theories and previous studies to complement the findings. However, new concepts can be added within the systems approach to arrive at new ways of classifying reality (Arbnor & Bjerke, 1996). This project concludes by adding new concepts to the respective field and proposes new ways of classifying the airline industry. Systems may be either models or real. Systems models intend to replicate reality in a simple manner and omit superfluous components, and are often used as steering tools. A real system attempts to replicate reality in its entirety, appropriate to the level of detail desired, which are descriptive in nature. This research is shaped as a systems model as it intends to provide future direction and has omitted factors that, though influential, may be nearly immeasurable or lie outside of the researcher-designated systems boundary. Systems models can be segmented according to their use. Arbnor and Bjerke (1996) list the mechanic, biological, self-organizing, and value-laden systems model. This project attempts to replicate reality and the model is of the self-organizing type. This type of model is able to adapt and change structurally to its environment to meet its predetermined targets. In essence, the model is able to use environmental feedback and learn how to adapt. This is representative of the real systems model of the airline industry. The propositions for future development are based on current airline positions in strategic groups and the industry and airlines can learn to react to competitor influence.

This section has explained the philosophy of science pertaining to this project. The operating paradigm and approach was discussed and how it relates to the research. The following section will present and discuss the project design.

2.4 Research project design

This project is a case study in business models of the airline industry. The advantage of conducting a case study rather than purely an experiment or survey is the ability to maintain a holistic perspective and incorporate real-life events throughout the study (Yin, 2003). Case study research is ideal when examining contemporary events but when behaviors cannot be manipulated. While an experimental study is able to answer the *how* and *why* of a subject, similar to a case study, it assumes that the researcher has control of events, which is not the case in this particular research project. While researching airline business models the researcher is an insignificant witness that attempts to explain the *how*

[8] The author uses the words, components, sub-sets, elements, and parts interchangeably. They are synonymous in this realm and signify that they are the building-blocks of an entire business model

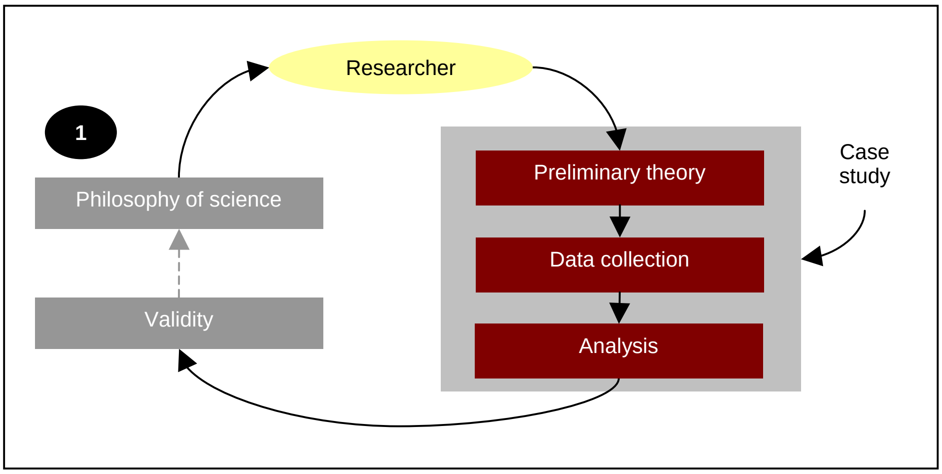
and *why* of the industry, and propose options for change, but is unable to affect events. This form of explanation falls into the realm of correlation, comparative, explanatory research. Research of this type attempts to discover the existence of a relationship between two or more aspects (i.e. business model and profitability) and explain why the relationship exists (Kumar, 1996). Yin (2003) provides a working technical definition of case study:

> *"A case study is an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident"* (Yin, 2003 pg. 13).

A case study requires the construction of a preliminary theory prior to data collection which acts as a blueprint for the study and is the glue that causally links the concepts together, and the level of analysis is dependent upon the developed theory (Gill & Johnson, 1997; Yin, 2003). This deductive process plays an integral part in the research, and testing of results in the empirical world is more important than the incorporated theories (Gill & Johnson, 1997). Stake (Berg, 2004) argues that researchers can choose to play an intrinsic or instrumental role in case study research. The intrinsic role of the researcher is not to develop, understand, or test theory or theoretical explanations, but to better understand the intrinsic aspects of the particular case, while the instrumental role is provide insight or refine a theoretical explanation with the case as a supportive role in the research. In this realm the researcher strives to intimately understand the case at hand.

This case study incorporates the theories of business modeling, strategic groups, innovation and imitation. These theories are woven together to provide a theoretical foundation to progress towards data collection. Data collection consists of secondary, observational, and primary, empirical data. Secondary and observational data sources include academic and trade journals, financial records, news sources, and conference participation. Empirical data collection was obtained through internal meetings and group projects at SAS Danmark, and a mailed survey to airlines globally (see Chapter 7). These data sources allowed the researcher to gather a holistic view of the airline industry. Completed data collection allows the researcher to model the generic contemporary airline business models, perform configurational causal modeling, and finally to propose hybrid business models that the industry may begin to witness. Validity is constructed by reviewing results with key informants within the industry, and discussing rival possibilities. Figure 2.2 depicts the longitudinal case study construction utilized throughout the study, which combines the philosophy of science introduced previously and its affect on the researcher, as well as, the research cycle. All research begins with the philosophy of science, which influences the researcher's perception of the problem and the methodology. This, in turn, reverberates throughout the study. It impacts the theoretical framework, which impacts the data collection method and analysis. These three elements comprise a case study. The conclusion entails validation techniques, which may produce results that are monumental enough to shift a researcher's core philosophy of science. This may lead to a paradigm shift (Kuhn, 1970).

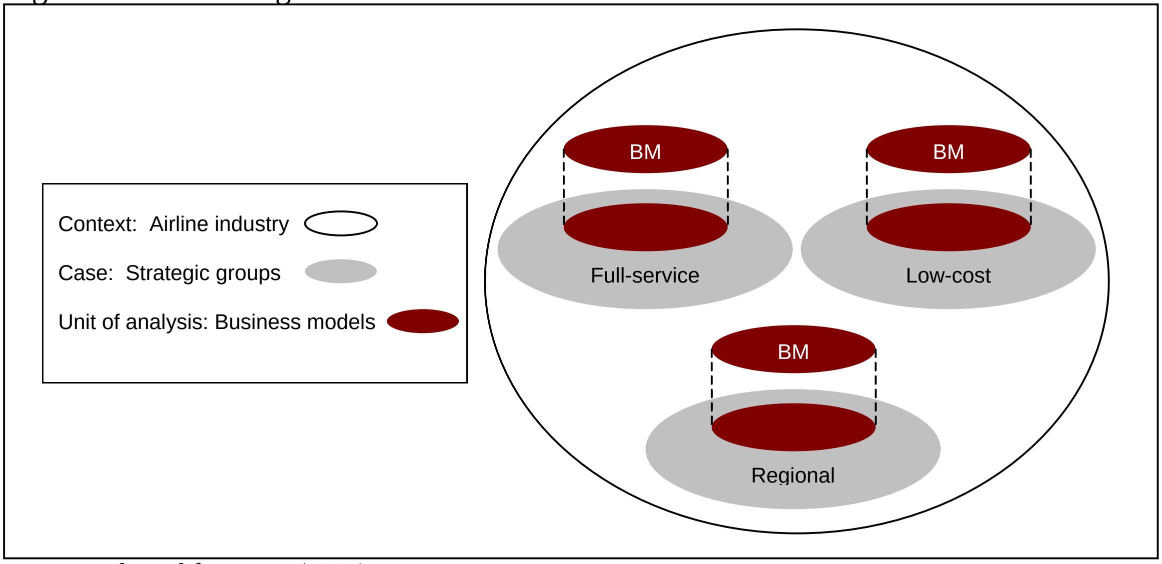
Figure 2.2: Longitudinal case study construction



Source: Author's own creation

A case study design has five components: the study's questions, propositions, unit of analysis, linking of data to the propositions, and the criteria for interpreting the results (Yin, 2003). The research project's questions and propositions were introduced in section 1.1, and will not be repeated in this section. The unit of analysis for this case study design is the business model of a firm, and within the context of the scheduled passenger airline industry. This unit of analysis is a snapshot study which is conducted at one point in time, an industrial cross-sectional analysis, rather than continuously or at numerous points. This is appropriate for the type of data collected and considering the relative slow rate of change in the airline industry, which takes place over the course of a year or more. Case studies can incorporate either a holistic or embedded design dependent upon the case itself and desired unit of analysis (Yin, 2003). This project utilizes a multiple embedded design as the unit of analysis which is distinguishable from the entire system, in other words, the business model is discernible from the airline system. However, as the research delves deeper into the embedded case it must return to the larger unit of analysis (Yin, 2003). The context of this research is the scheduled passenger airline industry, which is comprised of three cases: full-service carriers, low-cost carriers, and regional carriers. The unit of analysis in each case is the business model. This structure attempts to depict the industry in general. Figure 2.3 depicts the embedded case design and the unit of analysis for the research at hand (Yin, 2003).

Figure 2.3: Case design



Source: Adopted from Yin (2003).

The linking of data and the criteria for interpreting results are the least developed of the case study design components. This project utilizes the concept of pattern matching proposed by Campbell (inYin, 2003). This concept matches the puzzle pieces of the case study with the binding theory incorporated at the beginning of the case study design. The theories utilized allow one to propose future patterns of business models, which are tested using appropriate methods. The interpretation of results is handled in numerous facets. The most important contribution is the participation of the client in the research project according to the action research practice tool, which is described in the following section. This form of collaboration allows the results to be processed with academic and practical rigor. In addition, qualitative interpretation of survey results and qualitative interpretation of secondary data allows for understanding of generated results.

2.5 Action research

Action research is a method of research used to understand and change certain social practices, which requires that researchers include practitioners from the real world in all phases of inquiry (Masters, 1995); its intention is to produce information and knowledge that is useful to a group of people, and to enlighten a person in the group (Berg, 2004). It is able to produce knowledge grounded in local realities (Herr & Anderson, 2005). Although its origins are vague the community tends to agree that American psychologist, Kurt Lewin, constructed the theoretical foundation of action research in the 1940s in affiliation with wartime studies (Berg, 2004). It is a form of research that is inherently interdisciplinary and seldom fits into the norms of a particular field (Herr & Anderson, 2005). Action research has five main goals: generation of new knowledge, achievement of action-oriented outcomes, education of both researcher and participant, results that are relevant to the local setting, and sound and appropriate research methodologies (Herr & Anderson, 2005).

Action research allows the researcher to not only contribute to existing knowledge but also aid in solving a practical problem. Rapoport (1991, pg. 499) describes action research as an, "…*aim to contribute both to the practical concerns of people in an immediate problematic situation and to the goals of social science by joint collaboration* *with a mutually acceptable framework."* Action research shares similarities with ethnography, however it stands apart with researcher selection done by the client, while the opposite is true in ethnography. In addition, ethnographers assume that they are mere observers, while action researchers strive to inflict reflection and change (Gill & Johnson, 1997). This research project adheres to outsider action research since the researcher was not a firm insider prior to beginning the project (Herr & Anderson, 2005). An outsider action researcher has a desire to generate knowledge and contribute to the setting being studied, is invited inside to conduct research, and works outside the firm in collaboration with an insider. This action research achieves a high level of ecological research validity and naturalism, in other words, how applicable results are to general themes, compared to other research methodologies, which is rooted in its research in natural and non-artificial settings (Gill & Johnson, 1997).

Three main modes of action research exist, which include technical/scientific collaboration mode, practical/mutual collaboration mode, and emancipating/enhancing mode (Berg, 2004; Masters, 1995). This project utilizes primarily the emancipating/enhancing mode action research type, although it does borrow elements from the practical/mutual collaboration mode. The goals of the emancipating/enhancing mode include attempting to increase the closeness between day-to-day problems encountered by practitioners and to apply theoretically-based solutions, as well as, to assist practitioners in removing clouded understandings by raising their collective consciousness. There is an attempt in this research study to bring theory closer to reality to improve both theory and practitioner understanding.

There are four spiraling steps involved with action research: identification, gathering, analyzing, and sharing of results (Berg, 2004). Identification involves the researcher collaborating with stakeholders to define a research question. The most important element is that the research problem is considered important by the stakeholders. In this case the research question was broadly defined by SAS Airlines Danmark, who saw how vital the research was to future development. The researcher is guided by the question, as well as, the philosophy of science and methods. The final step in the process includes knowledge dissemination of the results. This occurs through publications and presentations to the core group of stakeholders, as well as, a broader audience.

Validity is a central theme in action research, and it is important to discuss its methodological role in the research; the four types of validity are democratic, process, outcome, and catalytic (Herr & Anderson, 2005). Democratic validity looks at the level of collaboration with stakeholders in the research. This research project had an established forum of airline executives and managers that collaborated on the research framework, data gathering, and outcome presentation of results. Discussions were held regularly with a group of participants, while outcome presentations were held for a broader audience. Process validity rates the framework that allows for ongoing learning at the client, which ties in closely with outcome validity. Outcome validity relates to the extent at which outcomes occur and leads to a solution to the problem studied. The integrity rests on the quality of action that emerges from the research. Catalytic validity is the degree to which participants are able to refocus their reality with the goal of transformation. Both democratic and catalytic validity take place when an outsider initiates action research with a goal of deepening understandings and action as a goal.

The methodology and research project design have been presented and discussed to benefit the reader's understanding of the underlying principles of the research, as well as, the role of the researcher throughout the project. The following sections will present an introduction to the methods and project structure.

2.6 Methods

Methods are the tools that researchers use to investigate an issue. At a broad level methods may be categorized as either quantitative or qualitative. Quantitative methods are grounded in mathematics and investigate the relationships among quantitative phenomena, while qualitative methods rely on examinations, analyses, and interpretations to discover underlying meanings and patterns. This research utilizes both types of research, however it is based primarily upon quantitative methods. The research is divided into three sections, which address the fore mentioned research questions. The first two research questions rely upon common statistical tools: regression, correlation, and analysis of variance. They are used to investigate the relationship between airline profitability and adherence to a traditional business model, how the imitative and innovative behaviour of varies categories of airlines vary, and how the external factor of rivalry impacts behaviour. These methods are well-known and mere summaries are provided in the detailed explanations in Chapter 5. The final analysis introduces a new method, qualitative comparative analysis (QCA), to the field of business model research and industry analyses. QCA may be understood as inhabiting both the quantitative and qualitative realms. This method relies upon the researcher's qualitative interpretation of variables and their measurement to be used in quantitative algebraic solutions. The method allows the researcher to identify unique combinations that mathematically are always present in a pre-determined outcome. QCA is used in this research project's scope to investigate the combinations of business model elements that are always present in financially successful carriers. This method is explained in detail in Chapter 5.

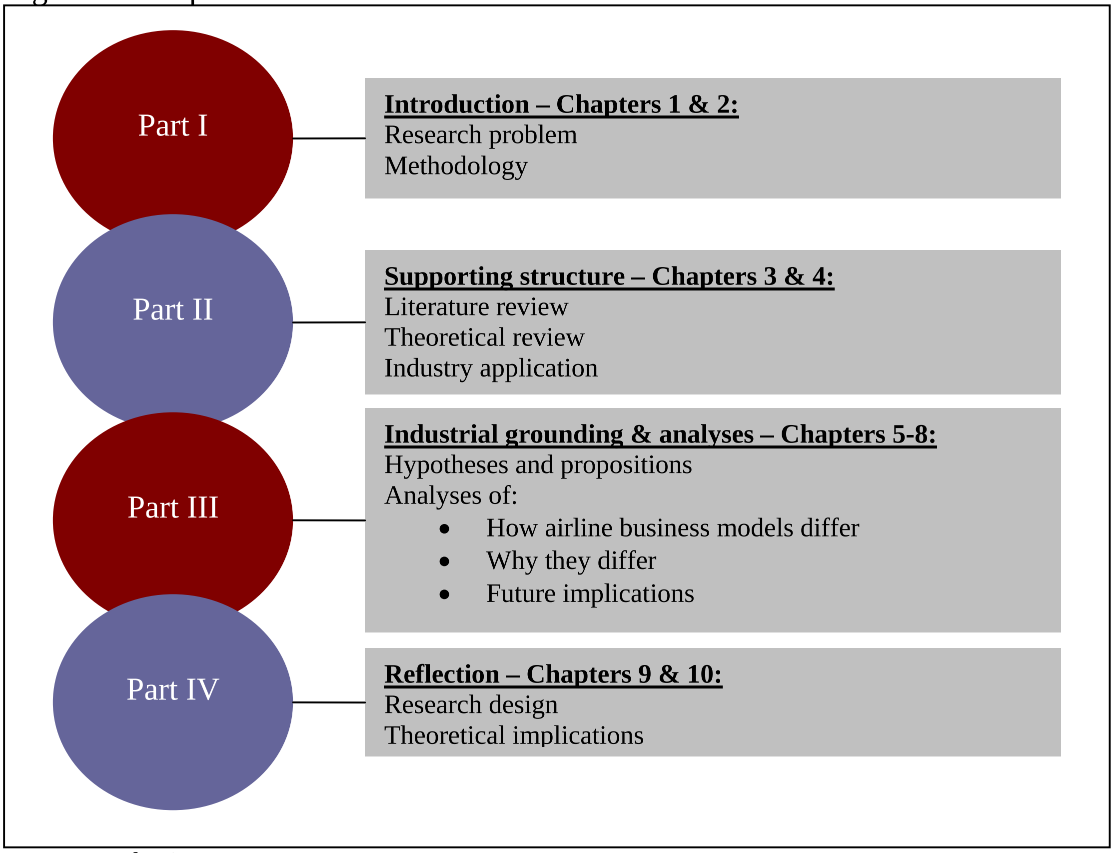
The ingredients that are utilized with the chosen methods may be based on various sources. Primary data is gathered first-hand by the researcher, while secondary data is gathered and presented by people other than the researcher. This research project incorporates both types of data. Primary data sources include open-ended interviews with participants at the client, participation in group projects, and discussions touching on various aspects of the project. After completion of two-thirds of the allotted project timeframe a questionnaire was distributed to CEOs of scheduled passenger airlines worldwide. Secondary data sources included airline industry-specific academic journals, primarily Journal of Air Transport Management, Transport Reviews, and Journal of Air Transportation. Non-academic journals include Air Transport World, Airline Business, Airways, and Airliner World. Numerous news websites were frequented and include Airliners.net, Air Transport World, and Airwise. News and data from a slew of trade organizations has been incorporated, such as International Air Transport Association (IATA), Air Transport Association (ATA), European Low Fare Airline Association (ELFAA), International Civil Aviation Organization (ICAO), Regional Airline Association (RAA), and others. Non-airline data sources include academic journals, such as European Management Journal, Harvard Business Review, Journal of Business Strategy, Journal of Business Research, and many others. These journals, websites, trade organizations, and books complement the primary data for the research project

2.7 Project structure

This research project attempts to guide the reader through the problem formulation to research findings in a structured and transparent manner. Each individual chapter provides an overview of the subject at hand, while a glossary and various appendixes are referred to throughout the project to aid the reader in understanding the topic. Figure 2.4 is a summarized overview of the research project's chapters, which should be referred to for the below-mentioned parts.

The project's problem formulation and methodology follows the introduction. The goal of these chapters in Part I is to lay the groundwork for the project at hand and justify the methodological frameworks that shape the research agenda, as well as, clarify the relevance and goals of the research. In order to lay the foundation for answering the research problem, Part II begins with a literature review of the relevant themes that support the research: strategic groups, imitation and innovation, and business models, which provide the reader with a comprehensive state of the art of the communities. A review of the theories incorporated in the research proceeds the literature review. The goal of this chapter is to familiarize the reader with the utilized theories that provide a guiding framework for the research topic. The theoretical review builds upon the literature review by entwining the concepts, frameworks, and elements into a seamless tool. An application of the theories to the airline industry follows, which includes an overview of the state of the industry and the role that the business model plays. An analysis of the current airline business models is provided, as well as, an integration of the theories described earlier, which concludes Part II. Part III integrates the introduced concepts and reviews the analytical research of the report. The variables, hypotheses, and methods are introduced in a systematic manner. The research is supported by both a quantitative survey-based review and a qualitative causal analysis, which provide supporting evidence for the research topic's conclusions. Part IV encompasses the chapters that reflect on the research design and the theoretical contributions.

Figure 2.4: Report structure



Source: Author's own creation

2.7.1 Phases

This entire research project is divided into distinct phases and all build upon each other. These phases are:

1. Theoretical research
2. Empirical data collection
3. Analyses
4. Verification
5. Conclusion

The theoretical research segment entailed studying the academic literature for relevant, supporting theories and frameworks. Once the appropriate theories were located they were studied and the researcher became familiar with the intimate details. They were analyzed from both an academic and industry perspective. Once the theoretical foundation was laid the researcher prepared the empirical-gathering process and initiated data collection. Upon completion of the empirical data collection phase the researcher was able to commence analyses. These were divided into three stages: regression and correlation, analysis of variance (ANOVA), and Boolean. Although these analyses were completed relatively simultaneously they do reinforce one another. The regression and correlation methods allow one to investigate the impact of strategic group placement on performance, while the ANOVA technique was used to research empirical survey responses regarding business model change in the industry. This supported the Boolean analyses which provided the researcher with industrial propositions that address the future direction of the industry. The researcher initiated a verification phase to test the industry practitioners' viewpoints of the future changes. The project was finalized in the conclusion.

The intention of this chapter was to explain to the reader the underlying philosophical and methodological structures. The philosophy of science of the researcher and the perception of the research problem were presented, as well as, the project design. The methods were briefly introduced, along with the representative case study groups. This information should support the reader's broad understanding of the research project and acts as an introduction to the theoretical framework utilized to better understand the research problem. The following chapter is the beginning of Part II. This part introduces the reader to the underlying theories and their application to the airline industry.

3. Theoretical review

- The wing area of a 747-400 is 5,600 square feet, enough to hold 45 medium-sized automobiles -

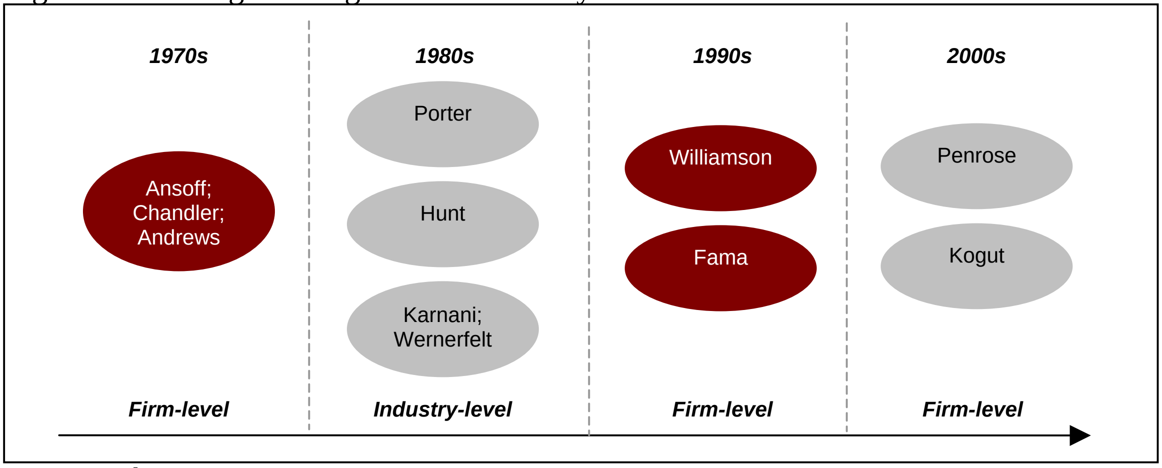
This chapter is a synthesis of past literature of the supporting theories. The goal is to introduce the reader to the current threshold within the field, and provide the necessary background knowledge supporting the research question. It begins from a meta-perspective and reviews past literary contributions in the field of strategic management and funnels into more specific topics: business models, strategic groups, and business model change based on imitation and innovation. These four core themes are reviewed to introduce the reader to the general concepts and the specific theoretical foundation supporting this research stream. In the following chapter they are applied specifically to the airline industry.

This chapter begins with a brief summary of strategic management and its varying analytical perspective through the decades, followed by the literary background and main themes of the three concepts. The conceptual review begins with the analytical perspective of the firm at the business model level. This is followed by the concept of strategic groups, which is a categorization tool to aid in analysis, and concludes embracing industry and firm heterogeneity, which is explained via innovation and imitation. The innovation theme, which aids in explaining industry heterogeneity, has a broad literary base which alone can support many in-depth academic research projects. To maintain a level of clarity it has been incorporated in the business model theme as a sub-category, while the imitation theme remains separate. This was primarily because business model innovation is a distinct research category in the field, while imitation is still a broad concept not yet applied within the specific realm of business models.

3.1 Strategic management literature

The strategic management field has expanded immensely since its inception in the mid-twentieth century (Chaffee, 1985; Hoskisson, Hitt, Wan, & Yiu, 1999), all the while its focal point shifting approximately every decade between the firm-level (micro-perspective) and industry-level (macro-perspective) as the unit of analysis (Hoskisson et al., 1999; McGee & Thomas, 1986). Recent theoretical and methodological shifts in the field have renewed interest in analysis at the firm-level (Hoskisson et al., 1999). Hoskisson et al. (1999) refer to this transitory cycle as *swings of a pendulum* and their historical analysis provides an overview of the field from its humble beginnings as a general overview course to its solid place in the study of industries and organizations. Figure 3.1 is an overview of the main theories found in the field and their primary authors, which shows the transition to the current state of strategic management research. This brief overview is intended to give the reader an understanding of how the applied theoretical foundations are grounded and their symbiotic relationship with the chosen methodology and paradigms.

Figure 3.1: Strategic management's transitory shifts



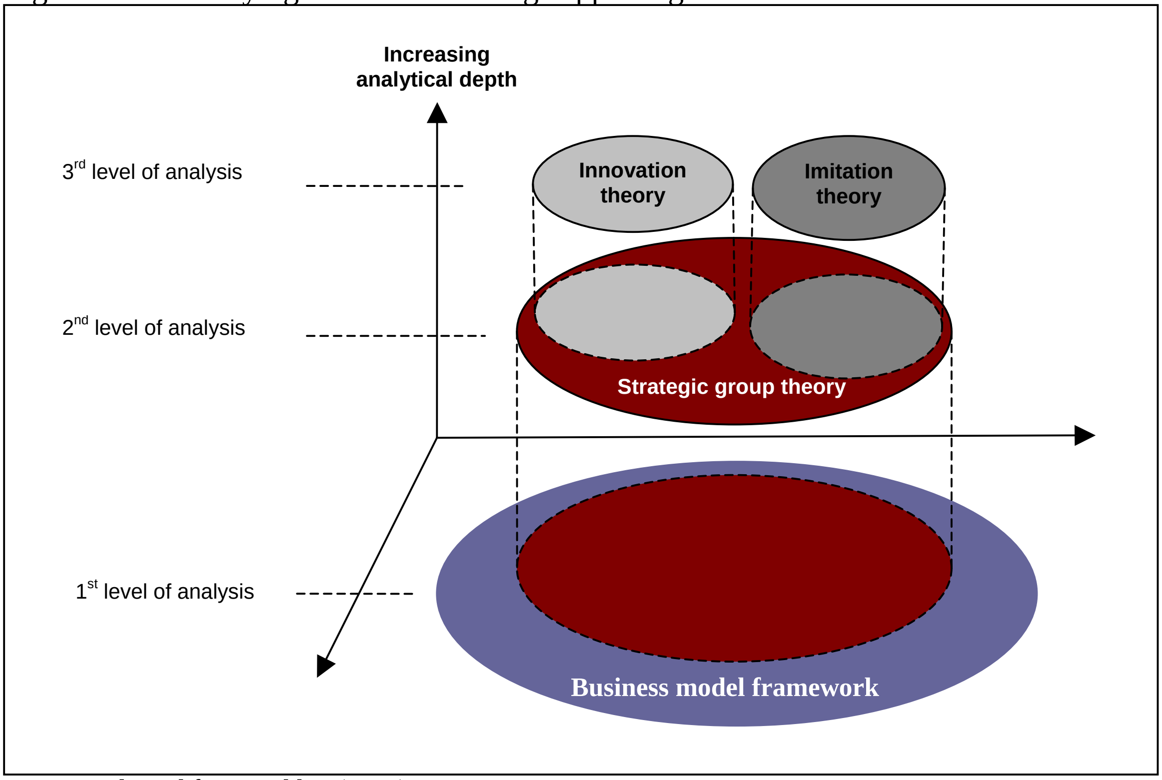
Source: Author's own creation

Strategic management was born with the works of Chandler (1996), Ansoff (1965), and Andrews (1971; 1997), and laid the foundations for later contributions. These works viewed firms as closed systems, were focused on the internal workings, and proposed how they succeeded in the marketplace. Their methodological approach was inductive and incorporated detailed case studies. However, for advancement in the field generalizations and an open-system perspective were necessary, and the field shifted towards an economic viewpoint. This is the industrial organization (I/O) and structure-conduct-performance (S-C-P) paradigm. Porter's (1980; 1985) five-forces model, Hunt's (1972) strategic groups, and Karnani and Wernerfelt's (1985) competitive dynamics were the seminal works in this paradigm, which worked deductively and shifted the focus to the industry-level. Statistical, scientific analysis enabled generalizations that could be applied across fields. This paradigm shift coincided with the introduction of increased computing power, centralized, large-scale databases, and statistical programs which enabled broad-based, statistical analyses. The pendulum reached its apex and swung back and strategic management turned its attention towards the firm once again with organizational economics, which is grounded in economic theory, yet attempts to crack open the firm's black box with the hope of explaining its inner logic. The major theoretical contributions of organizational economics is transaction cost economics (TCE) (Williamson, 1975; Williamson, 1987) and agency theory (Fama, 1980; Fama & Jensen, 1983; Jensen & Meckling, 1976). In addition, the theory of strategic groups saw a focal shift from an industry-level perspective to a firm-level perspective based on the understanding that heterogeneity is evident in groups (Hoskisson et al., 1999). This research ran into the problem of *unobservables* in firms and the lack of quantifiable variables, in addition to the varying assumptions that researchers' held which influenced studies. Some in the field continued to ponder why some firms were successful due to idiosyncratic characteristics, which led to an increased focus on firm specifics. These theories include the resource-based view (RBV) (Penrose & Penrose, 1995; Wernerfelt, 1984) and knowledge-based view (KBV) (Kogut & Zander, 1992; Polanyi, 1983). These theories open the door to cross-discipline cooperation, in such fields as leadership styles (Finkelstein & Hambrick, 1996), organizational learning (D. J. Teece, Pisano, & Shuen, 1997), or entrepreneurship (Nelson, 1991). The current state of strategic management, RBV and KBV, challenges researchers to measure immeasurables empirically, methods which are currently being developed (Hoskisson et al., 1999). Hoskisson et al. (1999) propose that the future of strategic management includes incorporating industry dynamics into studies, as well as, integrating strategy across various levels of the firm (e.g.

international, corporate, business level) (G. G. Dess, Gupta, Hennart, & Hill, 1995). Any changes to the strategic management field require researchers to possess a multi-theoretical view and incorporate both quantitative- and qualitative-based research. This research project attempts to accompany this request by straddling both the firm-level and industry-level perspective by incorporating both the business model and strategic group concepts, and relies on both quantitative and qualitative research.

An analysis of the firm incorporates the business model framework; however the heterogeneity in industries requires a categorization concept to capture the unique differences. This is achieved by incorporating the strategic group theory, which aids in analyses by grouping firms in related clusters. Yet, it is necessary to analyze the motivation and reasoning for industry heterogeneity by analyzing firms' innovative and imitative traits. Figure 3.2 is a diagram showing the relationship among the underlying frameworks and theories in this study. The level of departure is the business model framework, which is used to gain a deeper understanding of the representative firms in the industry. As the analytical depth increases the second level of analysis is the strategic group theory which allows one to categorize firms according to their business models. This creates a map of the industry. The apex of the research is achieved by incorporating innovation and imitation theories to aid in explaining industry transition and heterogeneity.

Figure 3.2: Underlying interaction among supporting frameworks and theories



Source: Adopted from Seddon (2004).

3.2 Business models

Growth in firm size and complexity in the middle of the 20th century challenged current understanding of internal firm organization (Foss, 1997). Theories for understanding internal activities and their roles have transitioned from identification of activities using a value chain analysis (M. E. Porter, 1985; M. E. Porter, 1996), to capability and resource uniqueness using the resource-based view (Rumelt, 1997; Wernerfelt, 1984), to today's identification of combinations of firm activities and their interaction with one another using the business model framework (Osterwalder, 2004). A business model is understood as a description of how a firm conducts its activities and the interactions between these activities. A picture is often used to represent the activities and the interaction between these activities. The term *business model* is relatively new to strategic management and to understanding firm structure. However, its concept as a framework builds upon contributions made many decades earlier. It was first with the introduction of electronic commerce that the phrase became commonplace in literature (Timmers, 1998).

The definition the researcher utilizes in this report is:

A business model is a framework of a firm's activities and their combinations that interact to create value for customers and a profit for the firm.

Activities are the primary actions of a firm that are performed related to creating customer value and firm profits. Activities may include traditional actions such as production, service, or distribution, but also unique operational aspects, customer relation activities, or business-to-consumer interface, particularly in online aspects. The processes and interactions between these activities are vital as their interface may create benefits unique to a firm. Two firms can have identical business model activities yet different organizational processes among them, which may result in different customer value propositions and profit results. The term, business model, is often associated with technology-based firms, especially since it appeared at the same time as the hype surrounding commercial activities using the Internet. Today's firms are often integrated and reliant upon information and communication technology, which plays a supportive role in business models. However, it is important to stress that business models are found in all types of firms, both those fully reliant upon technology and those that are not. In addition, business models may appear without the influence of technology, just as business models may be adapted utilizing existing technology; a new business model is not dependent upon new technology. For example, a firm may reorganize its processes and discover an entirely new way of conducting business which results in a new business model. Business model definitions, in general, are often grounded in technology firms, evident in the definitions below.

> *"An architecture for the product, service, and information flows, including a description of the various business actors and their roles; and a description of the potential benefits for the various business actors; and a description of the sources of revenues"* (Timmers, 1998 pg. 4).

> *"A business model depicts the content, structure, and governance of transactions designed so as to create value through the exploitation of business opportunities"* (Amit & Zott, 2001 pg. 511).

> *"Stories that explain how enterprises work"* (Magretta, 2002 pg. 87).

> *"This [business model] is the method by which a firm builds and uses its resources to offer its customers better value than its competitors and to make money doing so. It details how a firm makes money now and how it plans to do so in the long term"* (Afuah & Tucci, 2003 pg. 4).

> *"It is the set of activities which a firm performs, how it performs them, and when it performs them so as to offer its customers benefits that they want and to earn a profit"* (Afuah, 2004 pg. 2).

> *"A unique configuration or elements of elements comprising the organization's goals, strategies, processes, technologies, and structure, conceived to create value for customers and thus compete successfully in a particular market"* (Afuah, 2004 pg. 15).

> *"A business model is the combination of 'who', 'what', 'where', 'when', 'why', 'how' and 'how much' an organization uses to provide its goods and service and develop resources to continue its efforts"* (D. W. Mitchell & Coles, 2004 pg. 17).

A business model, at first glance, may appear strikingly similar to Porter's value chain (M. E. Porter, 1985), however there are unique differences (see Box 1). The value chain, with its primary and secondary activities, is a rigid framework that lends itself most easily to the manufacturing sector. Its structure fails to allow one to analyze a firm's unique composition of activities, but rather challenges a user to force firm activities into pre-determined categories. The business model, on the other hand, is a more fluid structure that allows a user to identify the particular activities of a firm and their interactions. Two firms in an industry may offer the market similar products or services, yet may perform differing activities to achieve this goal. A value chain analysis may fail to capture the uniqueness of the firms, while a business model analysis is more adaptive. More recent work by Porter has stressed activity sets of firms, which is more representative of a business model than a value chain (M. E. Porter, 1996).

Box 1: The Internet – A value chain vs. business model analysis

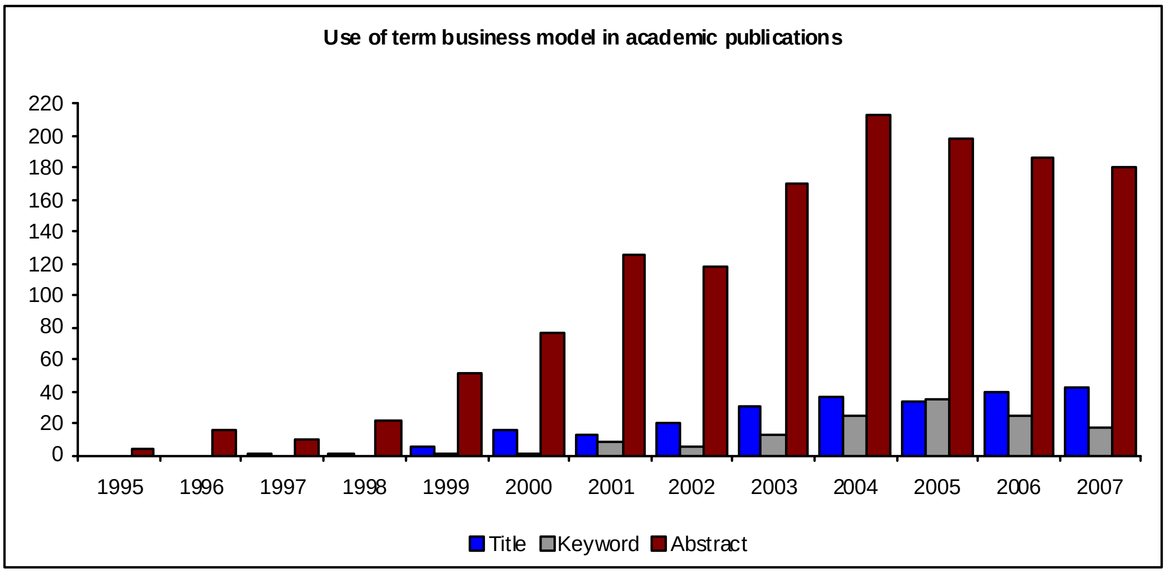
The Internet is a catalyst for change in traditional business practices. Conventional brick-and-mortar stores compete with online powerhouses, such as Amazon. However, other sites are financially successful using unconventional practices, such as Google or Facebook. A traditional value chain analysis of these two sites would be challenged to identify the activities that make these sites successful. A business model analysis enables one to identify activities that may not fit in a particular value chain category.

3.2.1 Literature

The literature stream related to the concept of business models is relatively short compared to complementing and competing concepts. This section will introduce the literary steam and tenets of the business model framework. The basic elements of the contributions by various authors will be discussed, as well as, dynamics related to innovative change, and the conflict that has arisen between business models and strategy.

The concept and terminology of business models entered the literature at the end of the 20th century with the meteoric rise of the Internet and electronic business (e-business). Although, the initial scholarly article introducing business models appeared in Accounting Review in 1960 (Jones, 1960), the field lay virtually dormant for nearly four decades. A review of the number of peer-reviewed articles in academic journals in the Business Source Complete[9] database investigating business models through the decades indicates a growing interest that coincides with the growth of e-business. Figure 3.3 highlights the growth of the term starting from 1995 through 2007. The term progresses from the publications' abstracts to the title, and eventually appearing as a keyword in 1999; the year following Timmers' (1998) seminal work.

Figure 3.3: Use of term *business model* in academic publications



Source: Adopted from Osterwalder (2004)

The term itself proliferated during the heyday of the Internet boom even though it was misunderstood and misused. It was used to describe a gamut of firm aspects; everything from revenue generation to organizational structure was incorporated, described, and defined as a business model (Linder & Cantrell, 2000c). The expression itself is used interchangeably with terms, such as, "e-business models," "internet business models," and "business framework." For the purpose of this dissertation the phrase, business model, will be utilized.

Table 3.1 is an overview of the primary literature stream within the field. This summary indicates the authors and their publications' business model endowment. The overview begins by identifying the core context of the work. While the majority of literature focuses on e-business some authors have expanded the generalization of the business model realm. The overview analyzes whether a lucid business model definition is proposed. This is complemented by discussing the proposed classification of business models. The majority of authors with a spotlight on e-businesses tend to propose

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[9] Business Source Complete contains a database of full-length articles from approximately 9,500 publications within such fields as business, management, economics, finance, and many more fields.

business model classifications, while generalists avoid specifying typologies. Next, it investigates the literature's indication of business model components. Researchers regard the field in a systematic structure (Arbnor & Bjerke, 1996), however not all present the building blocks comprising the system. Component synergy is also reviewed, which indicates those authors that discuss the relationship among business model components. Finally, an overview of whether the literature stream includes a model metric is analyzed. These elements of the business model literature stream overview highlight the field's shift since its major literary introduction in the late 1990s.

Table 3.1: Business model literature contributions

Author(s)	**Context**	**Definition**	**Classification**	**Components**	**Component synergy**	**Model metric**
Timmer (1998)	e-business	✓	✓			
Linder and Cantrell (2000c)	general	✓	✓	✓		
Hamel (2000)	general			✓	✓	✓
Amit and Zott (2001)	e-business	✓				
Afuah and Tucci (2001)	e-business	✓		✓	✓	✓
Weill and Vitale (2001)	e-business	✓	✓	✓		
Margretta (2002)	general	✓		✓		
Chesbrough and Rosenbloom (2002) & Chesbrough (2003)	general[1]	✓		✓		
Hedman and Kalling (2003)	general [2]			✓	✓	
Afuah (2004)	general	✓		✓		

[1]: Chesbrough (2002, 2003) discuss business models with a focus on exploitation of technological products
[2]: Hedman and Kalling (2003) discuss business models within a ICT realm, yet it is a general framework
Source: Adopted from Osterwalder (2004)

Context

Paul Timmers, then head of the European Commission in the Information Technologies Directorate, is regarded as producing the initial publication specifically directed towards business models (Timmers, 1998). This work focuses its attention on e-business and the potential for creating new forms of transactions utilizing technology. Although Amit and Zott (2001) and Weill and Vitale (2001) incorporate a wealth of general theories their analyses study e-business within a business model framework. Their work stresses value creation theory in the burgeoning e-business industry rather than a transaction-oriented approach. Chesbrough and Rosenbloom (2002) view business models as a mediating construct between technological value and economic value.

Linder and Cantrell, from the Accenture Institute for Strategic Change, have written a series of publications about business models (2000a; 2000b; 2000c; 2000d; 2001). Their work is general in nature, and is applicable to, and draws examples from, a wide range of industries. Magretta (2002) presents a business model discussion from a broad perspective, and discusses their importance and implication in a number of industries. Her work stresses the complementary role business models provide strategic development. As the depth of the field expands over time the applicability of the business model template broadens, with Hedman and Kalling (2003) proposing a general business model grounded in strategic theory and ICT technology, and Afuah (2004) focusing on the complements of a firm's resources on the chosen business model.

Definition

The business model definition has gone through various transitions, often reliant upon the context of the publication. Timmers' (1998) broad definition demonstrates the budding business model field. There are three core elements proposed: architecture for product, service, and information flows, as well as, a description of business actor roles; a description of potential benefits for the actors; and an explanation of revenue streams. Timmers (1998) stresses that a business model is inadequate for understanding how a company achieves its mission, it is necessary to incorporate "marketing models" to complement the business model. Weill and Vitale (2001) provide a definition inspired by product, information, and money flows, while incorporating the roles and relationships present among consumers, customers, partners, and suppliers, and identify actor value. While Timmers' (1998) and Weill and Vitale's (2001) definition's inspiration is information flows, Amit and Zott (2001) focus on transaction flows. Their definition describes business models as a construction designed to create value through exploitation of transaction content, structure, and governance.

Afuah and Tucci (2001) weave application of the Internet throughout their interpretation of business models. They state that any company that is present on the Internet should have a unique Internet business model. It is their view that business models can be divided into Internet and non-Internet business models.

Work by Linder and Cantrell (2000a; 2000b; 2000c; 2000d; 2001) state broadly that business models are a company's core logic for creating value. Magretta (2002) presents business models as a story of how a company does business, which she separates from the concept of strategy. Magretta's (2002) description dissects business models into system pieces that explain how the model fits together, which opposes business strategy by not incorporating performance or competition.

Afuah (2004) defines a business model as a framework for profit, which is rooted in the activity set of the firm. Firms are distinguished by the activities it performs, how it performs them, and when it performs them.

Classification

Various authors provide a classification of business models according to various traits. Timmers (1998) acknowledges that a systematic approach to business model generation can lead to an abundant number of models, although only a fraction are implemented in practice. He identifies 11 business model classifications measured on two axes: degree of innovation and functional integration. While these business model classifications are relevant their usefulness beyond e-business is limited due to the entwined Internet perspective.

Linder and Cantrell (2000c) offer a classification that focuses on a model's core profit-making activity versus its relative position on a price/value continuum. A business model can focus on three activities. The first is *providing*, which is a model that makes money through product or service transaction. A c*hannel* role profits through services that wrap around an offering, such as sales techniques, buying experience, or offering advice. The final activity is *intermediary* that brings buyers and sellers together to create markets. The price/value continuum is comprised of offerings ranging from high value, premium-priced innovations to low priced, commoditized offerings. The proposed business model classifications are price models, convenience models, commodity-plus models, experience models, channel models, intermediary models, trust models, and innovation models.

The work by Weill and Vitale (2001) identify eight atomic business models which describe various ways to conduct electronic business. These models are the content provider, direct to customer, full-service provider, intermediary, shared infrastructure, value net integrator, virtual community, and the whole-of-enterprise/government business model. These models describe how a company interacts electronically with customers.

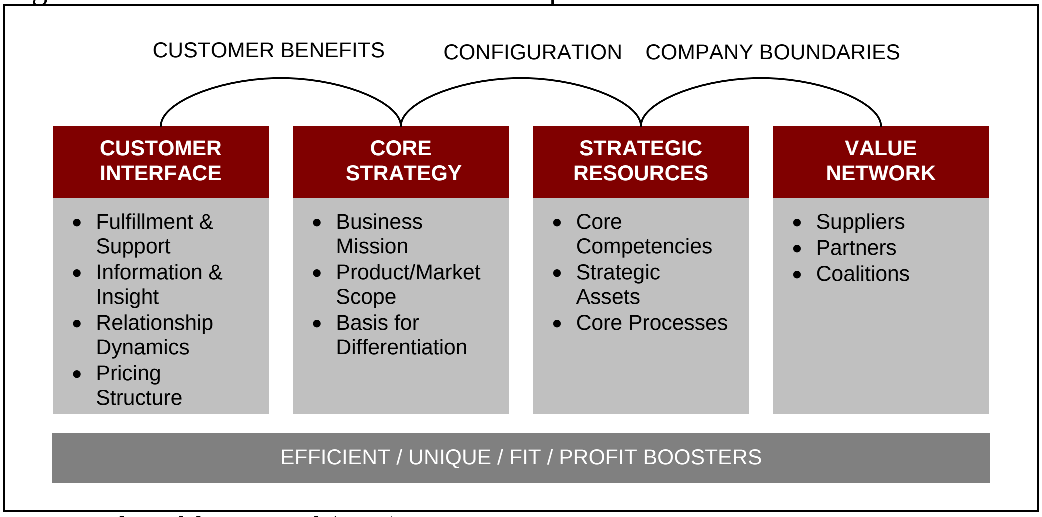
Although Afuah (2004) does not propose business model classifications, he does emphasize that many classification contributions are rooted in revenue models. It is believed this is inaccurate because two firms can have identical revenue models, however their business models can be completely different. The business model is concerned with profit, not revenue alone.

Components

While various authors deepen the business model understanding some identify the various components that comprise a business model. An analysis of this type bores a level deeper in the business model field. Through a component-understanding one is better able to analyze and propose a framework for companies. Linder and Cantrell (2000) recognize seven components of a business model, and highlight that media often only discuss one component while disregarding the remaining. These components are: the pricing model, revenue model, channel model, commerce process model, Internet-enabled commerce relationship, organizational form, and value proposition.

Hamel's (2000) depth of work in business models is limited compared to other authors in the field; however his contribution is still an integral part of the field. He states that a business model is merely a business concept that has been actualized. This work proposes four main model components: customer interface, core strategy, strategic resources, and value network. Each business model component is connected via a link to complete the model synergy. The entire model is supported by an underlying framework of how the model will earn profits. This framework is presented in figure 3.4.

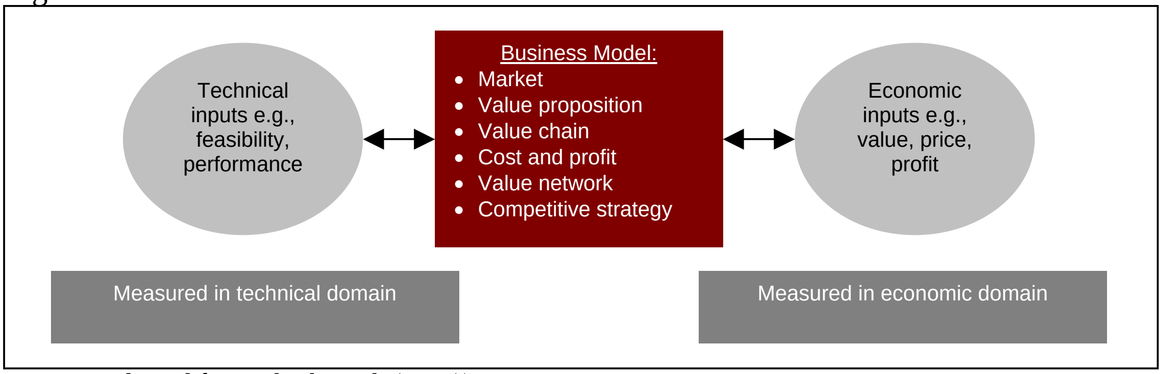
Figure 3.4: Hamel's business model concept



Source: Adopted from Hamel (2000)

Afuah and Tucci (Afuah & Tucci, 2001) center their business model components on value creation. The model must address a number of areas: what value should be offered, which customers should be offered the value, in what way should the value be distributed, how to provide the created value, and how to sustain benefits derived from the value. The components they propose include customer value, scope, pricing, revenue source, connected activities, implementation, capabilities, and sustainability. While Chesbrough and Rosenbloom (2002) do not explicitly provide a business model definition they operationalize the concept by incorporating the value offered in their proposed business model components, as well as, identification of the target market, structure of the firm's value chain, analysis of the cost structure and profit potential, identification of the firm's position in the value system, and the formulation of the competitive strategy. This framework unites the technological domain and the economic domain, as depicted in figure 3.5.

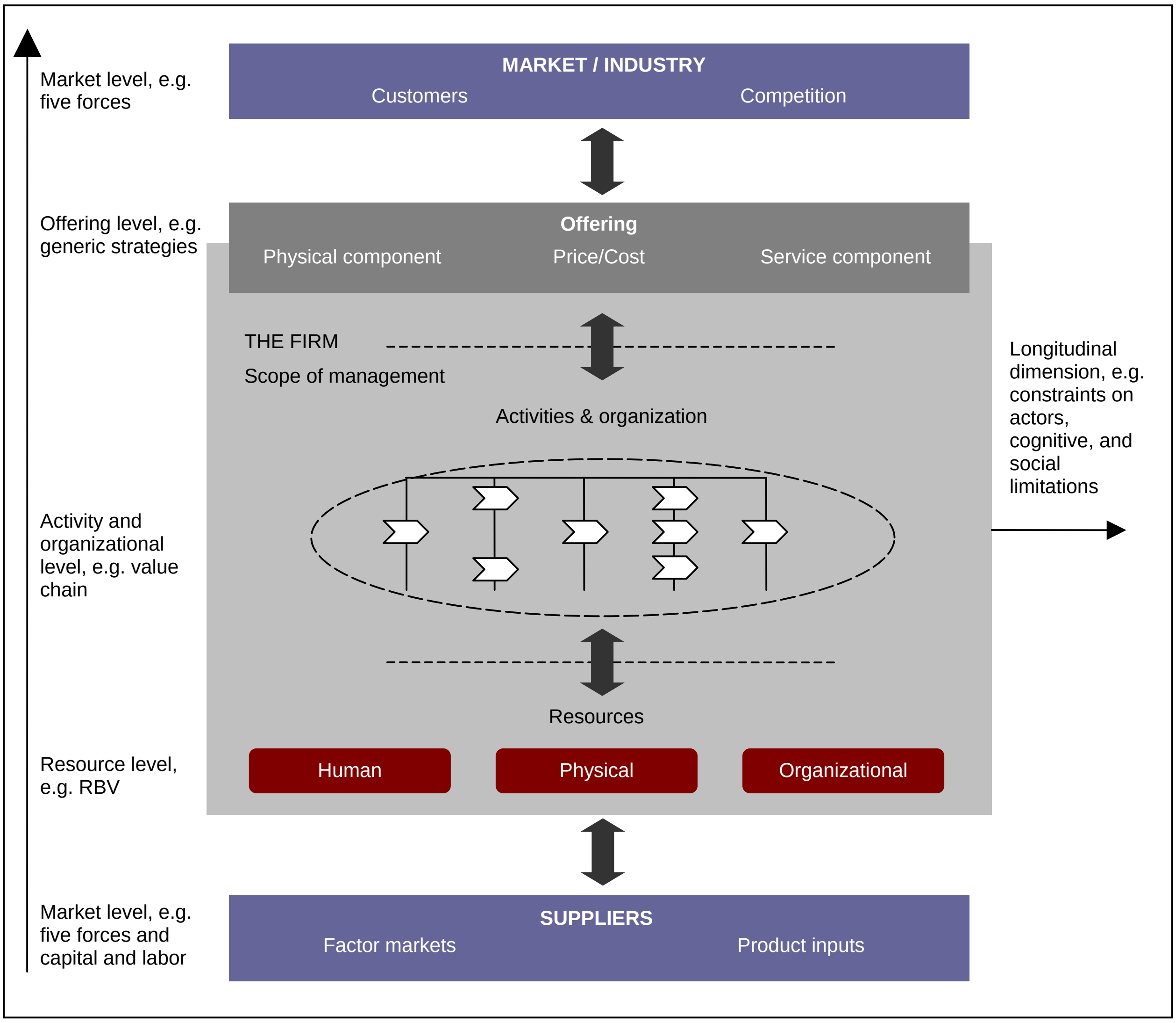
Figure 3.5: Business model as a mediator between technical and economic domains



Source: Adopted from Chesbrough (2002))

While Hedman and Kalling (2003) do not succinctly provide a business model definition they do propose a general business model of seven components that incorporates strategic theory to ground the concept. These components are, beginning from the market level: customers, competitors, offering, organization and activities, resources, supply input, and a longitudinal component to cover the dynamics of a changing business model over time. Hedman and Kalling's comprehensive business model structure is shown in figure 3.6.

Figure 3.6: The components of a business model



Source: Adopted from Hedman and Kalling (2003))

Magretta's (2002) elementary description of business models as a story complements her proposed model components. She distinguishes between two elementary parts: those activities associated with production and those with distribution.

Afuah's (2004) proposition of business model components consists of industry factors, activities, resources, positions, and costs. The resources of a firm are the roots of the business model and via the activities allow a firm to deliver value to customers.

Component synergy

While some authors merely list the components that comprise a business model, others investigate the relations among the components. This aspect adheres to the concept of the systems approach; a system is the sum of its parts and the affect of the relations between the parts (Arbnor & Bjerke, 1996). It is not always the components themselves that create a competitive advantage but the relations among them that is often challenging for competitors to emulate, thereby creating a distinct competitive advantage (M. E.

Porter, 1996). Hamel's (Hamel, 2000) four-component business model concept is interconnected with three bridges (see figure 3.4): customer benefits, configuration, and company boundaries. Customer benefits links the demand interface with a firm's strategy; a strategy should complement market demand and offer the benefits that are sought. The configuration should bridge a firm's strategy with its resources. In some industries nearly all firms may possess nearly identical resources; however unique configurations can lead to business model advantages. For example, many service industries are unable to patent their services or products which makes the business model configurations vital. Finally, company boundaries link the upstream supply system (M. E. Porter, 1985) with the firm. A business model may involve many in-house functions, while another may have a propensity for out-sourcing. The underling four-step factors, efficiency, uniqueness, fit, and profit boosters, entail how a business model intends to earn a profit. Efficiency stipulates that a business model deliver value at a cost less than what the market is willing to pay; there must be a positive operating margin. A unique business model allows for differentiation among competitors, but it must be valued by the market. Fit demands that a business models' elements must be mutually reinforcing in a positive manner; customers must experience consistency throughout an interaction with a firm's business model. The final supporting factor is profit boosters, which recommend ways that a business model can aid in boosting profit and become a stellar performer.

Afuah (2001) acknowledges the importance of the synergy among business model components, referring to them as linkages. The value that is offered to customers must be mirrored in the components and the linkages. Afuah uses Southwest Airlines as an example of a firm pursuing a low-cost strategy, and with the carrier's low level of service and use of secondary airports its business model components support the value offered.

Hedman and Kalling's (2003) business model (see figure 3.6) lists five broad components that transgress from demand market level, through the firm, to the supply market level. The authors emphasize that there are causal relations among the components. The business model must produce an offering, comprised of both physical and service components, that is valued by the demand market level, and be offered at an attractive price/cost ratio. The offering can only be produced by the unique configuration of activities within the business model, which, in turn, is supported by the resources the firm has access to and possesses, which are influenced by the supply market level. It is stated that the flow of change can occur in either direction and that the depth of change will vary. However, it is stressed that any degree of change may have a degree of influence throughout entire business model. Additional authors in the literature imply that there is a level of synergy among the components of a business model, yet fail to elucidate on the phenomenon. Chesbrough's (2002) mediating business model (see figure 3.5) shows the interaction between a technical and economic domain, yet does not delve into how the components of the business model interact. Afuah (Afuah, 2004 pg. 10) depicts a business model and its components with two-way interaction connection, yet does not clarify this relationship.

Model metric

Researchers of business models have recently begun proposing model metrics to measure the success. This is an important tool to determine the vitality of a model. Hamel (2000) discusses the potential of a business model from four perspectives. Initially, the model's efficiency in delivering customer benefits is measured, followed by the differentiation of the chosen business model. This concept borrows from Porter's (1980) work in differentiation tactics to ensure above-average profits. Strength among linkages proposed by Hamel's (2000) component synergy may be measured, and finally the metric analyzes the ability of the business model to exploit profit boosters to generate above-average profits. Profit boosters are described as competitor lock-out, strategic economies, and strategic flexibility.

Afuah and Tucci (2001) propose three levels of metrics that analyze profitability measurements, profitability predictor measurements, and business model component measurements. The first two levels incorporate common financial metrics, while the third level poses benchmarks for each of the publication's proposed model components. The first level reviews earnings and cash flows, whose superiority over competitor metrics indicate a competitive advantage. The second level measures profit margins, revenue market share, and revenue growth. If those measurements are better than competitors' it also indicates a competitive advantage. The final level of model metrics incorporates benchmark questions for each of Afuah and Tucci's (2001) business model components.

The previous section has introduced the reader to the business model concept and the contributing authors in the field. Definition and typology uncertainty is evident, however the authors all stress the importance of the framework. The following section expands the business model concept to include innovation. Within a competitive market innovation may provide firms with a competitive advantage; as Linder and Cantrell (2000a) stated, business models are carved in water and are adaptive.

3.2.2 Business model innovation

Firm success is often attributed to innovation (Christensen, Anthony, & Roth, 2004; W. M. Cohen & Levinthal, 1990; Schumpeter, 1949; D. Teece & Pisano, 2003) however, industry evolution is often carried on the back of technological innovation as well. The typewriter, rotary phone, and cable-driven excavating equipment industries were all transformed due to technological innovations (Christensen et al., 2004). However, industry evolution is increasingly attributed to business model innovation, for example Enterprise's business model for car rental, Unilever's transition to private labels, or Dell's order and manufacturing process. It is important to note that business model innovation does not imply that a new product or service is introduced, but rather a new way of conducting business (Markides, 2006), although innovations in technology and business models may coincide with each other (H. Chesbrough & Rosenbloom, 2002; H. Chesbrough, 2003). Through business model interaction with both the external environment and internal supporting elements (Hedman & Kalling, 2003; Osterwalder, 2004) it is often, and sometimes inevitable, that innovation takes place. Chesbrough (2002) states that occasionally new products and their value cannot be unleashed with a firm's current business model and firms must expand their perspective to capitalize on latent value. Innovation is justified for a number of reasons: disruptions from the external environment, industry reshaping by firms, or the need to break free of a competitive rut (Govindarajan & Gupta, 2001). The external environment can force a firm to innovate its business model in order to maintain its position or capitalize on new opportunities, firms within an industry can innovate their business model and have such a dramatic impact that the entire industry imitatively follows suit, or unsuccessful firms can see that they will maintain their poor competitive position without innovating their business model. New entrants or non-leading firms have been successful in attacking a leading competitor without the aid of technological superiority but rather with business model superiority (Markides, 1997). Schumpeter (1949) is often bestowed the title of introducing the concept of innovation to strategic management, which has since progressed into the mainstream literature and been applied in numerous contexts (Fagerberg, Mowery, & Nelson, 2005). The definition of innovation that will be utilized in this framework is:

> *"An* invention *is an idea, a sketch or model for a new or improved device, product, process or system...An* innovation *in the economic sense is accompanied with the first commercial transaction involving the new product, process, system or device, although the word is used to describe the whole process*" [emphasis added] (C. Freeman & Soete, 1997 pg. 6).

This definition stresses that the terms invention and innovation are not interchangeable, and implies that innovation pertains to the actualization of the invention. An invention may lie dormant, waiting to be implemented; a case in point is Leonardo da Vinci's helicopter invention in 1493 (Popham, 1945; Ramirez, 1999), which was not realized until more than 400 years later. In addition, the definition of both the invention and innovation may involve many aspects, not merely a technological parameter, which extends to include business models.

Success in unseating a leading competitor is not guaranteed by merely innovating a firm's business model. Studies have shown that the leading firm in an industry is 96% certain of retaining that position, and the second and third-ranked firms have a 91% and 80% chance of maintaining their ranks (Markides, 1997). However, success stories are found within industries and many times it occurred because of an innovative business model. Markides (2003; 1997; 1998; 2004; 2006) has numerous publications in this realm, initially under the heading of *strategic innovation*, however in 2006 he states:

> *"One type of innovation that tends to be disruptive to established competitors is business-model innovation. In earlier work (*(Markides, 1997; Markides, 1998)*, I called this type of innovation* strategic innovation*, which is a confusing term.* Business-model innovation *captures the essence of this type of innovation without ambiguity"* [author's own emphasis] (Markides, 2006 pg. 19).

Markides' definition of business model innovation argues that it is necessary to enlarge the *economic pie*, which demands attracting new customers or encouraging existing customers to increase consumption. A business model innovation is not solely the discovery of new products or services, it may be a mere reinvention of existing platforms; this is not the case in technological innovation. Christensen's work on technological innovation and industrial change (Christensen, 1997; Christensen & Raynor, 2003; Christensen et al., 2004) is easily supported in the realm of product innovation, however it becomes less applicable as it is stretched to encompass business model innovation. A key tenant of Christensen's work is that a new entrant and its technology eventually dominate a market; however business model innovation is not so drastic. The scenario that plays itself out in numerous industries is that a new business model experiences explosive introductory growth, which eventually stagnates and captures a significant share of the market. However, it does not succeed in overtaking the entire market (Hamel, 2000; Markides, 2006). This stresses that incumbent firms still have a choice to either imitate and embrace the innovative business model or continue with their current model. The innovated business model may emphasize a different set of attributes that appeal to a different market segment or introduce a set of new activities that increase efficiency, lower costs, or provide customer value. Therefore, the innovated business model is able to attract an entirely new group of customers, or entice existing customers to purchase more of a product or service (see Box 2). Markides (Markides, 1997 pg. 9) sums up the concept by stating, "*The trick is not to play the game better than the competition but to develop and play an altogether different game.*"

Box 2: iTunes and business model innovation

Apple introduced iTunes in early 2003. The computer program allows users to legally download music, videos, and movies. The program is an example of a business model innovation that offers customers a new way of purchasing media and entices them to purchase more of a product by offering increased flexibility. Apple announced that since opening iTunes more than 4 billion songs have been downloaded {{1415 Block,R. 2007; }}. iTunes has since been imitated by competing programs, such as Buymusic.com, Best Buy Digital Music Store, and Wal-mart Music Downloads.

As the business model framework crystallized, the field expanded to incorporate the benefits of innovative change. These works appeared at the turn of the 21st century, which coincided with the burst of the Internet bubble and the subsequent economic recession. The literature was reaching for an explanation to describe how emerging companies could upset the market leader or clarify how firms in a declining industry can continue to be successful, many times without a radical new technological breakthrough. This section reviews the major influential literary contributions to the field of business model innovation, presented in table 3.2. The first publication reviewed by Constantinos Markides from 1997 uses the term strategic innovation, and while he is not the first to study this specific field, the review will show that Markides in 2006 redefines his literature stream and research field to business model innovation.

Table 3.2: Business model innovation literature contributions

Author(s)	Goal	Challenges	Framework	Approaches	Success factors
Markides (1997)	Identify and capitalize on industry gaps			✓	
Markides (1998)	Reconceptualization of what the business is about	✓			✓
Choi and Valikangas (2001)	Innovative themes provide perspectives on strategy formulation			✓	
Mitchell and Coles (2003; 2004; 2004; 2003)	Business model innovation is key to rapid success	✓	✓		✓
Markides and Charitou (2004)	Implementing two business models in a single firm	✓	✓		
Voelpel et al. (2004)	Creation of disruptive competitive advantages	✓		✓	✓
Markides (2006)	Enlarge the economic pie through new customer attraction or increasing consumption	✓			

Source: Author's own creation

A review of business model innovation literature includes a presentation of the attempted innovation goal. As the table highlights there is currently disparity within this young field of research. The review analyzes whether the publications address business model innovation challenges, if an innovation framework and approach are presented, and whether success factors are highlighted.

Markides (1997) initially introduced the term "strategic innovation" to describe how new entrants in industries successfully upset the dominant leader, or rather, how successful challengers successfully enter a new market by breaking industry norms. He defines successful strategic innovation as when a firm identifies industrial gaps, fills them, and in turn, the gaps grow to become new markets. Gaps are described as new customer segments, new customer needs, or new activities enabling improved customer products or services. Strategic innovation has five distinct starting approaches:

1. Redefine the business
2. Redefine the customer segment
3. Redefine the offering
4. Redefine the activity base
5. Review the firm's industry at different points.

These approaches can be applied selectively or in combination with one another, however they all require that a firm asks demanding questions of their business. In Markides' 1998 publication he addresses the challenges that strategic innovators face. He identifies that industry outsiders are more likely to be viewed as strategic innovators as established firms already have a position in their industry. Established firms face four key innovating challenges:

1. Inertia of success
2. Questions of what to become
3. Uncertainty of new positions
4. Implementation

Inertia can be overcome when firms create "positive crises" and question their business, rather than waiting for a crisis to appear before initiating strategic exploration. Uncertainty in knowing what to transform into plagues strategic innovators, which can be addressed by challenging the accepted strategic planning process and institutionalizing an inquisitive attitude. If a firm is able to imagine a strategic innovation, the question remains whether it will be a successful transition. The dilemma that exists is that firms must be willing to initially trade efficiency for experimentation in order to determine which competencies need to be reinforced. The remaining challenge for a firm is how to implement a strategic innovation. Cannibalization is a threat and therefore implementation requires managerial and institutional support to facilitate success. In a 2004 publication by Markides and Charitou they discuss how firms can implement and manage a strategic innovation alongside the core strategy. This article is the first where Markides and Charitou incorporate the concept of business models (2004), and they take issue with Porter's notion that firms are unable to effectively compete with more than one strategic focus (M. E. Porter, 1985). In Markides' 2006 article he proposes that the theory of disruptive innovation (Christensen, 1997; Christensen & Raynor, 2003) requires clarification to continue its usefulness in practice. Markides proposes that disruptive innovation should be viewed either through business model innovation or product innovation, and not congealed with Christensen's work on technological innovation. Markides also clarifies his earlier work on strategic innovation by rebranding this term business model innovation to more accurately reflect its meaning. He defines a business model innovation as an enlargement of the economic "pie," which is achieved by attracting new customers or encouraging increased consumption, and continues to explain that innovators do not discover new products or services, they merely redefine what a product or service is and how it is distributed. The challenge for incumbent firms is that innovative business models attract different customers and have conflicting activity sets that are initially not viewed as threats, which shares many similarities with Christensens' work (Christensen, 1997; Christensen & Raynor, 2003). However, contrary to the work on technological innovation by Christensen, Markides (2006) highlights that business model innovations do not overtake the incumbent business model, they coexist together in industry.

Choi and Valikangas (Choi & Valikangas, 2001) analyze the strategy of more than 200 firms in an attempt to distinguish innovation patterns. The authors indirectly imply that there is a clear separation between a firm's strategy and business model, as they state, *"We examined nearly 200 strategies that departed from industry norms over the last two decades…We were primarily interested in innovations at the business model level"* (pg. 242). Their analysis produces ten innovation themes:

1. Convergence
2. Experience
3. Immediacy
4. Mass-customization
5. Universalization
6. Providing solutions

7. De-verticalization
8. Consolidation
9. Disintermediation
10. Going virtual

These themes occur in three major patterns: reverberation across industries, strategic trajectory, and repetitive innovations. The authors argue that innovation themes are found across numerous industries, suggesting their staying power. In addition, they state that strategic trajectory suggests that these themes shift over a naturally progressing cycle, and finally that innovation themes are seldom entirely new, but can be traced back as far as the industrial revolution. The authors propose that these themes can be used to devise an innovative business strategy by looking to other industries for success stories and imitating their business model or expanding an innovation theme beyond its currently accepted boundaries. The article highlights examples from firms that have successfully implemented innovative themes.

Donald Mitchell and Carol Coles (2003; 2004; 2004; 2003) have researched the success of the top US public firms in terms of stock price growth, and attribute this accomplishment to business model innovation. This type of innovation is defined as business model replacements that provide new product or service offerings to customers (D. Mitchell & Coles, 2003; D. Mitchell & Coles, 2003). Firm success is rooted in this type of innovation because continuous change forces competitors to either react to a firm's innovative behavior or ignore it; however the required resources to respond to innovation are a hindrance. As one CEO stressed, *"Technological innovation gives a company a six-to-12 month advantage at most. A business model advantage can last years, potentially yielding a dominant franchise"* (D. Mitchell & Coles, 2003 pg. 19). The framework for applying business model innovation consists of a thorough understanding of a firm's current business model, a clear innovation vision, and continuous design and installation of recurring innovations (D. W. Mitchell & Bruckner Coles, 2004). The authors stress that business model innovation is not a single-stop process to be utilized during less successful periods, but rather a continuous, never-ending process that builds upon previous experience. Successful business model innovation is dependent upon top management's interest and expectation of business model innovation, specialization in a firm's core competencies, business model flexibility and scalability, and finally internal processes must facilitate and accommodate business model innovation. Management's embracement of innovation fosters firm-wide interest in the phenomenon, while firm specialization ensures true business model innovation rather than superficial, sustaining business model adjustments (Christensen et al., 2004). Nurturing of top management who are steeped in a firm's current business model may be reluctant to implement a new, innovative business model for fear of catalyzing uncertainty (D. W. Mitchell & Coles, 2004). Flexibility allows a firm to react in a timely manner to innovative tests, while scalability allows it to ensure implementation throughout the organization. These factors are all facilitated by a firm's internal processes to ensure that business model innovation permeate within all corners of a firm. The main challenge to innovation is micro-level optimization which fails to account for the relationship among a firm's organizational system model (Arbnor & Bjerke, 1996). A micro-level innovation often leads to conflict within the organization, which a firm can avoid by lifting the innovative perspective. Many firms focus on innovative optimization in a select few, key areas which do not allow a firm to implement a true business model innovation.

Voelpel et. al (2004) analyze business model innovation in relation to its creation of competitive advantage, which, as the authors argue, is necessary in today's landscape of continuous and complex change. Changes in the business environment necessitate that firms must continuously adjust their business models to compete effectively. Incumbents face challenges in the face of business model innovation, entrenched routines, commitment to the existing business model, and reluctance at deconstructing the current business model. Firms must be willing to cannibalize their current business models to transition to the next competitive stage. The approaches firms can apply for innovating their business model include an extension of value chain management or expansion of customer value. Underlying these approaches is firm commitment to business model innovation. The authors highlight that firms are unable to effectively create and implement business model innovations without a supportive network. Success factors of business model innovation rely upon four dimensions within environmental change: customer sensing, technological sensing, business infrastructure sensing, and economic sensing. These sensing factors are synergetic and complement each other during innovate sensing.

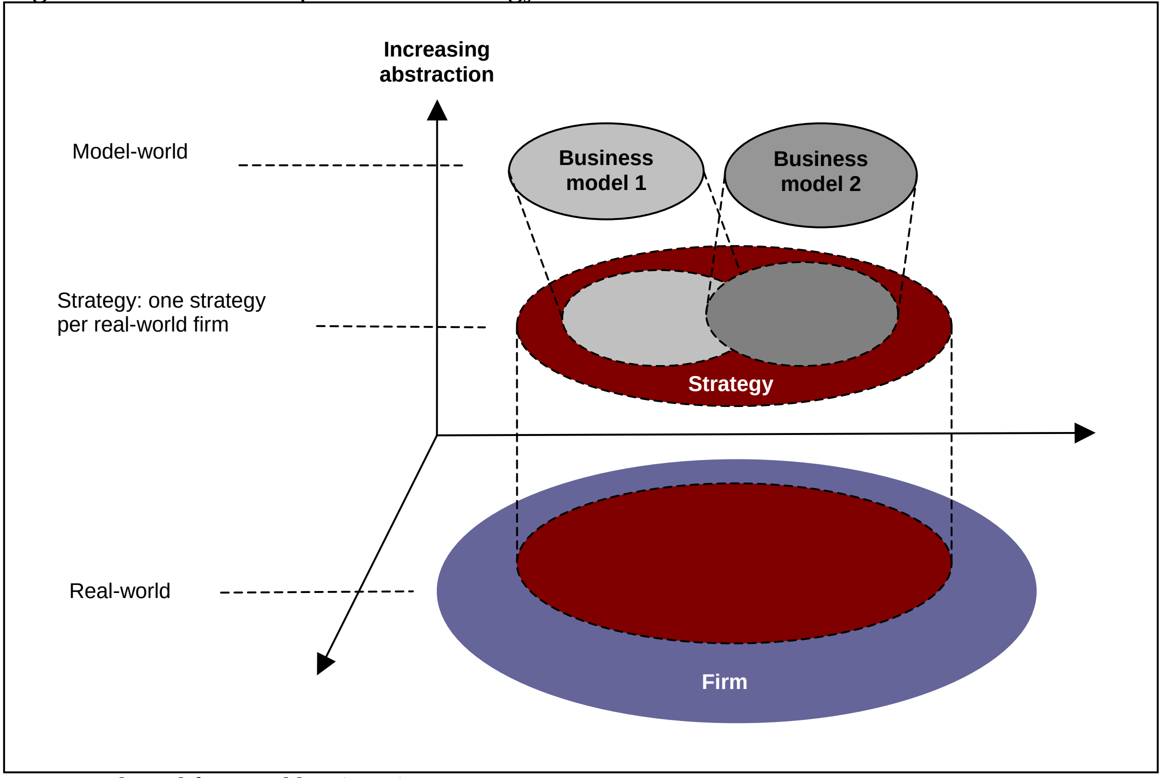
While the previous sections have introduced the reader to the business model concept and the role of innovation, the conflict between business model and strategy has yet to be addressed. While many authors in the field see a clear distinction, others are less convinced. This dilemma is addressed in the following section.

3.2.3 Strategic conflict

A raging debate which will not subdue in the near future is the strategy versus business model dilemma. As Magretta (Magretta, 2002 pg. 92) describes the two terms not much is left to the imagination, *"Today, 'business model' and 'strategy' are among the most sloppily used terms in business; they are often stretched to mean everything – and end up meaning nothing."* Michael Porter shows no support for the concept of business models and stresses that a firm's business model is no guarantee for creating economic value (M. E. Porter, 2001). He states that a firm's strategy is still the cause for success and that the business model framework should be excluded from business literature, it is part of the Internet's destructive lexicon (M. E. Porter, 2001). Strategy as a study subject is enormous and there are many schools of thought. These include balancing internal strengths and weaknesses with external opportunities and threats (SWOT), company positioning within its industry (M. E. Porter, 1985), balancing the resources within the firm (Wernerfelt, 1984), or defining a set of goals and objectives (Drucker, 1995).

However, many authors (Choi & Valikangas, 2001; Magretta, 2002), this one included, are strong supporters of a distinction between strategy and business models. While strategy concerns itself with a firm's competitive positioning, a business model outlines a firm's value proposition and the activity system that is used to create and deliver value to customers (Seddon et al., 2004). In other words, business models are abstractions of strategy and more inward-looking, while strategy is more outward-looking. Figure 3.7 depicts the relationship between the two concepts.

Figure 3.7: Relationship between strategy and business model



Source: Adopted from Seddon (2004).

Porter's influence on strategy development has shifted over time from a macro perspective[10] to a firm-specific micro perspective[11]. Porter's initial strategy work spawned the field of organizational economics and the development of numerous schools of thought (Hoskisson et al., 1999), including the resource-based view, which directs its attention internally in a firm. This perspective transition may help to shed light on Porter's distrust of the business model concept; however his interpretation of strategy continues to argue that it involves defining a long-term position in an industry, and making trade-offs about what activities a firm will and will not do to establish a competitive position. It is this long-term perspective and trade-offs that are the role of strategy, while business models are short-term reflections of a firm's business, or rather, abstractions of strategy. Strategy is about making choices while business models are reflections of those choices and their operating facets (Shafer, Smith, & Linder, 2005). All firms will eventually encounter competition and dealing with this factor is the role of strategy, as business models omit one vital element of performance: competitive positioning (Magretta, 2002; Seddon et al., 2004).

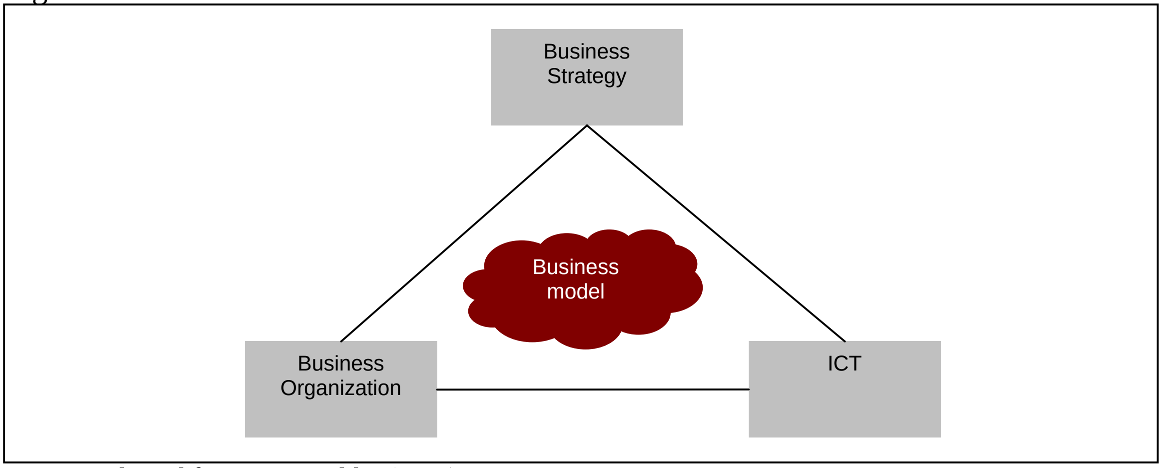
Business model role

It has now been made clear the distinction between strategy and business model, however this section will crystallize the actual role that business models play in a firm. A business model allows one to conceptualize how a firm operates, serves its customers, and earns a profit. It is the link between a firm's strategy, organizational structure, and information and communication technology (ICT) solution (Osterwalder, 2004). As discussed

[10] Five-forces model
[11] Value chain and more recently the activity system (McGahan, 2004b; M. E. Porter, 1996)

previously, a business model is the operationalization of a firm's strategy, while business models are often supported by ICT solutions, although this is not a requirement. These are three common windows that are used to peer into and analyze a firm. However, if these viewpoints are the windows, then the business model is akin to lifting the roof off of a house and peering inside. The business model allows all three facets to be combined. Figure 3.8 is a representation of the interaction of these three elements.

Figure 3.8: Role of business model in a firm



Source: Adopted from Osterwalder (2004)

Strategy, its role, and differences from the business model were highlighted earlier. What follows is a description of how the firm's organizational structure and ICT solution support the business model. The firm organization differentiates itself from the business model in that it describes how a firm organizes itself to facilitate implementation and running of the business model. It is the departments, work flows, and processes that comprise the firm organization. Changes in a firm's business model are actualized in adjustments to a firm's organization. This is necessary to ensure efficient information and work flows throughout the firm.

The final window into the firm is the ICT solution. This encompasses all electronic communication and technological solutions that the firm utilizes to facilitate and implement a firm's strategy, organization, and business model, such as distribution systems, customer relationship management software, websites, intranets, extranets, mobile services, etc. ICT has become such an integrated element in business today that it is not possible to remove this element when studying a firm's business model (Hedman & Kalling, 2003). In addition, ICT has been a primary driver in the founding of numerous firms and enabling new and innovative business model prosperity. Although ICT has been instrumental in web-based firms it has also allowed traditional firms to expand beyond their traditional realm. It facilitates customer contact, improves supplier integration, opens new distribution channels, and expands traditional firm networks. It is important that firms explore new ICT solutions to improve or change their existing business models when appropriate, or question how a business model change will impact the existing ICT infrastructure.

The business model concept has been introduced and the literature in the field reviewed. Adaptations to the business model have been discussed in the realm of business model innovation, and the important distinction between strategy and business model was presented. This tool allows the reader to deconstruct a firm and analyze its business model, however to improve industrial understanding a categorization tool is necessary. Firm heterogeneity implies that industrial analysis is best served with a method of creating groups, which is presented in the following section.

3.3 Strategic groups

Categorization and order appear to be a natural, human phenomenon. It allows for improved understanding and enables one to make generalizations. This phenomenon is apparent in the strategic management field with the strategic group framework.

The strategic group concept dates back to 1972 when Michael Hunt attempted to explain the performance of the white goods industry (comprised of major household appliances, such as dishwashers, dryers, refrigerators, etc.) of the 1960s in his doctoral dissertation (Hunt, 1972). Hunt (1972) observed that the white goods industry was increasing in concentration, yet firm performance was declining, contrary to current economic thinking. His explanation proposed that there are three types of asymmetry between firms: extent of vertical integration, degree of product diversification, and differences in product differentiation. These asymmetric aspects helped to spawn four distinct strategic groups within the industry; the rationale being that strategic groups minimized asymmetry within the group, essentially creating defensive barriers against new entrants. Hunt's (1972) study generated a new field of study within strategic management, the strategic group. Table 3.3 is an overview of this literature stream.

Table 3.3: Strategic group literature contributions

Author(s)	**Industry**	**Strategic group basis**
Hunt (1972)	White goods	• Vertical integration • Product diversification • Product differentiation
Newmann (1973)	34 producer goods industries: chemical processes	• Vertical integration
Porter (1973)	38 consumer goods industries	• Relative size of firm: leader/follower classification
Hatten (1974)	Brewing industry	• Manufacturing variables: number, age, capital intensity • Marketing variables: number of brands, price, sales • Structural variables: firm concentration ratio, firm size
Oster (1982)	19 consumer goods industries	• Product strategy: advertising/sales ratio
Frazier and Howell (1983)	Medical supply and equipment	• Customer groups served • Customer needs served
Dess et al. (1984)	Paints and allied products	• 21 marketing variables
Hawes and Crittenden (1984)	Supermarkets	• Marketing strategy: target market, product, promotion, price, buying, display
Cool and Schendel (1987)	Pharmaceutical industry	• Scope: market segment breadth,

		product types, generic drug commitment, geographic scope • Resources: research commitment, marketing commitment, promotion strategy, size
Mascarenhas (1989)	Offshore drilling	• Product-line diversity • Technical capability • Global spread • Vertical integration • Marketing orientation
Kling and Smith (1995)	Airline industry	• 19 consumer variables: Airline quality rating (AQR)
Athanassopoulos (2003)	Grocery industry	• Firm size • Geographic concentration • Resource deployment • Benchmarking & target contribution
Cappel et al. (2003)	Airline industry	• Porter's generic strategies
Zúñiga-Vicente et al. (2004)	Banking industry	• 7 strategic variables categorized according to: assets, liabilities, and asset/liability

Source: Adopted from McGee (1986)

While Hunt (1972) grouped firms according to asymmetry of operations within the same industry, Newman's (1973) doctoral dissertation based strategic group formation on the extent of vertical integration. Newman accepted Hunt's asymmetric group formation; however he also proposed that groups can be identified by their relationship with member firms outside of the core industry. He proposed that firms sharing similar businesses can be similarly grouped, while firms that operate in the industry but their principal business is in a different industry form a different group. Newman did state that his interpretation of strategic groups does not address other operational factors that can theoretically and empirically distinguish strategic groups (Newmann, 1978). Michael Porter built upon the concept in his 1973 doctoral dissertation and created a distinction between industry leaders and followers (M. E. Porter, 1973). Porter based his argument on firm size, stating that firms comprising the leading group achieve economies of scale, including broad product lines and distribution capabilities. Firms within the follower group will exhibit specialist or regional strategies.

Hatten (1974) explored the rigors of creating intra-group homogeneity and group variation in his doctoral dissertation, and argued that the contributions of earlier work was too elevated at the group-level and he proposed focusing on the firm-level. Previous contributions assumed industry homogeneity but they had failed to investigate firm-to-firm homogeneity. His work built upon case studies in the brewing industry and he created an eight-variable model focused on manufacturing and marketing. Hatten concluded that strategic groups could potentially assist management in evaluating strategic proposals and investigate competitive positions. Hatten's critics pointed out that his chosen industry was undiversified, single-business units and therefore his study was of business strategy rather than corporate strategy.

Oster (1982) chose to focus on one firm element, product strategy, as the formation of strategic groups. Product strategy was empirically measured by incorporating advertising and sales ratios, and firms were relegated to specific strategic groups depending on a firm's ratios compared to industry averages. Oster (1982) incorporated longitudinal change by analyzing the stability of groups over time. The analysis concludes that although the formation of strategic groups is judgmental, they do expand industrial understanding. Howell and Frazier (1980) apply the concept of strategic groups to the hospital supply industry, and incorporate the degree of scope and differentiation on customer groups and needs dimensions in order to create strategic groups based on customer needs.

Dess and Davis (1984) expand the field of strategic group studies by incorporating a great deal of qualitative tools in their research of the paint industry. Former studies focused on strategic outcomes, or 'strategy as realizations,' however their study focused on 'strategy as intentions.' Their variable creation relied upon industry experts to identify appropriate dimensions, which can then be used in a multivariate analysis to identify strategic groups. Hawes and Crittenden (1984) also rely upon marketing strategy variables in their retailing industry study. Their research created four strategic groups within the industry and they uncovered a partial correlation between strategic group membership and successful firm performance.

Cool and Schendel (1987) apply the strategic group concept to a longitudinal study of the US pharmaceutical industry, and attempt to determine group membership on firm performance and risk levels. They hesitantly note that they identified an industry cycle of experimentation, imitation, followed by new experimentation, while also noting the challenges of group shifts. Changes in group strategy are attributed to both exogenous shifts and endogenous initiatives.

A dynamic, rather than static, study of strategic groups was conducted by Mascarenhas (1989). He proposes that strategic change by a firm can result in a change in group strategy, group membership, or number of groups, based on the reaction by other group members' reaction to an initial strategic change. Results indicate that in declining economic periods firm mobility increases, especially among similar groups. The study concludes that strategic groups are not solely dependent upon environment and industry structure but also competitor response.

Strategic groups within the airline industry are analyzed by Kling and Smith (1995). They analyze customer quality ratings with firm costs and create strategic groups with the generic strategies proposed by Porter (1980). This analysis does recognize the impact of firm size and they propose that the industry is characterized by limited barriers to entry.

Athanassopoulos (2003) applies strategic group analysis to the UK retail grocery industry and uses four variables to compose strategic groups. He identified four distinct groups among the study group and demonstrates that performance variation within groups is apparent, as well as, smaller performance variation between groups. This longitudinal study attempts to identify reasons for variation over time, including macro-economic forces.

Cappel et. al (2003) propose a strategic grouping of the US airline industry utilizing Porter's generic strategies. Past research in the field has indicated that successful firm performance in the US industry adopted a combination of low-cost and differentiation, while in the EU a low-cost approach was more successful. Their work proposes a research agenda for extending the analysis of Porter's generic strategies, which they maintain are important to research in service industries expanding in globalized business environments.

The field of strategic grouping has been expanded with Zúniga-Vincente et. al's (2004) study of strategic behavior among Spanish banks. This study analyzes how strategic groups adapt their competitive strategy to changing environmental conditions, as well as, applying a more robust quantitative grouping method. The results indicate that environmental disturbances have important implications for group patterns and stability, and that strategic instability occurs during major environmental disturbances. Group transition indicates that firms carry out incremental rather than radical strategic change, and that the industry is free of mobility barriers.

The theory of strategic groups has progressed from the early 1970s through the previous four decades. Past literary contributions have shown that the theory of strategic groups enables industrial simplification and attempts to answer how firms strategically respond to inter- and intra-environmental factors. Numerous authors indicate the need for application of the strategic group theory to industries in order to facilitate managements' strategic choices (McGee & Thomas, 1986).

3.3.1 Mobility barriers, collusion, and rivalry

Initial strategic group research proposed that firms within a group are more likely to erect mobility barriers surrounding the group as a result of collusion (R. E. Caves & Porter, 1977). Mobility barriers are described as barriers to both entry and exit, due to market or supply conditions, operations, firm characteristics, social processes, or financial resources (McGee & Thomas, 1986; M. Peteraf & Shanley, 1997). High mobility barriers imply that the costs to change group membership outweigh the expected profitability, and vice versa. Hatten and Hatten (1987) distance themselves from the belief that mobility barriers are at the heart of strategic group theory, rather they state simply, that to change strategies involves costs and the more dissimilar a firm's strategy from another's the higher the imitation cost. Grouped firms have low costs associated with emulating their peers, while barriers between firms in different groups may be either high or low; research language commonly suggests that barriers are inherently high around all groups, which is not necessarily true (Hatten & Hatten, 1987). Mobility barriers may also be asymmetric. For example, a large firm may imitate a niche firm at low cost, while a smaller firm may experience high costs to imitate a larger firm; or, a high-cost firm may resist cost-saving and efficiency measures, while an efficiency operator may find it easier to add complexity to a business model. Entry costs into a group, a mobility barrier, may be low, while exit costs may be high. Porter (1979) wrote of this, *"…the importance of entry barriers, then, depends on the particular strategy adopted by the firm."* High mobility barriers do not always imply a firm advantage, rather they can become traps, even for industry leaders (Hatten & Hatten, 1987). For example, an industry's leading manufacturing assembler, a high mobility barrier against traditional competitors, can become a weakness, or exit barrier, in the face of a low-cost manufacturing assembler. An industry undergoes many structural changes over time and groupings must also change. A great deal of strategic group research is either cross-sectional or a limited time-series study, which does not always capture industry and strategic change. Long-term time-series studies (Hatten & Schendel, 1977; McLean & Haigh, 1954; Oster, 1982) shows that strategic change does occur, but over long periods and Oster (1982) referred to strategic change as "sticky."

3.3.2 Group populations

Strategic groups can be populated with three types of firms: core firms, secondary firms, and solitary firms (K. O. Cool & Schendel, 1987; McNamara, Deephouse, & Luce, 2003; Reger & Huff, 1993). A core firm follows the group strategy closely and is tightly aligned strategically, while a secondary firm follows a group strategy less closely. Some authors describe core firms as pure firms and secondary firms as hybrid firms[12] (Stewart Thornhill, 2007). The range found between the primary and secondary firms is referred to as the "range of acceptability" (Deephouse, 1999). Group membership, whether as a primary or secondary firm, sends a legitimacy signal to the market, which aids in acquiring resources (Deephouse, 1999), and is crucial for firm survival in fast-paced, highly-uncertain industries (Barreto & Baden-Fuller, 2006; Deephouse, 1996). A solitary firm is identified as a single-firm group, which is not strategically aligned with the industries main groupings. Reger and Huff (1993) label non group-member firms as misfits or idiosyncratic, whose strategies are either inconsistent or not easily expressed in terms used to explain most other firms in an industry. However, such placement on a strategic map raises legitimacy challenges (Hirsch & Andrews, 1986) which question a firm's actions. Strategic definition of groups can be measured in a variety of ways, for example product line, investments, research and development costs, etc. Managerial cognitive grouping is also an option, which analyses industry managers' perception of strategic groups (Porac, Thomas, & Baden-Fuller, 1989). Barreto and Baden-Fuller (Barreto & Baden-Fuller, 2006) present legitimacy-based groups, which place firms in communities based on perceptions of actors' in positions of authority. It is argued that is a better litmus test of modeling managerial decision-making.

Initial research postulated that external conditions acting upon an industry's groups will lead to similar firm performance within a group and varying performance among the remaining groups (R. E. Caves & Porter, 1977; K. O. Cool & Schendel, 1987). Collusion among firm peers within a group leads to competitive isolation and erection of mobility barriers, which should lead to similar firm performance. Past, and more recent research, has shown that there are indeed performance variations among strategic groups (Ferguson, Deephouse, & Ferguson, 2000; Ketchen et al., 1997). Research focus, however, has recently shifted away from analyzing performance variation between groups to analyzing firm performance variations within groups (K. Cool & Schendel, 1988; McNamara et al., 2003). Results have shown that firm performance among firms within the same strategic group does vary, which is in contrast to earlier beliefs, and coincided with the emergence of the resource-based view (J. B. Barney, 1996; M. A. Peteraf, 1993). The assumption of collusion is a vital element in performance variations among strategic groups, however its existence is under question (McNamara et al., 2003). This assumption builds on George Stigler's (1964) remark that industry conditions influence the level of collusion. Enforcement, number of firms, and bargaining power of buyers affect industry collusion, and there is growing support that similar firms are more rivals than colluders. The ability to collude among firms is challenged due to

[12] The author uses these terms interchangeably, although Thornhill and White's (2007) publication is built on Porter's generic strategies (M. E. Porter, 1985) rather than strategic groups (M. E. Porter, 1973).

coordination difficulties and variations in costs and benefits to industry firms (McNamara et al., 2003). Research by both Cool and Dierickx (1993) and Fiegenbaum and Thomas (1995) failed to identify mobility barriers in their research, suggesting the lack of collusion. Application of cognitive theories to strategic group research also question collusion among intra-group firms (K. Cool & Dierickx, 1993; Porac et al., 1989; Porac, Thomas, Wilson, Paton, & Kanfer, 1995). Porac et al. (1989) states that intra-group firms compare themselves to their group peers and decision-makers attempt to distinguish themselves from their peers (McNamara et al., 2003). Intra-group firms focus on their own competitive position within their group and are more reactive to their peers' actions than that of members of other groups. McNamara et al. (2003) determine from past research that intra-group rivalry rather than collusion is more prevalent, which reduces the heights of mobility barriers.

3.3.3 Intra-group positioning

The research community has conducted limited research on the role of firm positioning within a strategic group and its affect on performance. The affect of choosing a position as a core or secondary firm within a group and its performance implications is not well known. Secondary firms may deviate from a group's core strategy as a result of core strategic implementation challenges; however the same firms may be attempting a differentiation strategy relative to core firms in an attempt to improve performance. Cognitive recognition and strong identification with a strategic group may lead to improved effectiveness, however core firms may also be more resistant to change and have limited industrial views. There are two opposing theoretical propositions, oligopoly and resource based view, related to positioning and performance (McNamara et al., 2003).

Oligopoly theory suggests that core firms will outperform secondary firms. This belief is rooted in firm legitimacy and resource access (McNamara et al., 2003). Partners are more willing to interact with firms whose strategies are easily understood and perceived as rational, which may lead to improved terms. Better exchange terms will enhance the likelihood of exchange and thus potentially improve the legitimacy of partners as well. Partners may punish less legitimate firms because of a perceived increase in risk. Thornhill and White (2007) research the impact of strategic purity at an industry, rather than strategic group level. Results show that there is a relationship between firm position within a strategy continuum, however it is industry specific. The authors state that it is not possible to make broad, cross-industry generalizations about strategic position and performance by analyzing a single industry.

The resource-based view contrasts the oligopoly theory by suggesting that secondary firms should outperform core firms. This belief is rooted in application of contestable markets theory[13] (Baumol et al., 1982; Baumol, 2001) and the notion that similar firms face high competition and a high level of rivalry. Secondary firms are more likely to create unique resources and local monopolies which lead to increased performance (J. B. Barney, 1996; J. Barney, 1991; M. A. Peteraf, 1993). Porac et al. (1989) state that successful firms are able to balance pressures to conform with differentiation desires,

[13] Contestable markets theory, developed by William Baumol (Baumol, Panzar, & Willig, 1982)), analyzes the competitiveness of markets and barriers to entry and exit. A perfect market is considered a perfectly contestable market.

which is referred to as *existing on the competitive cusp*. Firms must balance the trade-offs of increased legitimacy and rivalry with decreased legitimacy and less competition (Deephouse, 1999). Solitary firms may face little competition but surrender strategic legitimacy, while core firms submit to increased competition in exchange for the benefits of increased legitimacy. Secondary firms strive to balance these two opposing forces.

The previous section touched upon the concepts of business models and its distinction from strategy, and the categorization tool of strategic groups. Strategy is related to broad-encompassing, firm positioning within an industry, while the business model is the conceptualization of a firm's strategy. In other words, strategy is the long-term goal of a firm, where as the business model is the short-term actualization of a strategy. Firms may have similar strategies, yet uniquely different business models. Strategic groups, on the other hand, allow for increased understanding of an industry through categorization of firms. An in-depth understanding of business models allows one to categorize firms into strategic groups, which aids in further analysis. Without the strategic group analytical tool the research may fail to recognize the detailed composition of the airline industry; one may see the airline industry as merely composed of similar airlines, while with the strategic group framework one recognizes three distinct groups of airlines, while the business model framework enables one to further classify airlines within these distinct groups. While the previous section introduced the notion of strategic groups, which aids in industry comprehension, and business model innovation was described to explain heterogeneity and firm capitalization and creative solutions, industry homogeneity may also be evident and attributed to mimetic behavior. Such firm traits are present in a number of industries and the concepts are introduced and explained in the following section.

3.4 Imitation

From afar an industry's firms may appear strategically scattered, however as one examines the field more closely one cannot help but notice striking similarities among them, as DiMaggio and Powell (DiMaggio & Powell, 1983 pg. 148) asked, *"Why is there such startling homogeneity of organizational practices?"* In reality, a strategic balance must be struck between differentiation and similarity. Differentiation may reduce competition, while imitation may increase legitimacy (Deephouse, 1999); Porac et al. (1989) referred to this as the *competitive cusp*. This is defined as the balancing act between a firm's desire to conform and differentiate. Imitation among firms is a common behavior seen in business. Replication can be found in areas such as product development, process implementation, managerial methods, or market entry. Mitchell and Coles (2003 pg. 16) refer to the, *"…matching [of] the competitor's offerings is a business model catch-up."* Such imitation can take place for a number of reasons. Firms may regard a competitor's behavior as evidence of possessing better knowledge or understanding of the market, or firms may fear their competitor is widening the competitive gap. Imitative behavior is a firm's response to these doubts. The results from such behavior can have the effect of increasing rivalry between firms, or promote collusion. In the scope of this research it will be investigated whether business model imitation is apparent in the airline industry, and if so, what will be the effect of such behavior. It is not possible to discern the underlying justification for imitative behavior among airlines, however.

Research often polarizes the concepts of innovation and imitation, and although antagonistically opposed they are related none the less. A firm's change in a process, technology, or system is often labeled as either an innovation or imitation, however classification is rarely so simple. It raises the question: if a firm imitates a competitor's product, yet adapts it to conform to its organizational resources, strategy, and market position, is it imitation or innovation? Sevón (1996) stresses that firms often imitate only certain features of competitors, and that they modify these to meet their own conditions, which may be regarded as imitation by outside observers and innovation by those inside the firm. Sevón (1996) demonstrates this phenomenon by referring to Westney (1987) who researched the imitative behavior of Japanese society during 1868 – 1912, and the innovative adaptations that took place. This interpretation of imitation complements the definition of innovation, *"…any idea, practice or material artifact* perceived *to be new by the relevant unit of adoption"* [author's own emphasis] (Zaltman, Duncan, & Holbek, 1973 pg. 158). This states that the firm that imitates a competitor yet adapts its imitation to conform to the adopting organization and perceives it to be new may regard the imitation as an innovation.

Research of imitative behavior among firms is often fragmented and often takes place in specific communities. Theoretical research dominates the field, while results grounded in empirical studies of rival imitation are few (Kennedy, 2002). This is a reflection of the underlying theories used to study imitation, such as economic, institutional sociology, or population ecology. However, Lieberman and Asaba (2006) attempt to assemble the field's knowledge and provide two broad theoretical categories to explain the cause of firms' imitative behavior: information-based or rivalry-based (Lieberman & Asaba, 2006). Information-based theories describe firms that mimic competitors that are perceived to possess superior information, while rivalry-based theories explain how firms imitate competitors to limit or maintain rivalry. These two theoretical perspectives are not exclusive and can take place simultaneously.

3.4.1 Information-based theories

Knowledge generation and understanding within firms is not equal and in uncertain environments the relationship between action and outcome is blurred. Information, whether gathered internally or externally, can be influential to managers in their decision process in such environments. Information-based theories explain this type of phenomena.

Banerjee (1992) and Bikhchandani et. al (1992, 1998) introduce the concept of "information cascades," which occur, *"…when it is optimal for an individual, having observed the actions of those ahead of him, to follow the behavior of the preceding individual without regard to his own information"* (Lieberman & Asaba, 2006 pg. 368). A firm may behave based purely on internal knowledge, however the behavior reveals that information to the market. Competitors may elect to behave in a similar fashion, ignoring their own internal knowledge, thus perpetuating the initial behavior. However, information cascades are easily broken and can be reversed if the contradicting signals emerge in the market, which can partially explain the growth of the "Internet-bubble" and its eventual collapse. In the market some firms' actions are more convincing than others' and are regarded as "fashion leaders" (Bikhchandani, Hirshleifer, & Welch, 1998). Historically successful firms are often mimicked as they are perceived to have better knowledge than less successful firms. As firms change, organizational theory attempts to explain mimetic behavior with firm organization, or institutional isomorphism (DiMaggio & Powell, 1983), a concept rooted in organizational sociology and ecology. Isomorphism is the process of one unit in a population mimicing other units that face identical environmental conditions (Lieberman & Asaba, 2006). Firms imitate the organization of more successful firms when the environment is uncertain (Deephouse, 1999; Haveman, 1993a). Such organizational imitation may eventually become institutionalized in the market and other firms will adopt the behavior without questioning (Deephouse, 1999; DiMaggio & Powell, 1983; March, 1981). Empirical studies have shown that the likelihood that a firm is imitated is based on its size and profitability (Haunschild & Miner, 1997; Haveman, 1993a). Industrial and environmental uncertainties also facilitate organizational imitation. Experimentation can be expensive and time consuming for firms, which is not possible in industries plagued by uncertainty. Therefore, imitation may be an attractive alternative.

3.4.2 Rivalry-based theories

While firms may imitate competitors holding the belief that superior information is possessed by other firms than themselves, others may display imitative behavior in an attempt to maintain a competitive position relative to competitors (Lieberman & Asaba, 2006). Rather than focusing on information, rivalry-based theories are rooted in business strategy. When firms possess similar resources and market positions competition can drive down prices and erode profits. Firms can attempt a differentiation strategy in this case (Kim & Mauborgne, 2005; M. E. Porter, 1985), however its success is not guaranteed. Many firms elect to imitate rivals and match their behavior in an effort to reduce competition and risk (Lieberman & Asaba, 2006). Studies of imitative behavior among rivals incorporating game theory have shown that firms can be punished by competitors for deviating from the "accepted" strategy of the group (Axelrod, 1985).

3.4.3 Challenges

Although imitation may appear as a viable solution for some firms, such as those that wish to reduce risk, implementation of such a strategy also faces challenges. Case studies, analyst reports, and books written by a firm's founders explaining the key to a firm's success make some strategies and business models transparent[14], yet emulators are sometimes unable to imitate the firm and be as successful. The research-based view states that some resources are inimitable and if firms are able to control these resources they can stave off imitators, as well as benefiting from tacit knowledge, economies of scale, scope, and density, first-mover advantage (J. B. Barney, 1996; J. Barney, 1991; Lippman & Rumelt, 1982; M. A. Peteraf, 1993) Rivkin (2000) states that a strategy's complexity in itself is a barrier to imitation. Complexity is based on the number of decisions and processes that comprise the strategy and the level of interaction among those decisions. This viewpoint can be extended from the broad-encompassing firm strategy to the conceptualized business model of the firm. It is often the activities and processes between the business model that create the advantage rather than the components themselves (Afuah & Tucci, 2001; Arbnor & Bjerke, 1996; Hamel, 2000; Hedman & Kalling, 2003; M. E. Porter, 1996); tacit knowledge requirements add complexity and success uncertainty (Lieberman & Asaba, 2006). A firm may have a transparent strategy comprised of imitable elements, yet the interactions among those

[14] Examples of this include: Freiberg (1996), Peterson (2004), Slater (1999), or Branson (2002).

elements may hinder imitation; a *"...would-be imitator could understand most of the ingredients that make up a successful business system yet still fail to grasp the recipe"* (Rivkin, 2000 pg. 825). Porter (M. E. Porter, 1996) highlights that the activities that firms perform and the fit among them help deter imitators, as it is the fit rather than the activities themselves that challenge mimicry. In addition, there is the danger that imitation may dissolve the incentive to innovate, however a homogenous market may stimulate past innovators to rise to the challenge again (Rivkin, 2000). However, as Sevón (1996) and Westney (1987) explain imitation has traces of innovation interspersed.

Naturally, the question posed when pursuing an imitation strategy is, who should be imitated. If a firm determines that imitation is an appropriate strategy it must research which competitor(s) or strategic group is of mimetic interest, and what should be imitated. Research suggests the "fashion leader" (Bikhchandani et al., 1998; Haunschild, 1993; Westphal, Gulati, & Shortell, 1997a), firms based on size (Haunschild & Miner, 1997; Haveman, 1993a), or the most successful (Haunschild & Miner, 1997; Haveman, 1993a). "Fashion leaders" are those firms who have acquired a perception of superiority and expertise by other firms. It is presumed that fashion leaders possess information and experience that others envy, and their behavior is often emulated regardless of other information signals in the market. It can be described by firms in an industry that take a "wait and see" approach with regard to adopting a new technology. All firms have an incentive to wait for the first to adopt in the hope of free-riding on their choice; the cost of deciding earliest is low for the firm with the greatest precision.

Imitation and its two broad-based categories of information and rivalry theories have been presented, and the challenges of emulation were discussed. This should provide the reader with a thorough understanding of this concept. The following section presents selected literature in this field to provide a background of the research conducted.

3.4.4 Literature

Mimicry of competitors' products, management or organizational styles, or processes is not a new phenomenon in strategic management. Isomorphism is found not only in biology but also in the business world (Hawley, 1986). Such behavior can result in competitive intensification or increase firm collusion, resulting in a reduction in competition. The imitative literature stream subdivides into various related topics. Multimarket contact looks at how many markets competing firms share, which may increase oligopolistic and mimetic behavior (Heggestad & Rhoades, 1978; S. A. Rhoades & Heggestad, 1985; Scott, 1982; Scott, 1990); imitative foreign direct investment (FDI) bunching by firms as a means of reducing competitive risk (R. E. Caves, Porter, & Spence, 1980; M. J. Chen & MacMillan, 1992; R. Henderson & Cockburn, 1994; Hennart & Park, 1994; Knickerbocker, 1973; Kogut & Chang, 1991; Yamawaki, 1998); organizational imitation which shows that firms demonstrate mimetic behavior for a number of reasons (Baum & Haveman, 1997; Baum, Li, & Usher, 2000; Davis, 1991; Deephouse, 1999; Delios & Henisz, 2000; Garcia-Pont & Nohria, 2002; Greve, 1996; Greve, 1998; Haunschild, 1993; Haunschild & Miner, 1997; Haveman, 1993b; Westphal, Gulati, & Shortell, 1997b); economic herd behavior that discusses why competing firms behave in unison (Chang, Chaudhuri, & Jayaratne, 1997; Kennedy, 2002; Rao, Greve, & Davis, 2001). The airline industry displays characteristics from many fields, however as this project is focused on business models it is appropriate to review those areas that are complementary. For example, airline networks are ideally suited for investigating the effects of multimarket contact, and numerous studies have researched this topic (Baum & Korn, 1996; Baum & Korn, 1999; Evans & Kessides, 1993; J. Gimeno & Woo, 1996), however this topic relates itself to mimetic behavior and its effects found specifically in airline networks, not business models. FDI and its affects are important strategic decisions that a firm must make, however this specific realm does not lend itself ideally to the airline industry. Although air transport service is a highly-integrated, international service, its involvement in FDI is limited compared to other comparable industries. Chen and MacMillan (1992) performed an extensive study analyzing mimetic investment bunching by airlines and the action response of airlines. This study showed competitive response is dependent upon strategic dependence, and action irreversibility delays competitive response. Investment strategy is a micro-perspective related to strategic decisions, while business model analysis is a meso-perspective. Lieberman and Asaba (2006) have generated a literature list of the branches found in the imitation literature stream; although the document is not a literature review, it is a good source for the reader to delve deeper into the theory. The following tables, 3.4. and 3.5., adopted from Lieberman and Asaba (2006), review the literature relating to organizational imitation and herd behavior.

Table 3.4: Literature on organizational imitation

Author	**Industry**	**Analytic tool**	**Findings**
Davis (1991)	Fortune 500	Multivariate regression of 16 variables of firms' *poison pill* adoption	• Adoption related less to imitation than to director contact and interlock
Haunschild (1993)	1981-1990 acquisitions of medium/ large firms in 4 industries	Regressions of director ties in firms	• Directors imitate acquisition activities of other firms that directors are tied
Haveman (1993a)	1977-1987 market entry in savings and loan industry	Event history analysis of change events	• Traits of mimetic behavior is evident in industry, with some caveats
Greve and Davis (1996)	1984-1993 adoption of radio formats by US stations	Event history analysis of change events	• Firms will imitate other members of the same corporation
Haunschild (1997)	1988-1993 selection of investment banker	Regression of types of imitation used to select investment banker	• Imitation behavior is influenced by frequency of observations, traits of copied firm, and quality of outcome
Westphal et al. (1997a)	TQM implementation in US hospitals	Heckman selection modeling	• Initial TQM adopters seek efficiency gains, while secondary TQM adopters seek legitimacy
Deephouse (1999)	1985-1992 population of banks in US	Hierarchical regression measuring return on average assets	• Strategic balance is ideal; be as differentiated as legitimately possible
Baum and Haveman (2000)	1971-1996 nursing home acquisitions	Logistic modeling of probability of acquiring particular nursing home	• Chains are more likely to imitate similar sized competitors in acquisition patterns
Delios and Henisz (2000)	1990-1996 worldwide plant location decisions by Japanese firms	Time logit analysis of plant location	• Imitation of prior behavior legitimizes a firm's choices

Garcia-Pont and Nohria (2002)	1980-1989 alliance formation among global automobile manufacturers	Event history analysis of probability of firms to enter an alliance structure	• Firms imitate others that occupy the same strategic group, rather than first-movers • Industry-level analysis tends to obscure mimetic studies.

Source: Adopted from Lieberman and Asaba (2006)

Davis (1991) studied the adoption of a “poison pill,” which is a shareholder rights plan issued by a firm’s board of directors and intended to increase the costs involved with a hostile takeover. This study researched Fortune 500 firms and their adoption styles of poison pills. Davis concludes that competitor imitation has less to do with poison pill adoption than interlocked board of directors that permeate through the Fortune 500 companies. Director interlock continues with Haunschild’s (1993) study of acquisition patterns among firms. Results show that firms imitate those firms that directors are tied to via directorships. Imitation spreads through manager’s inter-firm relationships.

Haveman (1993) looks the savings and loan industry and its entry into six diversified markets opened up by regulatory changes and imitative firm behavior. Haveman shows that entrants do not rely on imitative behavior of similar sized firms; however, large firms are role models for other large firms, while profitable firms are role models to firms of all sizes. These findings support the notion of mimetic behavior and successful incumbents will entice new, imitative entrants, but as the market grows entrance will be less attractive, producing a u-shaped rate of entry. Greve (1996) studied how incumbent firms adopt a new market position in an industry, and discovers that industry positioning does not change as a result of mimetic behavior. His unit of analysis is US radio stations and their entrance into a new radio format. Results show that stations will imitate sister stations that are owned by the same corporation; although Greve notes that mimetic behavior can create organizational isomorphism or polymorphism. Polymorphism is defined as the imitative behavior displayed by firms populating a conglomerate, while isomorphism is related a single firm (J. Freeman & Hannan, 1983).

Haunschild and Miner (1997) hypothesize that three types of mimetic behavior take place: frequency imitation (copying common practices), trait imitation (copying practices of firms with specific features), and outcome imitation (copying based on a historical outcome). Results show that the types of mimetic behavior are observable empirically and that they do influence imitation of other firms. Westphal et al. (1997) research adoption of innovative organizational practices, total quality management (TQM), in US hospitals. Findings show that early implementers of TQM seek to increase efficiency gains and seek customization of process innovations. Later implementers tend to seek legitimacy and display mimetic behavior rather than innovative trends. External social pressures have increased isomorphism of TQM practices.

Firms are pressured to differentiate themselves to reduce competition, yet legitimacy is also constantly pressuring managers. Deephouse (1999) investigates this balancing act within the population of banks found in a US metro area. Findings suggest that firms must avoid excessive differentiation which will reduce market legitimacy, while an abundance of conformity will increase competition beyond acceptable levels. Deephouse agrees that managers must balance the “competitive cusp (Porac et al., 1989),” and that a model of strategic balance is more appropriate than conformity or differentiation.

Baum et al. (2000) focus their research on imitative behavior of chain firms, finding empirics in nursing home acquisitions. Inspiration stems from a lack of research in chains' spatial expansion. Analysis was conducted on the probability of a chain acquiring an independent or component nursing home. Results show that chains are most likely to acquire targets that are spatially near their recent acquisitions and that acquisitions mimic those of similarly sized competitors. Henisz and Delios (2001) research worldwide plant location decisions by Japanese firms and results demonstrate that firms routinely imitate decisions by competitors in the home country, especially when locating their first foreign plant. Imitation of firms in the same business group was less correlated than imitation of competing firms. In addition, results show that uncertainty regarding policy implications has an impact on imitative behavior and firms imitate others to reduce uncertainty. Garcia-Pont and Nohria (2002) analyze alliance formation and imitation in the automobile industry between 1980 to 1989. Horizontal industry alliances among strategic groups were necessary for Asian manufacturers to learn regional distribution tactics and reduce preemptive collusive movements by US and European competitors, while their counterparts required the Asian manufacturing techniques to streamline operations. Results show that mimetic behavior at a macro, industry-wide level is not present, but do appear at a meso, strategic-group level. In addition, firms show little herd-like behavior and blatant copying of industry first-movers, but rather imitate those firms that closely resemble themselves and attempt to mimic their behavior.

This particular literature stream has focused on mimetic isomorphism, which borrows from organizational sociology, and shows that imitative behavior does exist in various industries. Prior research has shown that the level of analysis at the strategic group level is more appropriate, rather than an industry level analysis, which shows that firms are likely to imitate others in the same group, however legitimacy and balancing the competitive cusp are also important factors. Imitation may be instigated by director interlock, connection to a sister firm, and observation of similar competing firms. Organizational mimicry is but one tributary of the literature stream, and the following section will provide an overview of the other relevant tributary: herd behavior.

Herd behavior is a term borrowed from biological behavior displayed by animals, and refers to actors (individuals, groups of individuals, firms) that perform together yet lack a planned direction. Herd behavior is evident in areas such as manager mimicry (Scharfstein & Stein, 1990), stock market fluctuations (Scharfstein & Stein, 1990; Schiller, 2005), everyday decision making (Banerjee, 1992), or firm location decisions (Chang et al., 1997). While mimetic isomorphism borrowed from organizational sociology, herd behavior seeks inspiration from economics (Lieberman & Asaba, 2006). Table 3.4 shows the literature within this stream (Lieberman & Asaba, 2006).

Table 3.5: Literature on herd behavior

Author	Industry	Analytic tool	Findings
Chang and Jayaratne (1997)	1990 -1995 bank branch openings in New York city	Profit analysis of branch locations	• Branch openings display herd behavior and follow existing branches
Rao et al. (2001)	1987-1994 NASDAQ firm and security analyst coverage choices	Regressions of firm adoption rates of analyst coverage	• Actors imitate competent peers to reduce search costs • Cyclical adoption, disappointment, abandonment cycle
Kennedy (2002)	1961-1989 prime-time network television programs	Simultaneous equations model	• Herd behavior evident in industry, although imitated programs underperform

Source: Adopted from Lieberman (2006).

Bank branch openings and herd behavior was researched by Chang et al. (1997) and results show that firm location choices display herd behavior. Banks locate their branch offices in the same geographical area as their competitors, although they do avoid increasing competition beyond a threshold (Chang et al., 1997). Results also show that rational herding exists, however profit reduction is a side effect of this policy. Rao et al. (2001) turn their attention to herd behavior among security analysts and their coverage of firms listed on the NASDAQ. The authors introduce the concept of social proofs and that actors imitate the actions of others that are regarded as competent in an attempt to increase legitimacy and reduce search costs. Regressions of adoption and abandonment rates among analysts show that adoption, disappointment, and abandonment of firm coverage is evident, and that institutionalism rooted in imitation is fragile. Adoption based on imitation of peer coverage causes over-estimation and leads to disappointment followed by coverage abandonment by analysts. However, imitation of abandonment does not appear; actors are able to self-evaluate once information is available and initiate their own abandonment rather than follow cues of peers.

Kennedy (2002) researches broadcast television programming between 1961 and 1989 for signs of imitative and herd behavior. Future programming among the three large, US cable networks is relatively transparent, which can lead to imitative behavior. The author establishes that networks can choose either a differentiated or imitative programming strategy, and through simultaneous equation modeling shows that imitative programming behavior is evident. Results show that programming is influenced by rivals, however such behavior leads to underperforming compared to differentiated programming. This behavior may be explained by herd behavior and participation in information cascades, or agency issues which influence managers' wishes to stray from industry norms.

This final section has researched the literature on the concepts of imitation, which followed the discussions regarding strategic groups and business models. The intention of this chapter is to bring the reader to the current literary threshold on the theories that support method of addressing the research question: what will be the successful future airline business models. This chapter introduced the theories in the broad context of the research; however these are narrowed in the following chapter which will apply them in the field of the passenger airline industry.

4. Theoretical application to the airline industry

- A 25 minute taxi in a 747 burns approximately the same amount of fuel a Learjet 31 is capable of carrying, 1300 kilograms -

The airline industry suffers from cyclical highs and lows, just as its aircraft on a typical journey; however, this is not for a lack of professional or academic interest. Amazon lists more than 8,000 books on the airline industry and Google Scholar lists more than 74,000 papers, books, theses, and abstracts. Universities throughout the world educate future employees through specialized industry courses and degrees. This research project aims to complement the decades of previous research, and this chapter focuses on the underlying structure of the airline industry. The chapter is segmented into the three core themes: business models, innovation, and imitation. A review of past literary contributions is provided to complement the review provided in Chapter 3. It is, in essence, an application of the utilized theories and concepts.

4.1 Strategic management

Books on the theme of airline strategic management run the gamut from general management topics (Banfe, 1992; Dempsey & Gesell, 1997; Doganis, 2006; Flouris & Oswald, 2006; Holloway, 2003), marketing (Shaw, 2007), computer simulation (J. R. Smith & Golden, 1991), to alliances (Kleymann & Seristö, 2004). One recurring critique of strategic management studies center on the lack of detailed, industry-specific research performed by industry experts (McGee & Thomas, 1986). Practitioners and academics must seek common ground in order to learn from each other. For example, McGee and Thomas (1986) state that knowledge and understanding of industry-specific strategic groups would improve if researchers steeped in industry whould carry out more studies. The airline industry is highly visible and economically important yet suffers from enormous challenges, and incorporates multiple facets of strategic management, supply chain logistics, finance, etc. It is these roots that have spawned great interest in the industry and many studies are performed by individuals distant from the industry. This research attempts to bridge this gap through a dual-faceted, academic-practical cooperation; however it remains a complement and continuation of past contributions. The review of business model literature specific to the airline industry is appropriate to introduce the reader to underlying contributions to this research. Some publications have already been mentioned earlier in the literature review, however their specific applicability to the airline industry lead to a more detailed analysis.

4.2 Airline business models

This section will provide the reader with a general overview of the main business models found in the scheduled passenger airline industry. These three models include full-service carriers, low-cost carriers, and regional carriers. There are additional strategic groups in the broader passenger air transport industry, which include charter airlines, business jets, and air taxi. These groups are omitted from the analyses for various reasons. Charter airlines often operate on-demand flights to tourist destinations throughout the year. They are omitted from the analyses due to lack of participation in the researcher-distributed questionnaire, poor transparency among firms in the strategic group, and the varying degrees of integration in the industry's value chain. Many charter carriers are poorly represented in industry databases which challenge investigation. In addition, charter carriers may be mere capacity providers for tour operators, while others are integrated in a conglomerate responsible for the packaging and distribution of tours. This variation in integration in the value chain challenges categorization and studies in industry analyses. The business jet strategic group focuses primarily on offering on-demand flights at a high ticket price. One of the largest operators is NetJets (www.netjets.com) focusing on time-share ownership. This group was omitted from the analyses as they operate ad-hoc and often regarded as a niche segment that overlaps little with airlines. Air taxi operators operate on a similar foundation as the business jet group, however often with shorter-range aircraft. These operators may provide similar on-demand charter services, in addition to medevac[15] flights, acting as a forward air controller[16], or other duties. The intention is to introduce the reader to the past and current makeup of the industry, and to prepare for the following summary of the literature in the field. This is accomplished by introducing the three business models found in the scheduled passenger airline industry. In addition, each group's historical financial performance in the US is presented to highlight to the reader the fluctuations present in the industry. While distinction among regions, for example, European, Asian, and South American would have been more appropriate, transparency in markets outside the US is challenging.

Full-service carriers

Historically, airlines have been a transporter of their nation's cultural, political, and economic beliefs; they were flag carriers. Regulatory constraints grounded in the Convention on International Civil Aviation[17] limited capacity, pricing, schedules, and service levels, which stifled business model innovation. For example, regulators often demanded that a competing flag carrier provide a similar level of service, promoting regulatory-instigated imitation at the expense of innovation[18]. Limited, or non-existent, competition demanded that flag carriers offer their services to a wide range of market segments. The business community was treated to premium service, justifying the high cost of travel, while the leisure traveler was able to purchase a lower-priced ticket with lower service standards. Reduced competition and economic regulations ensured that air travel was an expensive mode of travel, and that carriers were nearly mirror images of each other. Full-service carriers' business models are often generalized by the following characteristics:

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[15] Medical evacuation flights; quick transportation of patients or organs is often done by air taxi firms.

[16] Forward air controllers are lead aircraft used in fire fighting duties responsible for coordinating fire suppression activities by other aircraft; such activities are seasonal and contracted to air taxi firms.

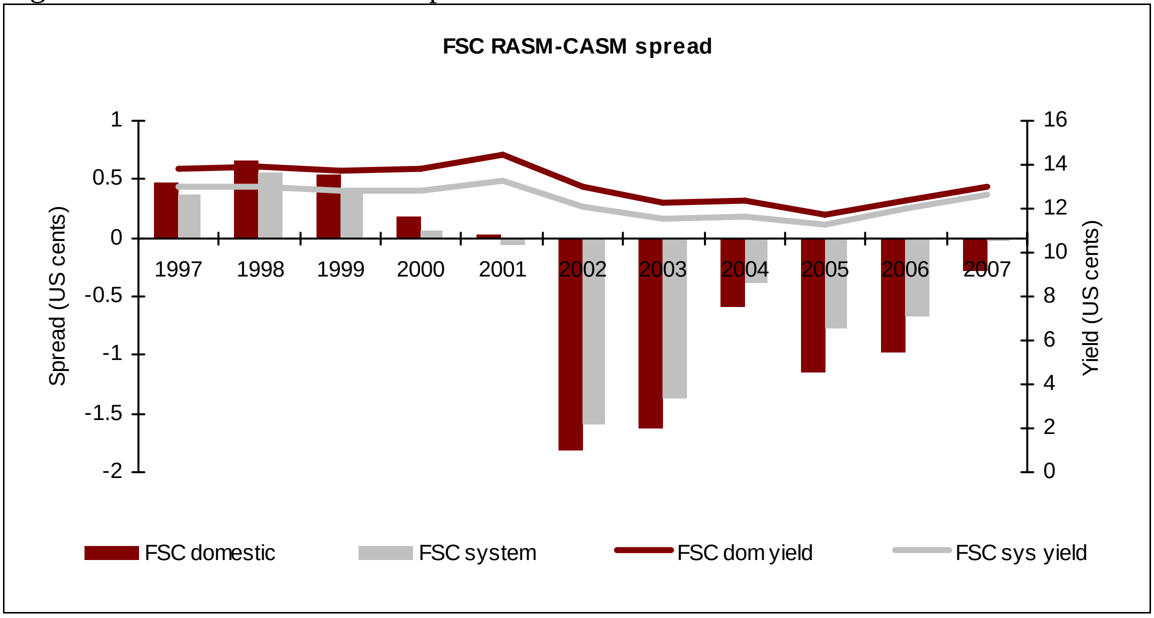
[17] This convention established the International Civil Aviation Organization (ICAO), an agency of the United Nations, in 1947.

[18] A case in point was a pre-deregulation issue regarding service uniformity. SAS was accused by its competitors of serving a sandwich which was *more* than a sandwich. The airline responded that it was a traditional Scandinavian sandwich and the airline should not be penalized for conforming to cultural customs, which led to Czech Airline stating it would service free beer in economy class, as it was also a custom (Gidwitz, 1980). Innovation was stifled due to stipulations regarding uniformity in various airline business model elements.

- Multi-market segment focus
- On-line and inter-line connections with cooperating carriers
- Membership in a global alliance
- Adherence to traditional distribution strategies
- Restrictive fares and complex booking policies
- Amenities and reward programs
- Both short- and long-haul operations with a diversified fleet

This business model has struggled in recent years due to increasing encroachment from low-cost carriers and a challenging yield[19] environment, as well as, an increasing cost structure. Aircraft manufacturer Airbus states that 2007 capacity figures show that low-cost carriers have captured 29% of the North American market, 26% of the European, and 9% of the Asian (Rouaud, 2007). Figure 4.1 shows an average annual spread between the revenue per available seat mile (RASM) and cost per available seat mile (CASM) for the FSC business model. A positive spread indicates that revenues exceeded costs, while a negative spread shows the opposite. The average yield for the group is also displayed. To provide a possible comparison with the following data for the other two strategic groups in the industry the FSC data includes a system-wide[20] and domestic perspective. The data was compiled from the Airline Planning Group (Seabury Airline Planning Group, 2008) and its grouping for FSCs[21].

Figure 4.1: FSC RASM-CASM spread



Source: Author's own creation, data from Seabury Airline Planning Group (2008)

This figure shows that prior to 2001 the FSC business model, on average, was generating positive financial results from operations; the RASM-CASM spread was approximately 0.5 US cents, both domestically and system-wide, with a steady yield, although the impact of the economic slowdown in 2000 is evident. However, the years following

[19] Yield is a measurement of the average revenue collected per passenger kilometer flown. It is used as a measurement of the average fare paid
[20] Domestic and international
[21] These carriers include: American Airlines, Alaska Airlines, Continental, Delta, Northwest, TWA, United, and US Airways.

2001 the business model was operating at a loss in a declining yield environment. This trend was reversed in 2005, and while domestically the FSC business model continues to operate at a loss in 2007, system-wide the model is breaking even. This is the result of more healthy overseas operations. The yield has fallen approximately one US cent from its peak of 14.44 US cents in 2001. The trends in the US are repeated in the European airline industry and its FSC carriers. Intra-European yield in 2006 has halted its fall since 2002, while international yield has reached its 2002 level (European Commission, 2007a)

Low-cost carriers

Low-cost carriers owe their existence to deregulation of the airline industry. Deregulation removes market constraints and allows competitive forces to shape industry. Deregulation commonly refers to economic deregulation and although it would be more accurate to call it *less* regulation, the researcher will continue to utilize the accepted term of *deregulation.* Deregulation first occurred on a national scale in the United States with President Carter's signature of the Airline Deregulation Act, although deregulation was permitted prior to this on intrastate routes within the US (Davies & Quastler, 1995). This ruling relaxed the requirements for establishing new airlines, eliminated the Civil Aeronautics Board's oversight of fare setting, and allowed intrastate carriers to set joint fares with interstate carriers. Deregulation in the US led to a growth in start-up LCCs which was repeated in the EU, displayed in Knorr's (2004) research, shown in table 4.1.

Table 4.1: Number of US and EU LCC start-ups

	US			EU		
	Entry	**Exit**	**Net**	**Entry**	**Exit**	**Net**
1979	1		1			
1980	3		3			
1981	3		3			
1982	3		3			
1983		1	-1			
1984	3	3	0			
1985						
1986		3	-3			
1987	1	3	-2			
1988		1	-1			
1989						
1990	1		1			
1991				1		1
1992	1	2	-1	1		1
1993	3	1	2	2		2
1994	2		2			
1995				1		1
1996		1	-1	2		2
1997	2		2	1		1
1998		3	-3			
1999	2	1	1		2	-2
2000	2	2	0	3		3
2001		1	-1			
2002		1	-1	12	1	11
2003	3	1	2	12	7	5

Source: Adopted from Knorr (2004)

The experiences from deregulation in the US industry were a catalyst for similar moves in other markets. Europe, the second largest market behind the US, implemented deregulation in a three-step program (European Commission, 2007b). The first package was adopted at the end of 1987 and relaxed fare setting regulations, this was followed by the second package in 1990 which relaxed fare setting regulations further and capacity constraints between EU members, and the third package was implemented between 1993 and 1997; the final regulatory hurdle, cabotage, was permitted at the end of the third package. This impact on the European air transport market has resulted in nearly a 170% increase in routes between 1992 and 2006, and more than a 300% increase in duopoly routes, approximately 20% more airlines since 1990, and the emergence of low-cost carriers (European Commission, 2008). Deregulation has since flourished in a number of regions throughout the world: Australia, Asia, and South America are areas where the airline industry is changing. A near-guaranteed feature following deregulation is the establishment of new carriers, especially low-cost carriers.

New entrant airlines following deregulation often compete in the marketplace with a range of business models, however those carriers with a focus on efficiency and low-cost are often the most steadfast. Examples of new entrant low-cost carriers include easyJet in the UK or Ireland-based Ryanair[22], Australian-based Virgin Blue, Brazilian-based Gol, or US-based JetBlue. The characteristics of these carriers include (Alamdari & Fagan, 2005):

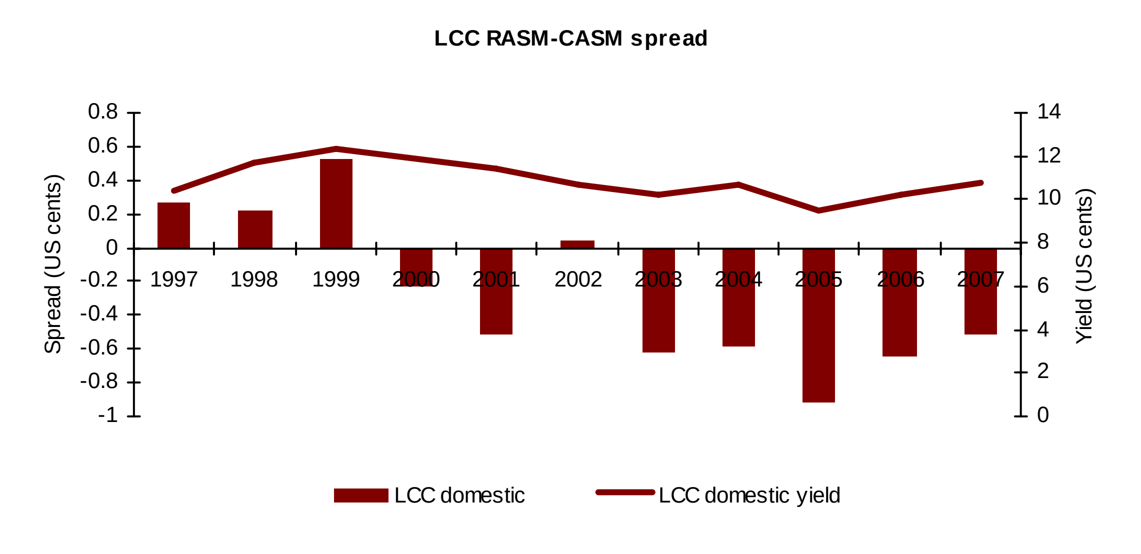
- Single market segment focus
- No on-line or inter-line connections
- Non-alliance membership
- Bypass of traditional distribution strategies
- Non-restrictive fares and simple booking policies
- No amenities or reward programs
- Short-haul operations with a single fleet

Figure 4.2 provides a snapshot of the RASM-CASM spread among LCCs, along with the yield among those carriers. These figures are gathered solely from US-based LCCs[23] and are provided to the reader to show the general trend in the particular market. The figure is again compiled from APG data (Seabury Airline Planning Group, 2008). The results show that the spread was similar to their FSC counterparts, nearly half of one US cent, although in 2000 declining yields and falling revenues, most likely attributed to the economic slowdown in the US, pushed the spread into negative results. This downward trend has continued throughout the remainder of the period, although since 2006 both the yield has been increasing and the RASM-CASM spread narrowing from its negative results. This graph is presented to dispel the common notion that the LCC is nearly always successful to the detriment of other models; this is not the case.

[22] Ryanair was not born of deregulation but was initially a carrier offering dual class service from Ireland, however its poor financial situation forced the carrier to seek a new business model, which was copied from Southwest in the US.

[23] These carriers include: Frontier Airlines, AirTran Airways, America West, Spirit Airlines, ATA, Southwest Airlines, Midwest Airlines.

Figure 4.2: LCC RASM-CASM spread



Source: Author's own creation, data from Seabury Airline Planning Group (2008)

Regional carriers

Regional carriers tend to play a supportive role in the scheduled passenger airline industry[24]. The European Airlines Association (ERA) defines the business model as, *"…essentially one that has its route structure concentrated on routes from regional points, either to a major airline hub or to other regional points"* (French, 1995 pg. 1). Regional airlines are often independently owned and either support full-service carriers' networks or operate in markets that are free of strong competitive forces (Berry, 2001); however, the largest regionals, measured in passenger figures, are exclusively integrated with mainline carriers (Airline Business, 2007b). In the US market nearly 70% of passengers on regional carriers are feeding into the network of a full-service carrier (French, 1995). Their lower cost base allows the carriers to operate on thinner routes which may be uneconomical for other business models, or complement FSC routes with increased frequencies during off-peak times. Although these carriers are supporting the FSC business model and provide transport primarily for business travelers, the carriers are experiencing a growth of leisure travelers. In Europe ERA's members reported 48% of passengers were leisure in 2006, 5% more than the decade prior (ERA, 2007). The characteristics of the regional carrier business model are as follows:

- Multi-market segment focus
- On-line and inter-line connections with cooperating carriers
- Non-membership in a global alliance
- Adherence to traditional distribution strategies, alternately full reliance on partner carrier
- Restrictive fares and complex booking policies, often reflecting the policies of their partner carrier(s)

[24] The US regional strategic group is the most developed and largest in the regional airline industry. The relationship between FSCs and regionals, strongest in the US, can be traced back to a handful of defining events: the 1949 deregulation of interstate routes flown on aircraft weighing less than 12,500 pounds at takeoff, suspension-substitution agreements initiated in 1964, the Allegheny Commuter system of 1967, 1978 industry deregulation and importance of FSC affiliation for regional carriers, and 1984 codesharing and CRS display regulation (Davies & Quastler, 1995)

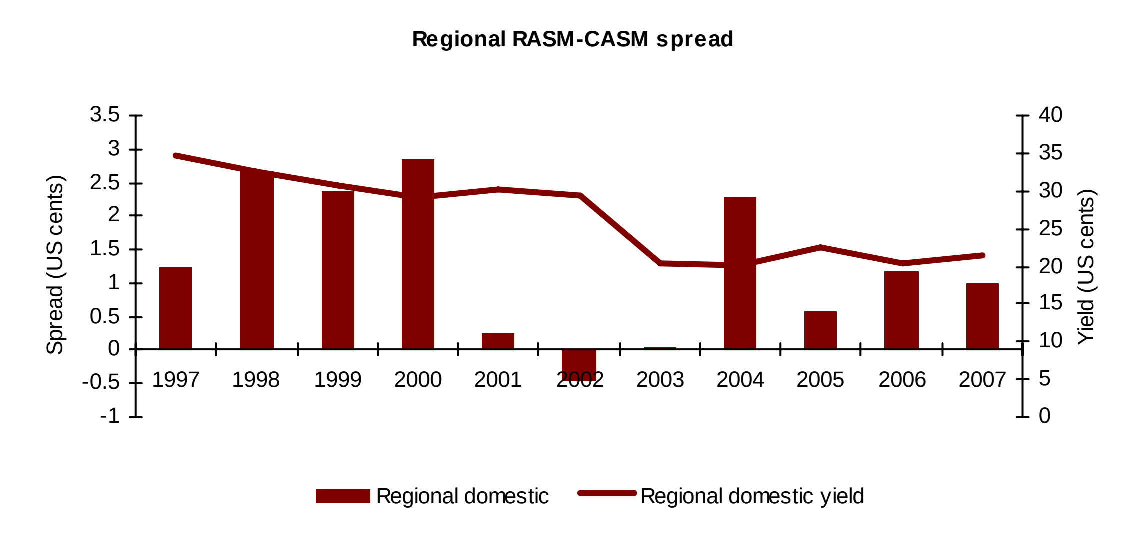
- No amenities and reward programs, alternately full reliance on partner carrier
- Short- haul operations with a single fleet

The cooperative level between regional and full-service carriers may be highly integrated resulting in the regional carrier utilizing many of the FSCs' business model elements. Although many regional carriers may adhere to the traditional distribution strategies in the industry, others may have no or limited distribution. Rather, they are reliant upon their partner carrier to distribute the regional carrier's capacity; likewise, for amenities within regional carriers' business models. A highly integrated regional carrier and mainline carrier may result in a regional carrier that merely operates as a capacity production platform. This is the case of many large regional carriers in the US, such as SkyWest or Chautauqua. It is not possible for passengers to purchase a ticket with these carriers as their mainline partners are solely responsible for sales, just as passengers may be entirely unaware that they are flying with these regional carriers. They often operate with identical brand insignias as their mainline partners.

Figure 4.3 shows the RASM-CASM spread between the years 1997 – 2007 and the average annual yield during the period. This data is compiled from the APG regional data[25] (Seabury Airline Planning Group, 2008). The results show that the regional carrier strategic group has benefited from a generally high, positive RASM-CASM spread, which peaked at nearly six times greater than the FSC and LCC groups. This may be representative of the agreements between regionals and FSCs in the US which often ensure a specific revenue or operational margin per flight. The effects on the industry from 2001 are depicted by the sudden drop in spread, which did not recover until 2004. Many regionals were forced to renegotiate their cooperation with FSCs following the downturn in the industry in 2001. An extreme example of such renegotiations was the transformation of Atlantic Coast Airways (ACA), a capacity provider primarily for United Airlines, into the stand-alone carrier, Independence Air; this was a result of the push by United to negotiate lower rates for ACA's capacity, eventually driving the carrier to seek independence (Arnoult, 2004). The yield has fallen steadily from the beginning of the period, especially in 2002, however it has settled nearly five US cents greater than the other two groups. This data shows that regional carriers, in general, have been financially more successful than their brethren in the industry, however this success may be sensitive to the satisfaction of FSC partners. If a regional carrier is not able to deliver a CASM that meets the requirements of an FSC the regional partner may be left out of future agreements.

[25] These carriers include: American Eagle, Comair (Delta Connection), SkyWest, Horizon, ExpressJet, Mesaba Aviation, Mesa Airlines, Air Wisonsin

Figure 4.3: Regional RASM-CASM spread



Source: Author's own creation, data from Seabury Airline Planning Group (2008)

This section has summarized the three main business models found in the airline industry and provided a synopsis of the financial situation of each model. The findings have shown that both the FSC and LCC business model have been struggling, at the group level, to generate revenues that exceed their costs, while the regional carrier strategic group has benefited from their lower cost base and relationship with FSCs. This data is gathered from a selection of US carriers, however the results are representative of the European FSC airline industry as well (European Commission, 2007a), and one may cautiously extend the trends from the other groups to other regions. A more detailed description of the specific business model elements is presented in Chapter 5. The following section will present the literature stream regarding business models found in the airline industry.

Literature

Strategic thinking from a business model perspective within the airline industry is a relatively new phenomenon. Research during the decades preceding the millennium followed a meso-level of perception, while research this decade has dug deeper into a micro level of perception incorporating the business model as the unit of analysis. The literature tends to focus on either the LCC business model specifically due to its growth and impact on the industry, or on the airline industry's dominating business models. Table 4.2 is a summary of the literature stream pertaining to business models within the aviation field. Each author is mentioned with the focus area of the publication, for example LCC, airline industry, or general. It is seen that the majority of research is focused on the industry as a whole, yet there is a strong interest in LCC business models specifically. In addition, those elements that each author includes in the business model description are included. Analysis shows that broad reaching elements, such as market segment and value proposition are seldom integrated into airline business model research. These elements are often discussed related to the expansion of new markets by LCCs (Lawton, 2002; Taneja, 2004). The majority of business model research studies the activities comprising the model, and to some extent network metrics, of carriers or strategic groups. These facets are transparent and quantifiable which aid in research. These factors include, for example, distribution, airport selection, fleet composition, stage length, and horizontal alliances. All authors in table 4.2 include at least six business model activities to explain an airline's business model. Some authors integrate change management and organizational flexibility into their business model analysis (Garvett & Hilton, 2002; Taneja, 2004), while factors such as workforce representation, historical context, or revenue generation are studied less frequently.

Table 4.2: Airline business model literature stream

	Porter (1996)	**Bieger et al.** (2002)	**Garvett and Hilton** (2002)	**Lawton** (2002)	**ELFAA** (2006)	**Taneja** (2004)	**Alamdari and Fagan** (2005)	**Bieger and Agosti** (2005)	**Doganis** (2006)	**Morrison** (2006)
	General	Airline	Airline	LCC	LCC	Airline	LCC	Airline	Airline	LCC
Market segment				✓		✓			✓	✓
Value proposition				✓		✓			✓	✓
Customer segmentation						✓				
Distribution	✓			✓	✓	✓	✓		✓	✓
Connections	✓	✓		✓	✓	✓	✓	✓	✓	
Thru-fares		✓				✓	✓	✓		
Trip restrictions				✓			✓	✓	✓	
In-flight service	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
In-flight classes							✓		✓	✓
Reward amenities						✓	✓	✓		
Seat assignments	✓						✓		✓	
Airport service	✓	✓		✓	✓	✓	✓	✓	✓	✓
Baggage service	✓									✓
Fleet	✓		✓	✓	✓	✓	✓		✓	✓
Aircraft utilization	✓		✓	✓	✓	✓	✓	✓	✓	✓
Load factors			✓							
Stage length			✓	✓	✓	✓	✓		✓	
Flight frequency	✓	✓	✓							✓
Punctuality										✓
Charter								✓		
Horizontal alliances		✓				✓	✓	✓	✓	
Organizational structure		✓				✓		✓	✓	✓
Supply partners		✓		✓		✓				✓
Change management						✓				

Organizational flexibility			✓			✓				
Technology				✓		✓			✓	
Incentive remuneration	✓			✓	✓					
Workforce representation	✓									
Revenue concept		✓		✓						
Network vs. P2P	✓	✓		✓	✓					✓
Brand				✓		✓				
Communication	✓	✓				✓		✓		
Historical context						✓				
Growth generation		✓							✓	
Revenue generations									✓	✓
Value network						✓				
Competitive strategy										✓

Source: Author's own creation

Although Michael Porter is not an adamant supporter of the business model concept and his research does not focus primarily on the airline industry a 1996 publication by him applies a very similar model to the industry (M. E. Porter, 1996). The researcher chose to include Porter's work for his contribution to the strategy field and his Southwest example. He applies an important element of the business model, the activity set, to Southwest Airlines to describe the company's success. Porter argues that the airline has chosen to apply activities that support its low-cost operation, which can be divided into six core activity sets: passenger service, reliability, productivity, high utilization, pricing, and a short-haul network. These core elements are further supported by the airline's second and third-level activity set, whose elements are identified in table 4.2. It is these complementary, multi-step activities that challenge imitation by competitors; the entire activity system must be imitated to improve the chances of success.

Bieger et. al (2002) divide the historical progression of the airline industry into four distinct periods, and discuss how the dominant business models in the airline industry are undergoing a transformation and how this will impact tourism. Stages one through three begin in 1925 and end just before the turn of the century, these periods were dominated by technological, political, and quality and cost focus. The fourth stage, the network and alliance period, is an era of consolidation, alliances, and network building, or, in other words, a period of business model differentiation. Bieger et. al (2002) identifies four generic airline business models: network carrier, regional carrier, low-cost carrier, and charter carrier. Their analysis of the business models touch on elements similar to those of Porter, however alliance formation, organization structure, and partnerships are all discussed, as well as, the importance of revenue and growth generation. This analysis has greater focus on the importance of networks in airline business models, both route structures and partnerships.

Elements that positively correlate with profitability are very important, and Garvett and Hilton (2002) attempt to analyze which factors drive airline profitability. They include four broad categories, cost, operational, situational, and commercial, that are tested for correlation. If a category results in a correlated relationship the authors attempt to determine if it is a driver, marker, result, or coincidence. Their results indicate that unit costs are not related to profitability for either US or worldwide airlines. The explanation for such a counter-intuitive conclusion is that there are successful and unsuccessful high-cost and low-cost airlines. There was a weak correlation between customer satisfaction and profit margin; however the authors researched a number of operational factors, such as aircraft size, fleet diversity, and aircraft age, which proved insignificant. In addition, the authors fail to establish a link between firm size and profitability, which demonstrates a lack of economy of size in the industry. Commercial factors were also analyzed and Garvett and Hilton (2002) find no relationship between yields and load factors with profitability. However, the authors did find a strong correlation between unit revenues and US airlines, however not among world wide airlines. This would suggest regulatory and competitive distortion among some airlines in the world. This publication suggests that airlines cannot simply focus on a select few elements to achieve profitability, but rather a holistic view of the entire firm is necessary, which is the role of the business model.

Lawton's 2002 publication focuses on LCCs and their inroads in the US and European aviation markets. He is one of the first authors to introduce the importance of market segmentation and the value proposition to the airline business model discussion. LCCs were able to tap into the vast underserved leisure market, emphasizing the importance of customer segmentation and moving the value proposition from schedule and flexibility to price awareness. In addition, he builds upon the traditional LCC business model definition by stressing the importance of supply partner relationships and their role in ancillary revenue. While Bieger (2002) discusses partnerships as an important step in gaining customer recognition, Lawton (2002) introduces the role that partners play in increasing non-ticket revenue. The role of technology and brand are introduced as important business model elements for LCCs. Technology allows LCCs to significantly lower their operating costs and extend their market reach, while strengthening the LCC brand increases in importance because of the commoditization of the travel service.

The European Low Fares Airline Association (ELFAA), founded in 2003 to represent LCCs' interests, attempts to clarify the business model of low fare airlines (European Low Fares Airlines Association, 2004). The ELFAA definition focuses on distribution, operations, route network, and workforce representation. ELFAA tributes LCC success to secondary airport utilization, quick turnaround times, point-to-point network with a standardized fleet, direct channel distribution, secondary income sources, and a workforce with a high level of variable remuneration. ELFAA stresses that these factors comprise the LCC business model and combine to bring numerous benefits to customers.

Taneja (2004) presents one of the first full-length publications specifically addressing the airline business model from a general airline perspective. He defines the business model and its components, which include the value proposition, consumer behavior, integrated working relationships, location, past burdens, change management, and flexibility. Taneja's publication emphasizes that airlines must have intimate knowledge of consumer behavior and their market segment, in addition to a complementing value proposition. He also introduces the importance of business model innovation and change management. In today's challenging business environment Taneja stresses that airline management must constantly be open to adapting their business practices, as well as integrating flexibility into the model to accommodate the industry's cyclical nature.

Alamdari and Fagan (2005) published an interesting account analyzing how the LCC strategic group has progressed from the initial business model founded by Southwest Airlines in 1969. The authors recognize that some members of the strategic group have deviated from a focus on low cost to one of differentiation. The authors elect to analyze three product features (network, service, and distribution) and four operational features (fleet, utilization, stage length, and airports). These seven features represent 16 business model components that are measured against the original business model on a Likert scale. Alamdari and Fagan compare the deviation results with the profit margins of the LCC study group, and conclude that those airlines that deviate the least from the original business model have the highest profit margin. The authors discovered that US LCCs deviated more from the original model than their European counterparts, suggesting that greater competition leads to a differentiation strategy.

Bieger and Agosti (2005) analyze the evolution of the airline industry and the perspective of change. They state that, traditionally, the industry has supported four business models: network carrier, charter carrier, regional carrier, and low cost carrier. The authors propose some success factors for each traditional business model, which include operation of a large hub and integrated work processes for network carriers. Low cost carriers, charter carriers, and regional carriers seek lean and efficient processes, simple networks, while the charter carrier relies upon integration into a tour operator system and the regionals desire access to regional airports. Bieger and Agosti (2005) state that there is a tendency to borrow from the low cost business model due to their greater success in the industry. Charter carriers are witnessing the greatest change, either being absorbed back into their network carriers or transitioning to nearly pure LCCs. Regional carries are currently being absorbed back into their network carriers due to their limited growth opportunities.

Doganis (2006) discusses the airline industry from a general perspective and provides insight into the direction of the industry. He presents a business model discussion that centers on business model activities, although he does stress the importance of market segmentation and the value proposition, especially due to pressure on decreasing yields and market instability. Growth and revenue generation are also introduced as important aspects of the business model, the first of which can be achieved through an alliance strategy. It is stated that revenue generation has become increasingly important as yields continue their downward trend. Technology is a leading contributor to revenue generation by decreasing costs and improving efficiency, and providing an opportunity to generate revenue beyond the core travel activity.

Morrison and Mason (2006) complement the work of Alamdari and Fagan (2005) by addressing the issue of business model variation among the LCC strategic group. The authors propose various metrics for measuring low cost business models, and correlations between operating margins and the proposed benchmark statistics that identify key cost and benefit drivers, work similar to Garvett and Hilton (2002). Aircraft utilization and employee productivity are key components of low cost profitability, while passengers per employee, average fares and yield are that variables most correlated with profitability.

These publications address business models in the airline industry specifically. There is a heavy focus on the activities found in airlines, as they are visible to industry observers and often used to study carriers. Recent research continues to affirm that the passenger airline industry is comprised of four strategic groups: full-service carriers, low-cost carriers, regional carriers, and charter carriers. This research project is focused solely on the scheduled passenger industry, which excludes the charter strategic group. In addition, authors have suggested (Bieger & Agosti, 2005) that the industry is witnessing a fusion of business models, which is concurrent with this research stream.

4.3 Strategic groups

Application of strategic group theory within the airline industry has centered primarily on Porter's (1980) generic strategy typologies. However, some studies have incorporated the industrial classification based on revenue according to government methodologies (Stankus, 2007), yet industry understanding is improved if airlines are classified according to competitive strategies. This section reviews the publications that pertain specifically to application of the strategic group concept in the airline industry, of which there are two (Cappel et al., 2003; Kling & Smith, 1995).

Kling and Smith (1995) apply the Porter model to the deregulated US airline market. The authors capitalize on the relative industry stability during the early 1990s, which allowed the researchers to apply the theory, although they do recognize that industrial stability is short-lived, especially in the airline industry. The authors focus on nine major US airlines between 1991 and 1993, utilizing the US government's definition of a major airline[26] (U.S. Department of Transportation). They measure each airline's CASM and airline quality rating (AQR). The AQR is an annual measurement of 19 consumer quality factors produced by Wichita State University in the US. A scatter-plot is created comparing both the CASM and AQR variables. The scatter plot creates four quadrants which the researchers utilize to define airlines incorporating differentiating, low-cost, and focus generic competitive strategies as defined by Porter (1980). The authors integrate stage length measurements to capture lower CASMs resulting from longer flights (Holloway, 2003). Validation of the results is

[26] The US Department of Transportation (US DoT) classifies US airlines according to annual revenues. The classification, major airline, is deemed one that earns over 1 billion USD annually, a national airline earns between 100 million USD and 1 billion USD, and a regional airline earns less than 100 million USD. The classification is often criticized for its terminology which is not applicable in the current industry. For example, many carriers that focus on short-haul routes, such as SkyWest, are often referred to as regional carriers because of their geographic focus, yet their annual revenue often exceeds 1 billion USD.

accomplished by observing operating profitability, and overall shows that the airlines straddling one or more of the generic strategies had an average operating profit margin of -3.57%, while those with a clear strategy achieved an average profit margin of 1.39%. The authors observe that the smallest and largest of the nine airlines are the most successful, while the smallest firms have the lowest costs, suggesting the absence of economies of scale in the industry (D. W. Caves, Christensen, & Tretheway, 1997). This publication is built upon the AQR ranking system, which is not a solid indication of consumer preference but rather Department of Transportation statistics regarding airline entity performance. The AQR measures four broad categories that consumers value: on-time performance, denied boarding, mishandled luggage, customer complaints. However, ticket price has been omitted from the AQR, which is especially important within a highly elastic industry (Brander & Zhang, 1990; Chang & Wei, 1993). The AQR incorporates objectively measured metrics, of which fare prices are not captured because of lack of transparency from reporting airlines. This omission is observed in low quality airlines offering low fare tickets, which are very successful; Ireland's Ryanair was chosen as the worst airline according to an online poll (Evening Times, 2007), yet it carries more than 50 million passengers and is extremely profitable. In addition, the AQR is based on Department of Transportation (DOT) data which is reported by the airline themselves, not verified, and categorized according to vague guidelines (M. Boyd, 2006)

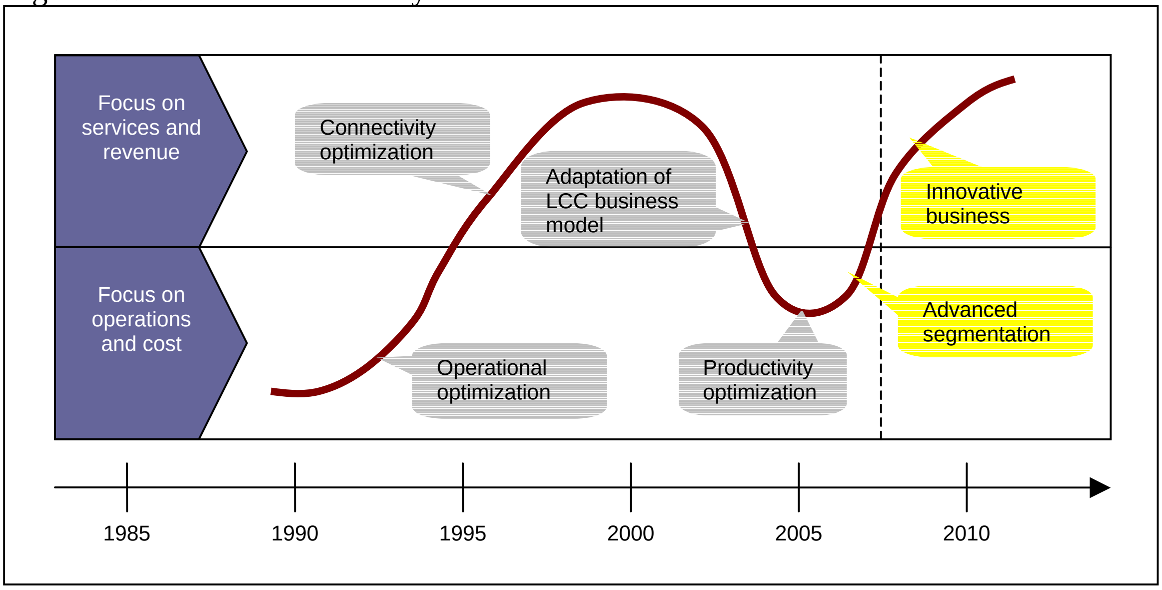
Cappel, Pearson, and Romero (2003) incorporate Porter's (1980) strategic group typology in the airline industry. This work builds upon a previous study by Cappel et. al (2003), which concluded that airlines incorporating a combination of differentiation and low-cost strategies were more successful than those utilizing a singular approach. However, the more recent publication returns to the topic following European deregulation and the terrorist events of 2001. The authors highlight that the airline industry fails to display economies of scale or strategic proprietary, similar to many public and open service industries. Economies of scale are potentially limited to advertising expenses. On the other hand, differentiation is adopted by firms in mature industries, which the authors believe the airline industry has achieved. However, research suggests that in mature industries services gravitate towards those desired by consumers and the effectiveness of differentiation minimizes. In addition, there is limited consensus what constitutes consumer value in the airline industry and generalization is challenging. The success of combining the low-cost and differentiation strategies has emerged as a result of the informed shopper. The Internet has empowered airline consumers to the extent that they can make the most informed decision regarding price and value. However, the industry environment post-2001 has shown that the most successful airlines are those that follow a low-cost strategy. However, the authors question whether this transition from their previous research is temporary or a permanent industrial shift.

These two articles represent research conducted specifically on strategic groups within the airline industry. This limited research is reflective of McGee and Thomas' (1986) statement that researchers with deep industry knowledge should conduct more research applicable to strategic groups. The intention of this research project is to complement the existing literature with current research. The following section will introduce the reader to innovation and imitation within the industry.

4.4 Innovation

Innovation within service industries is hampered partly by the occasional lack of reliance on technology and the inability to patent or protect intellectual property rights (Hipp & Grupp, 2005; Tether, 2005). For example, a retailer's breakthrough service innovation can easily be imitated by competitors, or an online site may be able to protect its underlying technological framework but not the function that is performed. Tether's (2005) findings support the notion that although service industries do innovate, their innovation differs from manufacturers, and tends to focus on organizational innovation or through collaboration (H. W. Chesbrough, 2006). Ben-Yosef (2005) stresses that for airlines innovation and change is matter or airline survival or airline extinction. Markus (2007) investigates innovation within the airline industry and states that innovation in the industry may allow airlines to achieve improved profitability. Markus' (2007) innovation is segmented into the following categories: new business models and advanced customer segmentation, and new technologies. New business models aim to expand the portfolio of offerings to customers, which will address advanced customer segmentation, all the while supported by process and efficiency gains through new technologies. The historical and potential focus of airlines is presented in innovation cycles in figure 4.4 (Franke, 2007).

Figure 4.4: Airline innovation cycles



Source: Markus (2007)

The figure shows that focus in the industry tends to parrot the economic cyclicality. During the downturn of the early 1990s airlines turned their attention on operational efficiency and cost control, while the upturn in the middle of the decade led to a focus on services and revenue and optimizing network connectivity. Following the downward cycle of the new millennium carriers continued their service and revenue focus, but through adopting LCC business elements, and eventually attempts to optimize productivity. Current innovative attention is focused on advanced segmentation and new business models.

Historically, the greatest example of business model innovation within the airline industry is the introduction of the low-cost business model. This efficient model first appeared in the US, yet has since flourished to all continents. Southwest Airlines is often credited with introducing the model, yet Pacific Southwest Airlines (PSA) appears to have implemented a similar business model as far back as 1949[27] (Jordan, 1979). The researcher will continue to credit Southwest as the founding LCC carrier, yet regardless of which airline takes the honor, it is a business model that has changed the airline industry dramatically. This radical innovation (R. Henderson & Clark, 1990), made possible only through deregulation, introduced air travel to entirely new markets and has severely challenged incumbent firms within the industry. In addition, the success of the model has influenced other industries to attempt to replicate it and its success (Moesgård Andersen & Poulfelt, 2006).

The industry is currently witnessing the affects of innovations within advanced customer segmentation and adapted business models. While the LCC model focuses on cost efficiencies for the masses, a new, niche model focuses on cost efficiencies for premium travel. These business models have yet to prove their endurance, but their presence indicates that innovation within the industry is still present. These carriers include US-based Eos and UK-based Silverjet[28]. The business model is built on operating internationally a fleet often configured in a single, premium-class cabin, with high-end service, to secondary airports, relying primarily on point-to-point traffic.

The two previous examples were related to entirely new and innovative business models within the airline industry. An example of innovation within a specific business model element is related to Internet distribution. Distribution of airline tickets via the Internet has been hailed as a technology-induced revolution in the industry (Calder, 2002). This simple shift from travel agency-dominated distribution to user-generated diffused channels resulted in lower distribution costs for airlines. The US General Accounting Office (GAO) reports that online ticket distribution increased from 7% in 1992 to 30% in 2002 (GAO, 2003). The GAO states that the increase in online distribution allowed major airlines in the US to reduce distribution costs nearly 26% over a decade. As such, many airlines are striving to drive increased traffic to online channels as nearly 50% of tickets purchased continue to be serviced by Global Distribution Systems (GDSs). Stelios Haji-Ioannou, the founder of easyJet, stated that it was the Internet that allowed easyJet and other LCCs to flourish as they were unencumbered by high distribution costs and predatory behavior of competitor-owned GDSs (Calder, 2002), which is one major advantage the industry's current LCCs had over their earlier predecessors (K. A. Hvass, 2005). Airlines have two options for distributing tickets online: through own websites or third-party websites. Own websites, such as www.ryanair.com or www.ual.com, allow airlines direct control over distribution and limited costs. Third-party websites, such as www.orbitz.com, are online portals that a GDS may operate as a separate brand. Such

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[27] PSA was an intrastate carrier based in San Diego, California. The regulatory framework of the US airline industry prohibited non Civil Aeronautics Board (CAB)-designated carriers from interstate operations, although intrastate carriage was deregulated. PSA was a sole intrastate carrier and opened its first interstate route the same year as the Airline Deregulation Act. In 1987 the carrier was acquired by USAir Group (Norwood, 1996; Trinkle, 2007).

[28] US-based MaxJet operated with a similar model yet entered bankruptcy December 24, 2007 (Arnoult, 2008).

third-party websites may continue to use GDS data and as such incur a fee, however it is commonly less due to bulk transactions. The Internet has also spawned new distributors such as *opaque travel distributors* (GAO, 2003) or *global new entrants* (GNEs). Opaque distributors sell distressed inventory; the seats that airlines may struggle to sell themselves. The site www.priceline.com[29] is an example of an opaque site that acquires distressed inventory from airlines and auctions it off to the public. GNEs are the new technology platforms that will allow airlines to bypass the traditional GDSs and capture cost savings similar to Internet distribution but with a wider audience. They argue that their transaction costs can be near US$ 3, which is what it costs an airline to sell a ticket on their own website, all costs considered (Field & Pilling, 2006).

Industry development is not rooted merely in innovation but also in imitation, as introduced in Chapter 3. While the previous section applied the concept of innovation within the airline industry, the following section highlights imitative examples.

4.5 Imitation

The airline industry displays imitative traits, though there is limited research conducted on the phenomenon. Smith et al. (1997) investigate competitive response among airlines segmented according to strategic groups. Results show that imitation of competitors within the same strategic group is just as likely as imitation of competitors from different strategic groups. This would indicate the lack of significant mobility barriers within the airline industry. This research complements the current research project; however its analytical perspective is elevated and does differentiate among, for example, business model imitation, price imitation, or route imitation, while this project selectively studies business models within the industry. Gimeno and Chen (1998) investigate airline strategic positioning, mimetic behavior, and rivalry within the industry and conclude that airlines will strive for differentiation due to competitive pressures but they will strive for similarities with better performing carriers. These findings indicate that imitation is present in the industry, rivalry has a catalytic affect, and this behavior impacts the positioning of carriers in industry.

If one observes the airline industry it is possible to discern imitative behavior. Reward amenities, such as frequent flyer programs (FFP), were introduced by American Airlines in May, 1981 (Frequent Flyer, 1997; Klophaus, 2005), to retain the airline’s most loyal customers by rewarding loyalty. Imitative behavior by competitors in the same strategic group led United Airlines to implement Mileage Plus days after American’s AAdvantage was introduced, and Delta Air Lines, Northwest Orient, Braniff, Continental, Western, and Trans World Airlines to follow suit the same year (Frequent Flyer, 1997; The Wall Street Journal, 1981). Such mimetic behavior resembles Smith et al.’s *tit-for-tat* imitation (K. G. Smith et al., 1997), which measured an imitative response to a competitor’s action. This marketing development transgressed to other hospitality industries, and within half a decade nearly all the major airlines, hotels, and car rental agencies had implemented

[29] Priceline allows consumers to enter a binding price bid for an airline ticket, which the site attempts to pair with its inventory. If the entered bid is matched with a ticket in the inventory the transaction is completed. The consumer may only enter the departure and arrival destinations, and date of departure; airline brand, cabin, time of departure and arrival, and connections are not available options to the consumer.

loyalty programs (Frequent Flyer, 1997). However, the airline industry's low-cost strategic group was initially reluctant to implement such programs, however they eventually imitated their group competitors. Southwest's CEO is often quoted as saying:

> *"We didn't want an FFP. But it came to my attention that FFPs were siphoning business travel away from us. We did it defensively, and I think if we had not done that we would have been terribly disadvantaged"* (Frequent Flyer, 1997).

This quote shows that LCC Southwest Airlines imitated its FSC competitors by mimicking the loyalty programs that so many had initiated as a defensive reaction to rivalrous behavior. Industry behavior seems to reflect Smith et al.'s (K. G. Smith et al., 1997) findings that tit-for-tat imitation is apparent both within and among strategic groups, and rivalry is often a catalyst for such behavior. Today, frequent flyer programs as a business model element are a very common sight among the world's airlines. However, some of Europe's leading LCCs have been reluctant to implement the programs, just as their role model, Southwest Airlines, was hesitant, however many industry observers predict that such programs will eventually be implemented among European LCCs as their marketing potential may outweigh their costs (ATW, 2005b; Bhagwanani, 2004; Klophaus, 2005; Rose, 2004; Thompson, 2006). Klophaus (2005) provides suggestions to how Europe's LCCs may structure their FFPs, while this research project's future configurational analysis (Chapter 8) will investigate whether LCCs should invest in such ventures.

Organizational imitation is not new to the airline industry; rather than imitating selective business model elements some have attempted to mimic the entire business model, in the hopes of achieving superior results (Lindstädt & Fauser, 2004). This is evidenced most clearly by the creation of separate LCC business units by FSCs. Morrell (2005) analyzes the creation of low cost subsidiaries by US FSCs, with the objective of spinning off profitable businesses, staving off and competing effectively against low cost competitors, and establishing a test-bed for low cost business model elements to eventually benefit mainline operations. Prior to the millennium the US industry saw a plethora of LCC offshoots from FSCs: Continental's Calite, United's Shuttle by United, Delta's Delta Express, and US Airways MetroJet. None lasted more a decade (Morrell, 2005). These LCC subsidiaries were hampered by lack of mainline differentiation, labor animosity, and most importantly, limited cost reductions. US FSCs have again attempted the strategy of *airlines within airlines* (Morrell, 2005) with United establishing Ted and Delta's Song. Ted's viability has often been questioned as the subsidiary has been diluting the mainline operations (Doganis, 2005), while Song was silenced in 2006. However, Song was able to implement and test various service features that the mainline carrier adopted (Adams, 2006; ATW, 2005a). Such imitation behavior is not limited to the US market. British Airways established Go (1998-2000), KLM established Buzz (2000-2003), SAS founded Snowflake (2002-2004), while still existing airlines within airlines include Qantas' Jetstar, Singapore's Tiger, and South African Airways' Mango.

Network developments among LCCs have led some carriers to adopt similar FSC business model elements, or more specifically, cooperative feed traffic[30] arrangements. FSCs have traditionally used regional inter-lining agreements to complement their network offering, as well as, obtain economies of density and scope (D. W. Caves et al., 1997; French, 1995), while the LCC business model has often focused on a solely operated point-to-point network (Alderighi, Cento, Nijkamp, & Rietveld, 2005; Calder, 2002; Tretheway, 2004). FSC feed traffic has often been provided by smaller regional carriers through various cooperative agreements, such as franchise agreements (Dennis, 2005; Denton & Dennis, 2000) or capacity purchase agreements[31] (CPAs) (Arnoult, 2007a; ATW, 2006a; ATW, 2007b). The forerunner to today's agreements was the Allegheny Commuter franchise of 1967. This innovative business model of Allegheny Airlines[32] was the first agreement between a full-service carrier and smaller regional carriers that placed the identifier code of the mainline carrier on all flights, integrated schedules, and published flights in computer reservation systems (Davies & Quastler, 1995). This was nearly an exclusive business model until 1985 when the success of Eastern and Metro Express', *"…was highly publicized, and the operation was inevitably copied"* (Davies & Quastler, 1995 pg. 138). Current examples of this business model include United Airlines' short-haul operation, United Express, operated via CPAs by Skywest, Mesa, Shuttle America, Trans States Airlines, Chautauqua, and Colgan Air, or British Airways' franchise operators Comair in South Africa, Sun Air in Denmark, and Loganair[33] in Scotland. Various LCCs have adopted similar feed traffic agreements, although these are mainly restricted to the North American market. Frontier had an agreement with Mesa to operate Frontier JetExpress, however Alaska Air Group's, Horizon, took over the responsibility two years later. Today, Republic operates the flights using 76-seat Embraer aircraft (Arnoult, 2006). Currently, 8% of Frontier's ASKs are provided by regional partners (see Appendix VI). This agreement allows Frontier to place the smaller aircraft in less dense markets without the operational challenges, which is delegated to Republic, or to complement more dense routes with increased frequencies during off-peak times. Frontier has recently started operations of a new, regional carrier, Lynx Aviation, using Bombardier Dash 8-400 turboprop aircraft to service markets within 650 miles with a cost base 30% lower than mainline operations (Karp, 2006; Ranson, 2006; C. Walsh, 2006; Yamanouchi, 2006). Additional LCC feed share agreements have been America West Express and Midwest Connect. These types of agreements show that the LCC strategic group is open to imitation beyond their own group's borders. This behavior will be address in more detail in Chapters 6 and 7.

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[30] This element is described in detail in Chapter 5, however a brief definition is provided. Feed traffic refers to the common FSC strategy of cooperating with smaller, regional carriers to operate in less dense markets to feed traffic into the FSC network.

[31] CPAs are agreements between a feed share carrier and mainline carrier and are nearly exclusive to the North American market. Agreements vary from carrier to carrier, however the main structure is that a regional carrier agrees to provide a certain amount of capacity with the associated costs absorbed by the mainline carrier. In exchange, the mainline carrier is responsible for marketing and sales, and benefits by depositing all the revenue earned. The agreements often include a predetermined fee paid by the mainline carrier to the regional carrier. CPAs are similar to wet-lease contracts but extend over many years and are more integrated, while wet-lease arrangements tend to be short-term (i.e. approximately 2-3 years (Regional A1, 2008)). In addition, the party retraining the revenue and exposure to costs varies between the two agreements.

[32] Renamed USAir in 1979

[33] This agreement will cease in October 2008 (Low-Fare and Regional Airlines, 2008a)

This chapter attempts to apply the research project's theoretical foundations to the airline industry, and reviews the literature that is specifically applicable to this realm. Examples of imitation and innovation within the industry are provided to allow the reader to grasp and apply the concepts. The following chapter will delve deeper into the research and introduce the specific business model elements that are researched in this project and their measurement.

5. Hypotheses and propositions

- At 31,285 cubic feet the passenger cabin of a 747 contains pressurized air that weighs approximately 1 ton -

Hypotheses, propositions, methods, and variables are the ingredients of a researcher's project. Hypotheses are assumptions that the researcher would like to test using appropriate methods, while variables are the elements that researchers use to test hypotheses. This chapter will explain in detail the hypotheses, methods, and variables that are used throughout the project. The hypotheses are presented first, which will introduce the reader to the overarching aim of the research. This is followed by a discussion of the methods used to address the chosen hypotheses, while the presentation of variables explains in detail to the reader how constructs were measured. Finally, an explanation of the study groups used to analyze the industry concludes the chapter.

5.1 Hypotheses and propositions

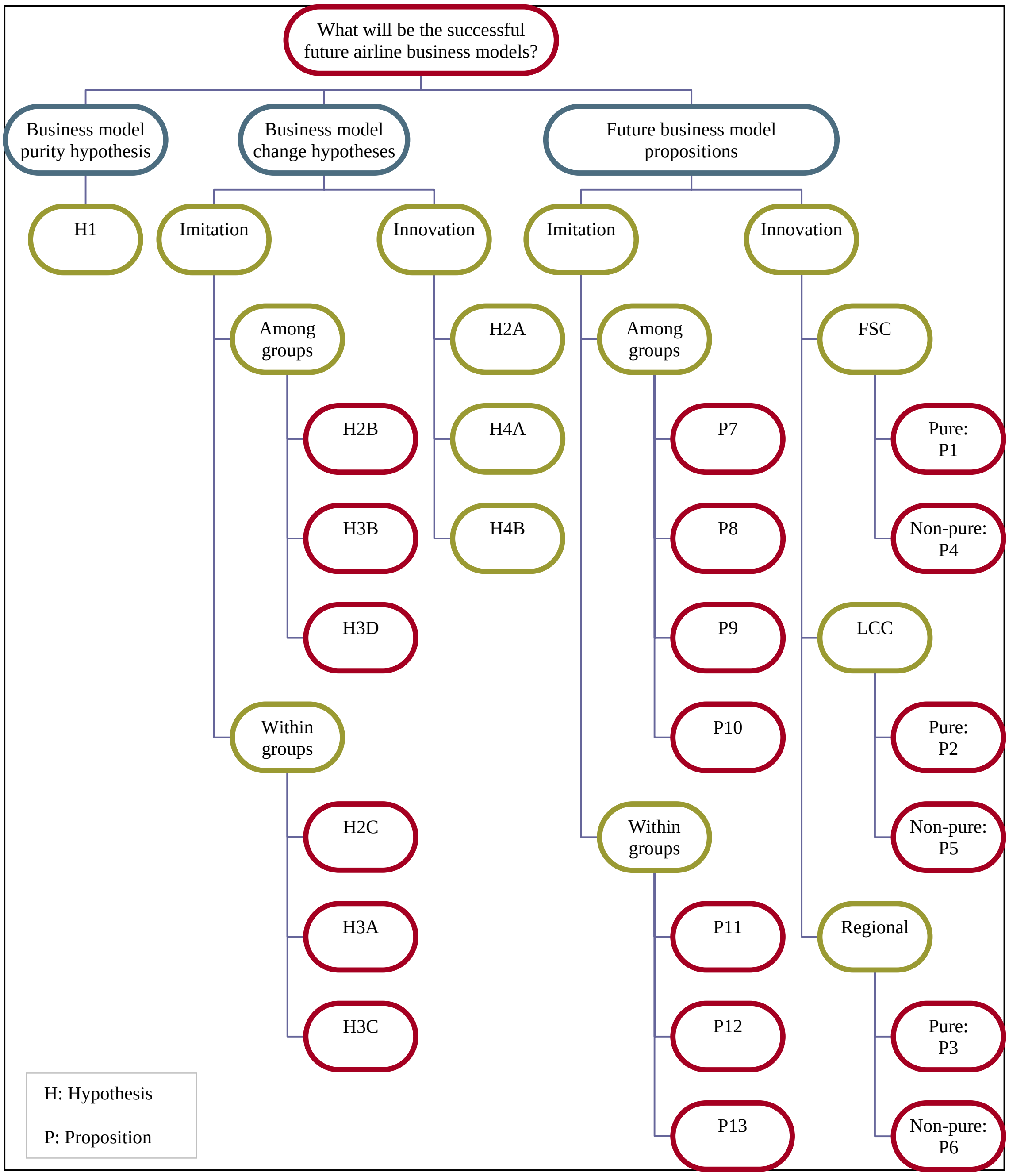
The main research question of this project, what will be the successful future airline business models, and the three supporting questions are comprised of hypotheses and propositions. Hypotheses are assumptions that the researcher believes describe the airline industry; they can be tested and either proven or disproved by the researcher. Propositions, on the other hand, are presented by the researcher which can be accepted or not by the reader. The propositions are the researcher's bid for what shape the future airline industry's business models may take. It is not possible to test and prove future propositions; acceptance should be grounded in the applied research strategy, methods, and responses from airline representatives that were confronted with the research results.

The main research question is supported by the three sub-questions:

1. How does the variation of airline business models affect profit?
2. Why is there variation in airline business models?
3. What future airline business models can be proposed?

Integral research questions comprise the three sub-questions. Figure 5.1 is an organizational chart consisting of five levels that show the structure of sub-questions and the hypotheses and propositions. The chart only displays the hypothesis and proposition number. A detailed explanation can be found proceeding the figure.

Figure 5.1: Hypotheses and proposition organizational chart



Source: Author's own creation

5.1.1 Business model purity: H1

Sub-question 1, how does the variation of an airline's business model affect profit, can be rephrased in terms of business model purity (Alamdari & Fagan, 2005). A pure business model is one that adheres to the traditional model of the respective strategic group, as presented in Chapter 4. Past research has shown that airlines with pure business models have higher profits than those without (Alamdari & Fagan, 2005). However, this research was only applied to the LCC group. The researcher wishes to test this research across the industry. Hypothesis 1 states:

H1: The more pure an airline's business model the greater the operational profit margin.

5.1.2 Business model change: H2-4

Hypothesis 1 investigates the level of an airline's adherence to the traditional business model in the respective strategic groups. It will be determined whether business model variation does exist in the airline industry. The next challenge is investigating what is the source of business model change. Airlines change their business models for various reasons and use either imitation or innovation as a tool. The following hypotheses are grounded in the strategic group theory and incorporate the segmentation of airlines as pure (i.e. core) airlines and non-pure (i.e. secondary). The hypotheses incorporate a main assumption: an airline's level of adherence to the traditional business model will affect the types of business model change.

H2A: The more pure the business model the more innovative an airline.
H2B: The less pure the business model the more imitation among strategic groups.
H2C: The less pure the business model the more imitation within strategic groups.

It may appear counterintuitive to state that pure airlines are more innovative than less pure carriers as innovation implies change, which should mean that innovative carriers would become less pure as they change. However, innovation is measured by analyzing the amount a carrier changes its traditional business model elements (see 5.3.2.5). Innovation, therefore, fails to capture the changes that drive a carrier to less purity; this is the role of imitation.

Rivalry is an important concept within the strategic group realm and has been incorporated in the next hypotheses. The goal is to research the presence of rivalry in the industry and its affect on business model imitation, both internally and externally.

H3A: A high rivalry within a strategic group will negatively affect internal imitation of airlines with a pure business model.
H3B: A high rivalry within a strategic group will negatively affect external imitation of airlines with a pure business model.
H3C: A high rivalry among strategic groups will negatively affect internal imitation of airlines with a pure business model.
H3D: A high rivalry among strategic groups will negatively affect external imitation of airlines with a pure business model.

Rivalry's affect, both internally and externally, on innovation is captured in the final hypotheses. Rivalry will affect innovation of an airline's business model is the main question being addressed.

H4A: A high rivalry within a group will positively affect innovation of airlines with a pure business model.
H4B: A high rivalry among groups will positively affect innovation of airlines with a pure business model.

5.1.3 Business model propositions: P1-13

The previous hypotheses all support the final analyses, comparative configurations of future airline business models. The hypotheses test the business model variation in the industry and explanations for this deviation. Comparative configurations give the researcher a method for analyzing what impact innovation and imitation will have on future business models. The method incorporates Boolean algebra, which is explained in detail further in the chapter. There are two innovation-propositions for each strategic group, four imitation-propositions among strategic groups, and one imitation-proposition within each strategic group. Table 5.1 categorizes the propositions according to macro-level variable headings. They are propositions regarding future general trends in the industry, rather than detailed and specific predictions. The propositions will be compared with the findings from the QCA analyses to test their accuracy, similar to testing hypotheses.

Table 5.1: Overview of propositions 1-13 using variable headings

Proposition		**Network**	**Distribution**	**Service**	**Operational**
Innovation					
P1	Innovation: pure FSC	Sustained integration	Sustained GDS presence	Sustained service levels	Fleet standardization and longer stage lengths
P2	Innovation: pure LCC	Sustained network segmentation	Sustained GDS absence	Sustained “no-frills” concept	Sustained fleet standardization
P3	Innovation: pure regional	Network integration with CLT	Sustained CLT reliance	Sustained CLT reliance	Fleet standardization
P4	Innovation: non-pure FSC	Increased ticket flexibility	Sustained GDS presence	Sustained service levels	Fleet non-standardization
P5	Innovation: non-pure LCC	Restricted network integration	Restricted GDS presence	Restricted unbundled service	Fleet non-standardized & longer stage lengths
P6	Innovation: non-pure regional	Network integration as stand alone carrier	Sustained GDS presence	Sustained complementary service	Fleet non-standardization
External imitation					
P7	Imitation: non-pure FSC & non-pure LCC	Increased network integration	Increased GDS presence via third-parties	Unbundled service features	Fleet standardization
P8	Imitation: non-pure FSC & non-pure regional	Increased network integration & CLP	Sustained GDS absence	Sustained reliance on partner providers	Fleet standardization
P9	Imitation: non-pure LCC & non-pure regional	Network segregation	Increased GDS presence via third-parties	Unbundled service features	Fleet standardization
P10	Imitation: non-pure FSC & non-pure LCC & non-pure regional	Increased network integration	Sustained GDS presence	Unbundled service features	Fleet standardization

Internal imitation

P11	Imitation: pure FSC & non-pure FSC	Network segregation	Sustained GDS presence	Sustained service levels	Fleet standardization
P12	Imitation: pure LCC & non-pure LCC	Network integration	GDS presence via third-parties	Unbundled services	Fleet standardization
P13	Imitation: pure regional & non-pure regional	Sustained network integration	Sustained GDS presence via partners	Sustained bundled services via partners	Fleet standardization

Source: Author's own creation

Configurational comparative analysis will allow the researcher to propose which unique combinations of business model variables the industry may witness in the future, grounded in either innovation or imitation. The method, described in the next section, may not utilize all of the 18 variables analyzed in its conclusions. Therefore, the researcher's propositions only focus on those variables that are believed to be included. The results may indicate otherwise. The propositions under each variable heading utilize key words, which are explained in the following section.

The propositions under the network heading focus on integration, segregation, complementation, and flexibility. Network integration is defined as a network that relies on through-fares, restrictions, interlining, onlining, alliances, codeshares, and capacity lift. These features need not be limited to FSCs and not all business model variables must be present for a network to be integrated. Segregation implies a business model that focuses on a point-to-point network, and has few or none of the integrated variables. A complementary network is often a supporting, short-haul network offered by a regional carrier. These carriers will offer their partner airlines capacity and feed traffic either through an alliance, codeshare, or capacity lift provider.

Distribution propositions relate to GDSs and suggest absence, presence, or presence via a third-party provider. Some propositions suggest that carriers will maintain their current GDS presence while others may opt to join this traditional distribution channel. Existing and future IT solutions may allow carriers to join GDSs on a limited basis through third-party providers. Such a solution may offer a cost and revenue advantage to participants.

Service features in the future will either be bundled or unbundled. This relates to offerings such as loyalty programs and lounge access. Costs associated with a service offering may be subsidized by passenger fare expenses or they may be unbundled and paid for on a piece-meal basis. The bundling of service offerings may entice more passengers to experience the service; however the higher cost may deter some from purchasing a ticket with a carrier. An unbundled service feature brings transparency and allows the passenger to judge the value of the offering; however the transparent cost may deter some from experiencing the offering. In addition, it is proposed that services to secondary airports may supersede bundled/unbundled service features for selected business model change in the future.

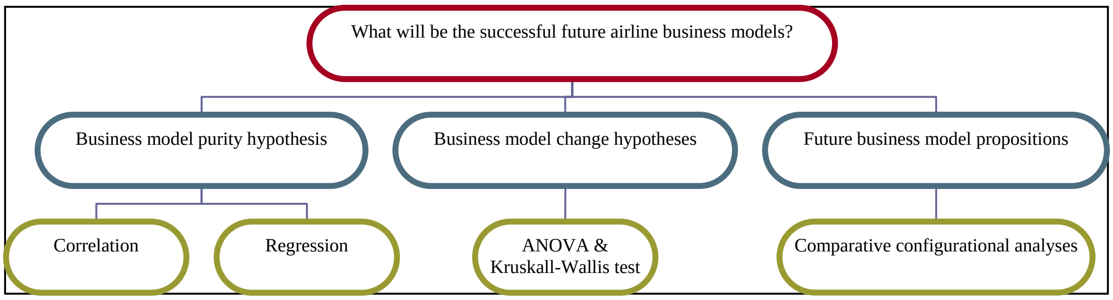
Operational propositions will focus on either fleet standardization or stage lengths. Standardization of fleets will be a primary operational change for carriers in an attempt to lower costs. Stage lengths may be lengthened or shortened in the future to enter new markets with a new business model, or to complement existing networks.

The hypotheses and propositions that will be addressed in the analyses have been described. The following section of this chapter will explain the methods utilized in the research project to address the above-mentioned hypotheses and propositions.

5.2 Methods

The methods utilized in research vary according to the type of data accumulated, procedure, and desired format of the outcome. This research utilizes four methods, presented in figure 5.2 and their relationship to the specific analysis, to address the three sub-questions. This section will describe the methods individually and conclude with an overview of the variables that are utilized in each analysis and method.

Figure 5.2: Specific methods used to address sub-questions



Source: Author's own creation

Hypothesis 1 utilizes two methods, correlation and regression, to accommodate the type of data available to address the research question. The aim is to show the relationship between business model purity and profit. An analysis of variance (ANOVA) and Kruskall-Wallis test are used to address the level of variance between variables in hypothesis 2. This research studies the variation within and among carriers in the respective strategic groups. The final analysis, hypothesis 3, proposes future business model configurations using qualitative comparative approach, also known as comparative configurational analyses. The descriptions of the correlation, regression, ANOVA, and Kruskall-Wallis test are mere summaries as these are standard and often used methods. The researcher points the reader in the direction of statistics books for more detailed explanations, such as Aczel and Sounderpandian (2002), Weiers (1998), and Carlson et al. (2003).

Correlation

While one may be interested in knowing whether two variables are related and use a coefficient of correlation or chi-square analysis these results fail to show in what way the variables are related. For this one may use a correlation analysis. A correlation analysis measures the strength and direction of a relationship between variables; it searches for interdependence. The correlation between two random variables x and y is a measure of the degree of linear association between the two variables (Aczel & Sounderpandian, 2002 pg. 448). In the analysis that utilizes this method the independent variable (x) is business model purity and the dependent variable (y) is the operating profit margin. Correlations can be linear, y increases as x increases, or non-linear, *y* increases as *x* increases but then *y* changes directions and decreases. This analysis studies the relationship in a linear fashion. In other words, the researcher investigates the rise or fall in operating margin as business model purity changes.

The correlation coefficient, or *r*, shows the strength and direction of the relationship. The values of *r* can vary from -1.0 to +1.0; if *r* is positive the relationship is positive, *y* increases as *x* increases, or conversely if *r* is negative. The correlation equation is well known and can be found from a range of sources (Carlson et al., 2003 pg. 65), therefore the researcher will omit from publishing it. MS Excel was used to calculate the correlation in this project.

Partial correlation

While correlation analyses investigate the strength and direction between two variables it may be appropriate to test for the effect of external influences. This is done by performing a partial correlation, which controls for a third, or more, variables. These variables are referred to as control variables. The results of the controlled correlation are compared with the original correlation to determine the affect of the control variable. If there is no difference one may constitute that the control variable has no affect, however if the controlled correlation approaches 0 one may state that the original correlation is influenced externally. MS Excel was used to calculate the partial correlations with add-on WinSTAT[34].

Regression

Correlation concerns itself with the degree of association between variables while a regression analysis seeks to describe the dependence of the dependent variable on the independent variable. The difference is that while correlation may confirm that a relationship exists, it does not tell whether there is dependence; a change in the independent variable will lead to a change in the dependent variable. Through utilization of a regression analysis the symmetry of the statement, the correlation between x and y or the correlation between y and x, is removed.

The coefficient of determination, or r^2, measures the strength of a relationship. A measure of how well the regression line fits the data. The r^2 figure explains the percentage of variation in *y* that is explained by the regression line. The number is between 0 and 1; 0 being the line explains none of the variation of *y*, and 1 signals that all is explained. The coefficient of determination reveals nothing about the direction of the relationship, or, in other words, a negative or positive association. However, the value of r^2 reveals the power of prediction. A greater value allows for more accurate predictions. For this method the researcher utilized MS Excel. While the correlation and regression methods are utilized to investigate the relationship of business model purity and financial success the analysis of variance method is used to study the survey responses from the industry. This method is explained in the following section.

[34] http://www.winstat.com/

ANOVA

An analysis of variance (ANOVA) method is utilized to study the second hypothesis regarding business model change. ANOVA compares the means of groups and tests for significant differences between the groups, which is appropriate for this research investigating variation between pure and non-pure airline business model change. ANOVA is a statistical method for determining the existence of differences among several population means (Aczel & Sounderpandian, 2002 pg. 370). A *factor* is the independent variable(s) and is the cause in variation; in this research the constructed business model variables. The ANOVA equation is found in numerous statistical textbooks (Aczel & Sounderpandian, 2002; Carlson et al., 2003; Weiers, 1998) and the research will refrain from presenting a copy here.

ANOVA has related statistical calculations which are necessary for determining the validity of the ANOVA results. These calculations include the *F-statistic* and the *significance*. These two calculations have an inverse relationship; as F-statistic increases, significance decreases. The F-statistic is a ratio that compares the variation between groups and variation within groups. In other words, as the distance increases one may have greater confidence in the results because there is greater difference between the groups under study. Significance, on the other hand, is a test which shows the probability of calculating a statistic that is statistically significant. Statistically significant is a choice that the researcher makes and often lies at either 5% or 1%.

The Kruskall-Wallis test is similar to the ANOVA method, however it addresses the issue of a non-normally distributed population and utilizes ranks within groupings as measurement rather than means (Kruskal & Wallis, 1952). The advantages of this include simplified calculation, only very general assumptions are made, and data in ordinal form may be used; it does not assume normal distribution, although it does assume that observations come from populations with the same shape of distribution (J. H. McDonald, 2007). The observation with the lowest value is ranked as a 1, the second-lowest 2, and so forth. If there are observations with identical values they are all assigned an average rank. A group containing less than five observations is deemed too small (J. H. McDonald, 2007). The Kruskal-Wallis equation is not presented in this project but can be found in various publications (Aczel & Sounderpandian, 2002; Carlson et al., 2003; J. H. McDonald, 2007; Weiers, 1998). The test statistics report the significance of the results, which must often be below 5% to be considered significantly different. In other words, if the results are significant it shows that there is significant difference between the groups analyzed, and the mean rankings show which group is significantly different. The statistical software package, Statistical Package for the Social Sciences (SPSS), was employed to run both the ANOVA and Kruskall-Wallis tests.

This section reviewed the ANOVA and Kruskall-Wallis test methods that are used to study how business models change in the airline industry. The final method utilized, comparative configurational analysis, is new to the field of business model change and is explained in detail in the following section.

Comparative configurational analysis

The Merriam-Webster dictionary defines *compare* (Merriam-Webster) as:

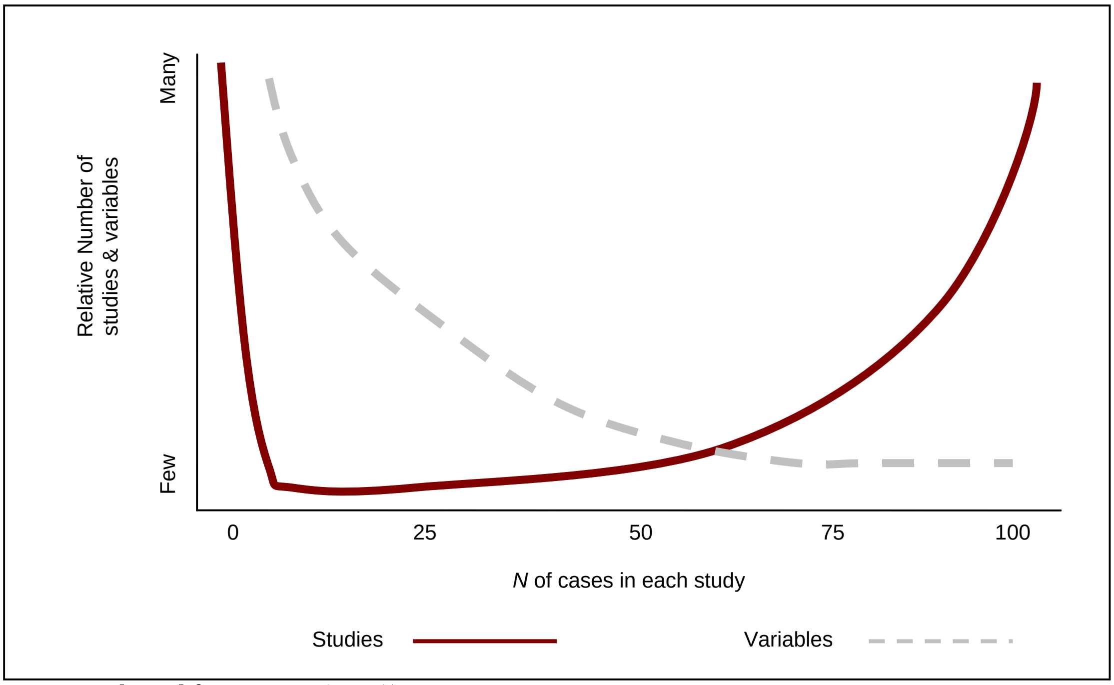
> *"To represent as similar; to examine the character or qualities of, especially in order to discover resemblances or differences; to view in relation to."*

Researchers are often tasked with comparative analyses, either in the hope of identifying similarities or differences; although the term *contrast* is more appropriate when seeking dissimilarities. One aspect of this research project is a comparative analysis of airline business models which attempts to highlight the evolutionary direction of the industry. This comparison is applied in the researcher's slightly feigned assumption that it is possible to precisely predict the future; although a presentation of likely scenarios in the future airline industry is possible. The intention of the propositions (see table 5.10) and their testing is to present the reader with scenarios of future industrial evolution. Scenarios may be used to explore uncertainty and prioritize issues, identify signals of emerging risks, focus attention on external challenges, or to prepare for surprises (Ringland, 2002). These scenarios are created using qualitative comparative analysis[35] (QCA) (Ragin, 1987), whose underlying concepts, and application are presented in the following section.

A comparative analysis allows a researcher to compare or contrast two or more elements, for example theories, articles, or in this research project's realm, airline business models. A comparatist must elect from which lens the comparison is conducted. Does the researcher elect to view element B through the lens of A, or are both elements equally weighted? The chosen perspective influences the analysis. In this research there are three lenses, the full-service carrier, low-cost carrier, and the regional carrier. Each case group is viewed irrespective of the other and afforded equal weight. Once the comparatist lens is formed the researcher often faces an analytical dilemma: complexity versus generalization. Research that focuses on complexity often relies on qualitative, case-oriented, or small-N methods; while research that provides generalization is often quantitative, variable-oriented, or large-N focused. This over-simplified, polarization of research methods often portrays complex research as *"...rich and emancipatory but soft and subjective,"* and general research as, *"...scientific but sterile and oppressive"* (Ragin, 2000 pg. 22). The case-oriented researcher is focused on depth, while the variable-oriented researcher demands breadth. As Rihoux (2006) points out, topics of interest are sometimes limited in number, especially at the meso-sociological level (e.g. firms), which demands that researchers posses techniques for analyzing small-n populations. As Ragin (Ragin, 2000 pg. 25) shows there are an abundance of small-n studies and large-n studies, with a depression within medium-n. In addition, there appears to be an inverse relationship between the number of cases and the number of variables that researchers study researchers tend to study either many cases with few variables or few cases with many variables as shown in figure 5.3 (adopted from Ragin 2000).

[35] Qualitative comparative analysis is a term that has yet to be fully adopted by the community. Other names that may be used include comparative configuration analysis. The author uses both of these interchangeably.

Figure 5.3: Relationship between number of cases and number of studies and variables



Source: Adopted from Ragin (2000))

These two analytical methods do have their advantages and disadvantages. When a study analyzes a large number of cases it is challenging to conduct an in-depth study; the details eventually become blurred and the researcher is challenged to remember, distinguish, and analyze the data. Quantitative studies are more appropriate for large-N studies; however breadth replaces depth. Qualitative studies attempt to understand how all the different pieces interact *within* a case; this configurational view sees case elements as interconnected, as in a systems approach. However, quantitative studies attempt to understand how the pieces fit together *among* cases, or cross-case analysis; a pattern of co-variation is the evidence researchers seek (Ragin, 2000). Case-oriented studies offer answers that are intensively analyzed and justified by showing compatibility with other case-aspects or cases, and are commonly used to answer questions regarding cultural or historical phenomenon; while variable-oriented studies provide answers that are extensively correct using many observations and justified by showing generability, and are suited to identify broad, theoretically relevant patterns (Ragin, 2000). Ragin (2000) stresses that academic environments have aided in creating a polarization of researchers who tend to identify themselves and each other as purely qualitative or quantitative; Crane (1972) mentions the formation of *invisible colleges* which reinforces this methodological dichotomy.

Quantitative studies are common-place within strategic literature (Ketchen, Jr., Thomas, & Snow, 1993; Scandura & Williams, 2000), however the strategic management community's ebb into business model analysis has failed to bring along quantitative methods. The same can be said about analyses of airline business models. Quantified data and metrics are abundant in the industry, yet for various reasons they have yet to be adapted and applied rigorously within the business model framework. One may cautiously state that qualitative methods may precede quantitative in some fields as descriptive, explanatory characteristics of cases is easier for researchers to analyze compared to quantification of case aspects. As the field expands the community may begin exploring quantitative methods. One transitional step in this research progression may be a bridge between the dichotomous qualitative and quantitative methods, which is precisely what Charles Ragin has accomplished with development of the qualitative comparative approach (QCA). This allows a formal analysis in a small-N setting. The term *qualitative* should not be understood as solely an interpretative method, but rather as a configurational method; QCA analyzes the presence or absence of variables, and determines specific configurations that explain a designated outcome. The term *comparative configurational analysis* may be a more accurate description.

QCA builds upon previous work on comparative methods (Gee, 1950; Smelser, 1973) and attempts to apply quantitative rigor within a qualitative realm; which Gerring (2001) rates as one of the few genuine methodological innovations of the last decade. Comparatists are focused on studying how various conditions or causes fit together in a particular setting and result in specific outcomes, and compare that with how conditions or causes fit together in another setting with specific outcomes; set theoretic methods are used to analyze causal complexity in a cross-case arena (Rihoux, 2006). Each observational entity (Ragin, 1987 pg. 13), or case, is analyzed as an interpretable combination of parts, in other words, it is regarded holistically, complementing the systems approach perspective (Arbnor & Bjerke, 1996). QCA has five general purposes as a methodology (Rihoux, 2006), presented from basic to complex. First, it may used to summarize data in a truth table (presented in detail further on), which aids a researcher's data exploration. A review of data coherence and logical contradictions is a process that QCA does well. It can also be used to test hypotheses or theories, as well as, testing of researcher's assumptions. Finally, in more complex situations QCA can be utilized to develop new theoretical assumptions. As Rihoux and Ragin (2004) state, the research community, as a whole, is still exploring the uses of QCA and some of the current uses are under explored. This researcher intends to expand the use of QCA. First, by contributing to the small but growing community of users within the fields of economics and management (Compasss, 2008), and by presenting a new application of QCA: predictions for future business models.

The comparative method is based on *logical methods* (Gee, 1950; Mill, 1843), where researchers attempt to pinpoint commonalities across cases. In practical terms, one identifies cases that share a given outcome and one attempts to identify shared causal conditions. Or, one may elect to examine cases that all share a causal condition and determine whether these cases share a similar outcome. Comparative method does not rely on common statistical criteria, but rather logical processes. Seawright (2005) concludes that QCA should not be regarded as an advancement over statistical regression, however Ragin (1987) stresses his work in QCA is not to be seen as a replacement for quantitative methods but rather as a complement to current causal research; as a tool for small-n studies challenged by statistical limitations, and somewhat as a bridge between qualitative and quantitative methods, also referred to as a *synthetic strategy* by Ragin (1987), which attempts to *"…integrate the best features of the case-oriented approach with the best features of the variable-oriented approach"* (Ragin, 1987 pg. 84). QCA has fewer formal boundaries compared to quantitative methods. For instance, an infrequently occurring combination of conditions is equally weighted with a frequently occurring combination of conditions;

in other words, frequency of occurrence is irrelevant. A statistical analysis of such a phenomenon might dilute the infrequent occurrence to the point that it does not influence the results, which may limit a study's findings; outliers are often ignored though they may be rich in explanatory power. Case diversity is diffused or even omitted in statistical methods, while the comparative process embraces heterogeneity. Statistical relevance, such as samples, populations, and frequency, are not relevant in the comparative method, which has many advantages over its statistical counterpart, especially in a small-n setting. The comparative method surpasses statistical analyses in that combinatorial analyses are possible. Statistical methods typically analyze conditions in a singular, linear manner. Although, analyses of statistical interactions in a non-linear manner is possible this is challenged by collinearity and scarce degrees of freedom, especially in a small-n setting (Ragin, 1987). The comparative method's result considers every instance of a particular phenomenon; although deviating results may be evident, they are highlighted by the method and allow the researcher to delve deeper into the phenomenon. Field boundaries within the method are determined by the researcher rather than by the population or data set. Statistical methods are sometimes challenged by the source of information available which limits the sample used. Finally, the comparative method requires the researcher to become intimately familiar with cases, as opposed to the statistical method which merely requires the researcher to disaggregate a sample into variables for a distanced analysis; QCA de-emphasizes analysis of variables in isolation from the cases they describe (Seawright, 2005). Lieberson (in Marx, 2005) criticizes QCA as being unable to distinguish real from random models, which would render the method useless. However, Marx (2005) shows through a methodological experiment that variable bias is avoided by ensuring that QCA uses few variables and a significant number of cases. Marx (2005) suggests that QCA research with up to 50 cases should limit the number of variables to a maximum of eight[36]. Although, the over-simplified, polarization statement that small-n studies are only suitable with QCA methods and large-n studies for quantitative studies, the current QCA bibliographical database (Compasss, 2008) shows otherwise. While a large number of studies look at five cases or less, there are more than 15 that observe between 10 and 50 cases (Rihoux, 2006), as well as, some studies that utilized cases that numbered in the thousands (Amoroso & Ragin, 1999; Miethe & Drass, 1999). Limits to case selection are only restricted by the researcher's tolerance for complexity and interest in familiarity with each case. Herein lays the strength of QCA and its overlap with quantitative facets. QCA and its ability to analyze a large number of cases open up the method to generalization, a key tenet of quantitative studies (Rihoux, 2006). Scientific advancement is possible as QCA is a replicable, analytic approach which allows others to corroborate results, however the method does leave room for holistic interpretation, as it is a transparent technique which requires a researcher's theoretical understanding and justification.

Algebraic logic

The underlying comparative quantitative logic of QCA is Boolean algebra, which is also referred to as *the algebra of logic* or *the algebra of sets* (Ragin, 1987). Boolean algebra was invented by the British mathematician and philosopher, George Boole, in the mid-19th century, and is at the core of computer science and electrical circuitry (Boole, 1854; MacHale, 1985). Boolean algebra and QCA views cases with varying combinations holistically and identifies patterns of multiple conjectural causation. It

[36] This project uses, on average, 31 cases and 16 variables in the MVQCA analyses

has a narrowing, funnel-like approach to minimizing complexity as it proceeds from the bottom up (Ragin, 1987). It begins with the highest level of complexity: every logically possible combination of case variables is analyzed, which are reduced through experiment-like contrasts. The final result is a parsimonious, causal descriptor of logical sets that explain a specific outcome.

In QCA cases are represented by independent variables, referred to as *conditions*, and dependent variables, called *outcomes*. In traditional QCA conditions or outcomes are dichotomously noted as either true or false; present or absent; black or white. These are coded as 1 (true; present) or 0 (false; absent); presence is often indicated by an uppercase condition and absence by lower case, if binary digits are not used to represent conditions. QCA advancements allowing non-dichotomous notation will be described and applied in the following sections. There are two Boolean notations that QCA utilizes which are tantamount, conjunction and disjunction, which differ from mathematical notation. Conjunction is logical *AND*, which is represented by a multiplication symbol (* or x); this symbol is commonly omitted and implied in analyses. Disjunction is logical *OR*, which is represented by an addition symbol (+); this symbol is always present and not implied, unlike logical *and*. Table 5.2 is an example of Boolean set notation, which shows the use of codings {1} and {0}, and logical *and*. It shows how, for example, Copenhagen is a capital city *and* it is in Europe *and* it is not large, or that students who study hard *and* pass an exam *or* students who do not study hard *and* do not pass an exam.

Table 5.2: Example of Boolean set notation

Variable	**Set notation description**
Copenhagen	Capital{1} * Europe{1} * Large{0}
New York	Capital{0} * Europe{0} * Large{1}
Students	Study hard {1} * Pass exam{1} + study hard {0}* Pass exam {0}

Source: Adopted from Cronqvist (2007a)

Application of QCA

QCA operates in a four-step process:

1. A truth table is generated,
2. The truth table is minimized,
3. Prime implicants are extracted, and
4. Prime implicants are minimized to QCA solutions, as QCA attempts to identify the most parsimonious solution, or the shortest solution possible to explain the desired outcome.

A truth table is generated from the raw data a researcher gathers and displays the configurations observed. It is the researcher's assessment and theoretical knowledge which determines the dichotomous, binary (0 or 1) set notation. Thresholds which determine the recoding of raw data are determined by the researcher. The truth table is then minimized. Identical configurations are grouped together; as already stated, frequency of occurrence is irrelevant in QCA. Within the truth table cases with identical configurations yet differing outcomes (some with outcomes 1 and others with outcome 0) are noted as *C*, or contradictions. Once the truth table is minimized the prime implicants are extracted; they are the unique combinations of conditions that uniquely explain an outcome, which can be coded as 0, 1, or *C*. It is the researcher who elects to explain which of the three outcomes is to be explained. The final step in QCA is to algebraically minimize the prime implicants to determine the QCA solution. Appendix IV explains in greater detail the underlying logic of QCA, notation, and algebraic solutions, however, a small example is listed in table 5.3. There are three conditions in this example (A, B, and C) and 11 cases that are observed. The example solves for an absence of the outcome, coded as 0. Note that a lowercase condition indicates an absence, while an uppercase condition indicates a presence.

Table 5.3: QCA example

Truth table **Case**	**Conditions** **A**	**B**	**C**	**Outcome** **O**
C_1	0	0	0	0
C_2	0	0	1	0
C_3	0	1	0	0
C_4	0	1	1	0
C_5	0	1	0	0
C_6	1	0	0	1
C_7	1	0	1	0
C_8	1	1	0	1
C_9	1	1	1	1
C_{10}	1	0	1	0
C_{11}	0	1	1	0
Minimized truth table				
C_1	0	0	0	0
C_2	0	0	1	0
C_3, C_5	0	1	0	0
C_4, C_{11}	0	1	1	0
C_6	1	0	0	1
C_7, C_{10}	1	0	1	0
C_8	1	1	0	1
C_9	1	1	1	1
Prime implicants **(step 1)**	**Minimization** **(step 2)**	**(step 3)**		
abc	ab	a		
abC	ac	bC		
aBc	aC			
aBC	aB			
AbC	bC			
Parsimonious solution				
0 = a + bC				

Source: Adopted from Ragin (1987)

This example shows the steps of a QCA analysis, and that the outcome 0 is explained by an absence of condition “a” *or* (indicated by the “+” symbol) the absence of condition “b” *and* (indicated by the implied “*” symbol) the presence of condition “C”. This solution leads to the concepts of *necessity* and *sufficiency*. A necessary condition is one which must be present for the outcome to occur, and all cases with the outcome share this condition. There is no necessary condition present in the solution above; however if the reader solves for outcome 1, the reader will find a necessary condition. A sufficient condition is one which in which the outcome occurs every time the condition occurs, however the outcome might occur in cases without this condition. In the example above an absence of condition “a” is sufficient to explain outcome 0, however it does not explain every case containing this outcome. Therefore, solution “bC” must also be added.

The basic tenets of Boolean algebra and QCA methods have been presented which introduce the methodology invented by Charles Ragin. Although it is possible to perform a simple Boolean analysis by hand, as shown by the example above, more complicated data sets require the use of computer software. There are two commonly used software packages: fs/QCA developed by Ragin et al. (Ragin, Drass, & Davey, 2006) and TOSMANA developed by Lasse Cronqvist (Cronqvist, 2007b) which use the Quine-McCluskey algorithm. QCA was originally designed for research in political science and historical contexts, which are the typical realms in which comparatists operate. However, the method is expanding to encompass a wide range of other fields; a review of the bibliography on the Comparative methods for the Advance of Systematic cross-case analysis and Small-n Studies (Compasss) website (Compasss, 2008) lists studies using qualitative comparative analysis in fields that include sociology, economics and management, law and criminology, psychology and education, geography, philosophy and theology, life science, and applied science, although more than two-thirds of the documents are related to political science (Rihoux, 2006).

Non-dichotomy

Those who regard society through a black and white lens may benefit from a QCA analysis; however such a method disregards the shades of grey that may be present. Although QCA is a useful method its dichotomous nature constrains its advancement to other fields, therefore two complementary techniques have been added to the QCA realm: fuzzy-sets and multi-value QCA. This research project utilizes multi-value QCA, which will be described in detail; however fuzzy-sets will be briefly presented to provide a holistic understanding of the various methods. Ragin (Ragin, 1987; Ragin, 2000) built upon the QCA method by developing fuzzy-set QCA, which signals that conditions can have varying degrees of set membership rather than a dichotomous classification. As Ragin (2000) explains, people’s height or investment risk is poorly coded using dichotomous notation. Fuzzy sets build on QCA algebra but incorporate interpretation, which is half verbal-conceptual and half mathematical-analytical, allowing researchers to become more intimate with ideas and evidence. In essence, a fuzzy set allows researchers to code conditions between the dichotomous values of 0 and 1; social science’s shades of grey are brought to the surface.

Fuzzy sets allow a researcher to have greater dialogue with the algebraic method as the set is more infused with theoretical and substantive knowledge, which allow one to customize the set to best suit theoretical concepts. It is imperative that condition coding and diversity is grounded in a researcher's knowledge, otherwise its accuracy is not utilized. Fuzzy sets combine both quantitative and qualitative assessment into one method (Ragin, 2000); even more so than the original QCA. Each set contains two qualitative conditions: full non-membership (0) and full membership (1) and all the quantitative interpretation that lies between. This tool does not restrict researchers to choose between pure dichotomous representations but allows multiple interpretations of a concept. This method takes a closer step to quantitative methods as it is more probabilistic in its logic than QCA or multi-value QCA, which is veristic. fs/QCA is best used in situations with a larger N; it is generally accepted that 50 cases is the minimum necessary to utilize fuzzy-sets. For more detailed information regarding this method see Ragin (2000).

Multi-value QCA

Cronqvist (Cronqvist, 2007b) developed multi-value QCA (MVQCA) as a complement to QCA and a tool to incorporate fuzzy sets but without losing Boolean synthesis as in fs/QCA. It also allows a researcher to determine a parsimonious causal relationship for a set of identical outcomes, rather than a probabilistic relationship as in fs/QCA.

MVQCA requires that values be ordinal or nominal, which requires that raw, interval scaled data be recoded. After coding the researcher sets a threshold to which values of natural numbers (0, 1, 2, 3…) are assigned (Cronqvist, 2003). For example, if a researcher was studying civil liberties and the ordinal scale was: none, few, most, or all, then the researcher may choose to set the thresholds at 0, 1, 2, and 3 (Cronqvist, 2003). In this case the natural number, 0, represents no civil liberties while 3 may represent a presence of all civil liberties, and 1 and 2 somewhere in between. Notation within MVQCA is similar to QCA, however with one caveat: upper- and lower-case notation is not possible. As the researcher sets thresholds the conditions can have more than two possible outcomes which render upper- and lower-case notation infeasible. Instead, set notation is used. For example, a trichotomous (0, 1, 2) condition (V) can be written as *V{0}*, or *V{1}*, or *V{2}*. This type of notation is called a *literal*. Table 5.4 is a hypothetical multi-value matrix to highlight the difference between QCA and MVQCA.

Table 5.4: A MVQCA truth table

Case	**Variable**			**Outcome**
	A	**B**	**C**	**O**
C_1	0	1	1	0
C_2	1	2	1	0
C_3	1	0	0	1
C_4	0	2	0	1

Source: Adopted from Cronqvist (2007a)

There are four cases in this example, C_x, three conditions (A, B, and C), and an outcome (O). Variables A and C are dichotomous (0 and 1), while B is multi-value, or more specifically, trichotomous, that is 0, 1, and 2. The literal *B{2}* occurs in cases C_2 and C_4. In MVQCA Boolean conjunction and disjunction notation are identical. Therefore, one could write the literal for C_1 as follows: *A{0}B{1}C{1}*. One may also state that the literal *A{0}+B{2}* is present in C_1, C_2, and C_4. This concept can be illustrated with a practical example studying invitations to a party. The cases represent individuals, while the variables are smart (variable A), good at sports (variable B), and wears glasses (variable C). The outcome represents those that are invited and those that are not. Individual 1 (C_1) is not smart and good at sports and wears glasses, but was not invited to the party. Those that are not smart or are good at sports are present in individuals 1, 2, and 4.

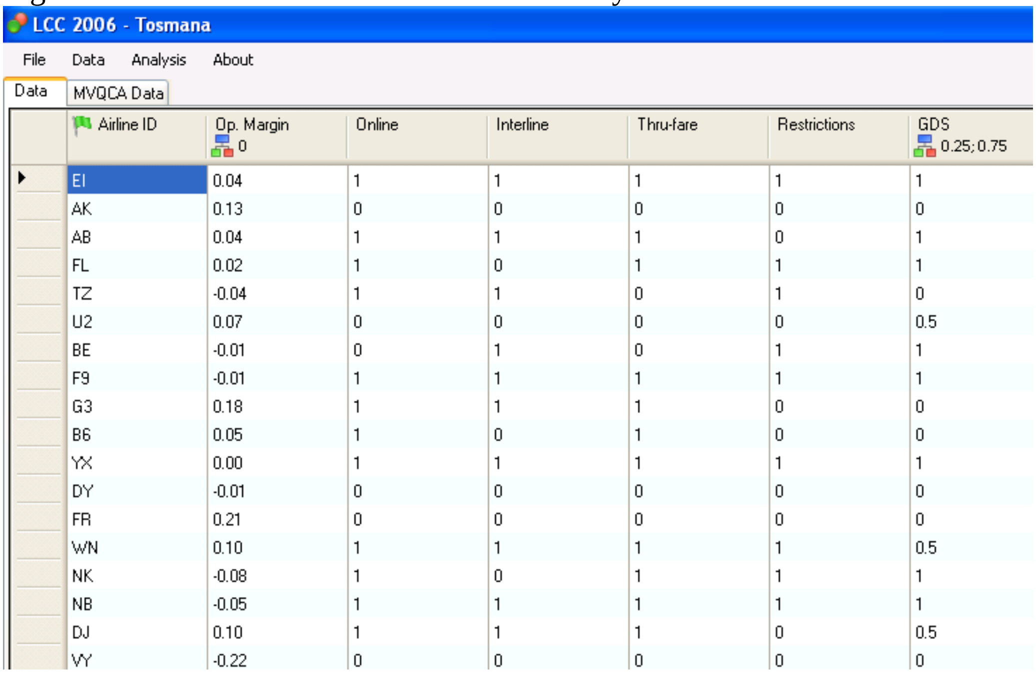
While contradictions in the truth table have been discussed there is one factor that has yet to be introduced: logical remainders. The example in table 5.12 had three conditions and eight unique combinations, which are the total number possible with dichotomous sets (2^3). However, this is usually not the case in research, especially with a high number of conditions, which increase exponentially in crisp sets. Therefore, there will inevitability be logical combinations of cases that are not observed, which are referred to as logical remainders. A researcher can elect to include logical remainders in an analysis or not. If they are included in an analysis they do no contradict existing cases. This adds some assumptions to the research, yet can result in greater parsimony. It is common practice to include these remainders in an analysis.

TOSMANA

In connection with Cronqvist's MVQCA model a computer program, Tool for Small-N Analysis (TOSMANA) (Cronqvist, 2007b) was developed to perform the necessary calculations. This section will provide a summarized description of the software.

TOSMANA utilizes a clickable graphic user interface (GUI) that many computer users will find intuitive. A user can choose to enter raw data directly into TOSMANA or import files from various programs (Excel, SPSS, fs/QCA). Figure 5.4 is a screenshot of a raw data matrix taken from this research project's raw data.

Figure 5.4: Screenshot of TOSMANA data entry



LCC 2006 - Tosmana

File Data Analysis About

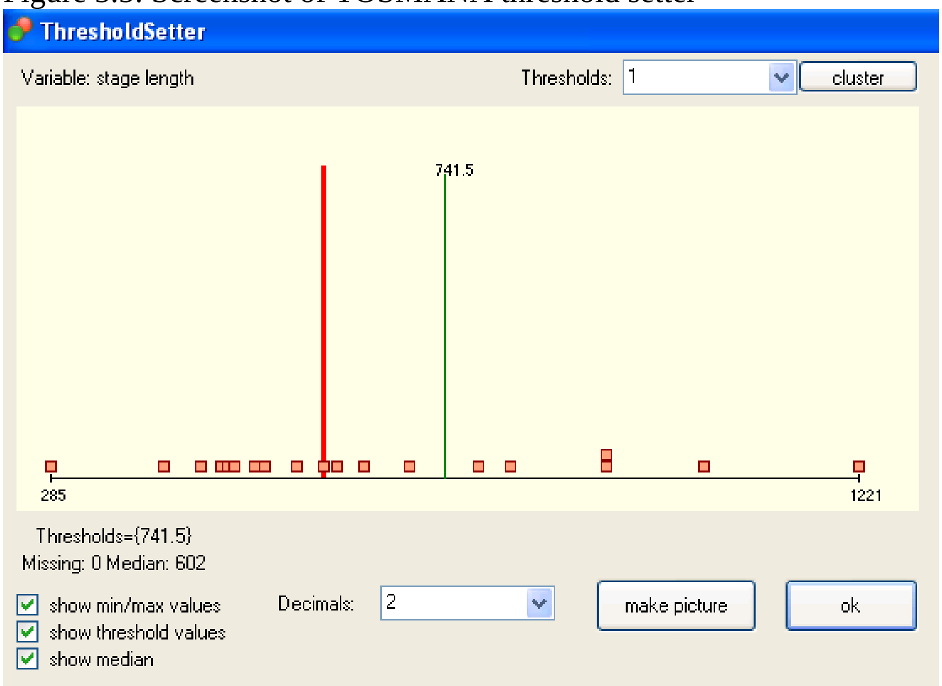
Data | MVQCA Data

Airline ID	Op. Margin 0	Online	Interline	Thru-fare	Restrictions	GDS 0.25; 0.75
EI	0.04	1	1	1	1	1
AK	0.13	0	0	0	0	0
AB	0.04	1	1	1	0	1
FL	0.02	1	0	1	1	1
TZ	-0.04	1	1	0	1	0
U2	0.07	0	0	0	0	0.5
BE	-0.01	0	1	0	1	1
F9	-0.01	1	1	1	1	1
G3	0.18	1	1	1	0	0
B6	0.05	1	0	1	0	0
YX	0.00	1	1	1	1	1
DY	-0.01	0	0	0	0	0
FR	0.21	0	0	0	0	0
WN	0.10	1	1	1	1	0.5
NK	-0.08	1	0	1	1	1
NB	-0.05	1	1	1	1	1
DJ	0.10	1	1	1	0	0.5
VY	-0.22	0	0	0	0	0

Source: TOSMANA data

TOSMANA allows a researcher the freedom to set threshold settings, which determine whether a condition is coded as 1 or 0 (in dichotomous sets) or with more thresholds in a multi-value analysis. This feature gives the researcher the freedom to move the multivariable borders and achieve a parsimonious result; the grey borders found in reality can be moved to best represent reality. An understanding of theoretical influence is important when setting thresholds, as well as, care not to split outcomes that are very close together. Figure 5.8 is a screen shot of the threshold setting function found in TOSMANA for the condition stage length from this project.

Figure 5.5: Screenshot of TOSMANA threshold setter

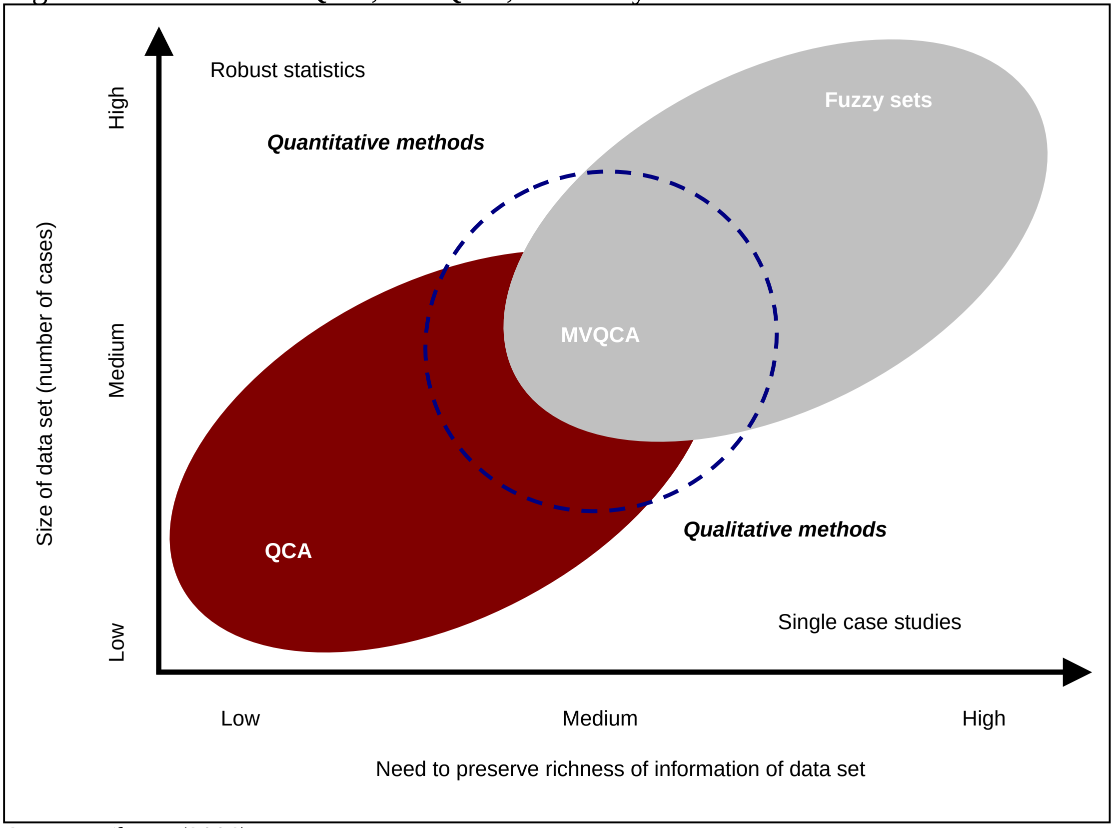


Source: TOSMANA data

In this figure a single threshold is set and the median is displayed. Care has been taken not to split two cases with similar condition data by the threshold setter. Although there are no hard and fast rules for threshold placement, the researcher must take care not to split close-lying cases, and can perform a cluster analysis in a software package or in the TOSMANA software to aid in placement.

Comparative configurational analyses methods have been presented to the reader. These methods include QCA, fs/QCA, and MVQCA, which all allow a researcher to straddle both the qualitative and quantitative paradigms. Choice of method is dependent upon the type of data available, the number of cases, and underlying theoretical foundation in the research. Figure 5.6 (Rihoux, 2006) shows a summarized picture of the three methods and where their application is best served; note how MVQCA straddles the QCA and fs/QCA methods.

Figure 5.6: Best use of QCA, MVQCA, and fuzzy sets



Source: Rihoux (2006)

The method used in this research is MVQCA. It is appropriate for this particular research due to the limited population studied and the desire to capture industry heterogeneity in order to identify and propose the possible combinations airline business model elements that may appear in the future.

Scenarios are but one prediction method available. Other methods include a Delphi survey, quantitative trend studies, or environmental scanning. Scenario planning is a method that has been employed in a number of industries (Ringland, 2002) and has many unique tools available. This research project attempts to introduce QCA as a scenario-creation method, which has yet to be attempted. The method has been used in the antithesis of future studies, namely historical analyses (Berg-Schlosser & Meur, 1994; Berg-Schlosser & Mitchell, 2000; Berg-Schlosser, 2004; Boswell, 2006; Brown & Boswell, 1995). The researcher will attempt to identify unique combinations of business model elements that are present in successful FSCs, LCCs, and regional carriers using the MVQCA method. These models highlight those business model elements that carriers may innovate in the future in attempt to maximize success. In addition, the method is used to merge the successful configurations of business model elements from the respective strategic groups in an attempt to simulate imitative behavior in the industry. Again the results produced are unique combinations of business model elements, however based on imitation rather than innovation. It is these combinations of business model elements that create the scenarios within the industry. This method differs from existing scenario planning, which is based on workshops that extract the underlying foundation. Rather, the MVQCA method incorporates current success within the industry and extrapolates this success into the future based on industry behavior. The previous section has introduced the reader to the methods incorporated in this study, and to provide a summary this chapter concludes with an overview of the variables utilized in each method.

5.3 Variables

This research project consists of two categories of variables: business model and constructed. Business model variables are the micro-scale elements that comprise the business model of an airline. Constructed variables consist of those that the researcher created from the survey responses in order to measure imitation and innovation of airline business models, both within and among strategic groups, and rivalry. There are a total of 33 variables used throughout the project, however not all are utilized with each of the three methods. At the end of this chapter, following an explanation of the methods, a table provides an overview of all the variables and their utilization with their respective method. Some variables were inquired about in the distributed questionnaire, however were not integral elements of the measured business model. This is mainly due to limited quantitative data for the respective variables.

5.3.1 Business model variables

This section will present the background information, airline relevance, and analyses measurement of the variables utilized. There are five broad distinguishing variable headings: network, distribution, service, operational, and profit. Within these headings features, such as connections, global distribution system participation, frequent flyer programs, fleet purity, and operational profit will be discussed.

5.3.1.1 Network

A carrier's network is its primary product: travel. This research project is not a macro network analysis (Gastner & Newman, 2006) but rather a meso network analysis, it is firm specific. A micro network analysis would investigate specific routes or origin and destination markets. These analyses will research a carrier's network related to its business model from the following perspectives: through-fares, ticket restrictions, interline, online, alliances, codesharing, capacity lift provider, and capacity lift taker.

Through-fares:

Airline fares are comprised of complex revenue management policies which manage demand. As passengers, we know that fares vary according to a number of opaque strategies, and the only certainty is that we will not pay the same price for the ticket compared to the passenger next to us. In addition, travel to a destination may require a connection, essentially the combination of two or more legs of travel. However, the fare to travel from point A to point C, with a connection at point B is usually not the same as the sum of the fares from point A to B and point B to C.

Passengers who wish to fly from San Francisco to New York may require a departure time when there is no direct flight, therefore they are required to transfer in Denver and are mixed with passengers whose final destination is Denver. Yet the ticket price, San Francisco to New York via Denver, cannot be priced excessively more, even though it is a two-leg journey, as this may force the customer to travel with a competitor. A through-fare is a single fare that is lower than the sum of fares that comprise the journey. The advantage of through-fares is that they encourage people to travel with a particular airline. Elasticity is relatively high in the industry (Davies & Quastler, 1995) and it may be necessary to provide a discount on one leg to entice the customer onto another leg; the short hop to the hub airport may be subsidized by the long domestic flight. However, through-fares add complexity to the business model. Revenue management is challenged to ensure that routes are profitable and that their pricing strategy is optimized and scheduling must ensure that transfers are adequate. Therefore, many LCCs have opted not to offer through-fares for fear of complexity, while FSCs embrace the practice.

Measurement

Measurement of through-fares is challenged by airline-specific, proprietary data. An average for carriers that offer through-fare discounts would have been preferred, however this was unobtainable. The researcher opted to determine dichotomously if airlines offer a discount or not. This was determined by investigating numerous routes at the specific airline. The price of a two-leg journey was compared to the price of a single, non-stop leg from the same departure airport, on the same day and time, to the same destination. This method was used for ten routes, if possible, on three varying days to determine if airlines offered a discount for connecting traffic.

Trip restrictions

Ticket restrictions are used to price discriminate among customers (Stavins, 2001); restrictions essentially screen customers because their demand is heterogeneous. As Morrison states, *"As they always have, travelers self-select into appropriate fare categories. The few who cannot or will not meet any restrictions fly at unrestricted full fares; the vast majority who can meet some or all restrictions choose from a range of discount fares"* (1995 pg. 78). The most common forms of trip restrictions are advanced purchase discounts, reservation requirements, cancellation penalties, and Saturday-night stay-over requirements (S. A. Morrison & Winston, 1995). Past research has shown that trip restrictions can lead to increased load factors (Borenstein & Rose, 1994; S. A. Morrison & Winston, 1990), as well as, increased revenues

(Holloway, 2003). It has been estimated that yield management, coupled with ticket restrictions, yielded American Airlines an additional US$ 1 billion in revenue (Horner, 2000). Trip restrictions and their use vary according to market dominance. Stavins (2001) concludes that airlines with high market share on routes increase their price discrimination. Ticket restrictions and customer discrimination were the industry norm until the beginning of the 21st century when business travelers became increasingly reluctant to pay the exorbitant fares in exchange for flexibility, which coincided with the emergence of the simplified fare structure of LCCs (Ben-Yosef, 2005). Morrison (1995) shows that the Saturday-night stay requirement was particularly onerous to business travelers. Ben-Yosef (2005) argues that the traditional yield management tool of restrictions was eroded due to FSCs offering their inferior product with a high number of restrictions while LCCs did not, therefore economy service and its restrictions became a viable option to high-yield business traffic as the economy slowed which eroded the effect of restrictions, and an increasing price gap in the late 1990s forced many high-yield passengers to purchase from other carriers. Ticket restrictions complicate the revenue manager's job and confuse and agitate the consumer. LCCs were able to market themselves effectively on the fact that their prices were uncomplicated. Restriction-less tickets were appealing and one factor that aided in the success of LCCs. However, recent moves by FSCs have brought back restrictions, at least in the US market. Reed (2008) states that carriers such as Continental, Delta, and United have reinstated Saturday-night restrictions in select markets after removing them in 2005 as a response to Delta's SimpleFares and LCC growth. The carriers have yet to implement the reinstated fare restrictions in all markets, choosing to selectively apply the changes.

Measurement

This variable uses a binary distinction: airlines either have trip restrictions or do not have trip restrictions. Airline websites describe the restrictions associated with tickets, such as Saturday-night stay requirements, weekend restrictions, web-only restrictions, or round-trip versus one-way restrictions to name a few. Change fees though are not regarded as restrictions.

Interline

There are many agreements between airlines covering a range of areas. Interline agreements are experienced by passengers daily and form the basis for transfers. The agreement is between two or more carriers and governs matters mostly related to ticketing and baggage. It allows passengers and their baggage to transfer to another carrier on the same itinerary, and is sometimes used to accommodate passengers and baggage during irregularities. Interline agreements create the structure of global alliances, though they are also found outside of these structures. For example, British Airways had, until recently, interline agreements with Air Greenland and Russia-based Krasair (British Airways, 2007) and has agreements in place with Star Alliance members Austrian Airlines, bmi and LOT as well as a number of others (Amadeus, 2006). It is common for FSCs to have numerous interline agreements, even among regional carriers (Davies & Quastler, 1995), however many LCCs have been reluctant to introduce the complexity of such contracts. Carriers, such as Ryanair and Air Asia, have avoided interline agreements, however some LCCs, have introduced the agreements into their business model (AirTran Airways, 2002). Southwest Airlines historically had a single interline agreement with Icelandair (Southwest links deal with Icelandair, 1996) which was later suspended, however currently the airline states it does not have any interline agreements in place[37]. Although, the agreement the LCC has with US-based ATA though fulfills the criteria of the interline definition and the researcher regards Southwest as having an interline agreement in place[38].

Measurement

Measurement of interline agreements is dichotomous and is researched by reviewing airline websites. Airlines that are alliance members or have code-share agreements tend to offer interlining.

Online

An online agreement is similar to an interline agreement with the exception of one major difference: the agreement is an internal contract within a single airline. This type of agreement allows passengers and baggage to transfer planes with the same airline on a single itinerary. This type of transfer is used when passengers and their baggage transit an intermediary stop which requires a plane-change. All FSCs tend to offer online capabilities, however regional and LCCs may operate a point-to-point network which does not necessitate such a policy. An online agreement adds complexity and cost to the business model. Missed passenger connections and lost baggage must be compensated, which dilutes the efficiency of the traditional LCC business model. A carrier such as Irish-based Ryanair shuns onlining while Southwest has embraced the policy.

Measurement

Onlining is coded dichotomously for carriers and determined through airline websites. Onlining is not as common among LCCs as it is among FSCs and regional carriers.

Alliance

The airline industry has an abundance of alliances; there were nearly 500 in mid-2007 (Airline Business, 2007a). They have spawned a plethora of literature. A keyword search in the article database, Business Source Complete, reveals more than 8,000 results and Google Scholar more than 13,000 results. Numerous books and chapters have been written on the subject (Doganis, 2002; Doganis, 2006; GAO, 2004; Kleymann & Seristö, 2004; Lu, 2003), too many to list all of them. Alliances can take many forms and be based on numerous cooperative agreements (Doganis, 2006; Kleymann & Seristö, 2004; D. L. Rhoades & Lush, 1997), however in the context of this specific project the research is interested in membership of one of the three global alliances in the industry: Star, SkyTeam, or oneworld. Alliances, as they are organized today, are the closest organizational form to a trans-border merger acceptable in the industry due to regulatory restrictions (GAO, 2004). Alliances have existed since the mid-20th century with cooperative agreements between carriers related to maintenance or other operational issues (Page, 2005), however the structure

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[37] http://www.southwest.com/travel_center/childtip.html#policies
[38] This agreement ended abruptly with the bankruptcy of ATA in April 2008

present in the industry today dates to the late 1980s and the now defunct Wings Alliance. Table 5.5 provides an overview of the three alliances found in the industry currently.

Table 5.5: Alliance facts and figures – 2007

	Star Alliance	SkyTeam	oneworld
Founded[1]	1997	2000	1999
Member airlines[1]	17	11	10
Passengers (millions) [1]	405.7	427.6	321.3
Destinations[1]	855	841	688
Global passenger share[2]	25.1%	20.8%	17.9%
Global operating revenue share[2]	27.2%	20.2%	20.0%
Global ASK share[2]	27.0%	22.5%	21.6%
Global RPK share[2]	26.1%	22.3%	20.7%

[1]: respective alliance website
[2]: Star Alliance General Presentation (2007)
Source: Author's own creation; data from various sources

Star Alliance is the largest of the three alliances in all metrics except passenger numbers. Alliances have been touted as huge cost savers and revenue generators, however some have stated alliances are merely "half-way houses" for smaller carriers and that these carriers only contribute a minute capacity and that their benefits are often overstated (Dixon, 2007; Mannion, 2007). Alliance membership is a key facet of FSCs, however not all are members. Asian and Middle-East carriers have only recently shown interest in the organizations and have slowly begun to join. Air China and Shanghai Airlines joined Star Alliance and China Southern Airlines joined SkyTeam at the end of 2007 (Cantle, 2007; Straus, 2006). Research has shown that non-membership can be disadvantageous and may lead to relegation as a niche player (Li, 2000; Oum, Park, & Zhang, 1996). LCCs, on the other hand, have avoided or not been invited to be members of the major alliances. The costs and complexity of such organizations are prohibitive for the LCC business model, while the requirements for a certain service-level may challenge some LCCs' desire to join. One carrier, Irish Aer Lingus, is the exception. The carrier transformed itself from a small FSC to an LCC, a process that began in 2002 (Harrington, Lawton, & Rajwani, 2005). By 2005 the carrier had positioned itself beyond the boundaries of the FSC strategic group and was ranked the world's 12th leading LCC according to operating revenue, sixth in operating profit, and fourth in net profit (ATW, 2006d). However, the carrier was still a member of the oneworld alliance in 2006 and did not leave until late spring 2007 (Buyck, 2006). The current Aer Lingus CEO recently stated that the costs of alliance membership, related to such areas as IT investment, and the revenue earned were not in balance and leaving the alliance was a rational decision (Mannion, 2007).

Measurement

Alliance membership can be measured in a number of ways. The researcher could have chosen to determine the level of activity by carrier measured in passenger numbers, available seat kilometers, or some other metric. However, the researcher opted to measure dichotomously whether carriers are members of the three global alliances. This option was chosen due to the challenge of data availability.

Codeshare

The major alliances in the industry were previously discussed, however it was mentioned that alliances can take many shapes and forms. A codeshare agreement is one form of alliance which is more arms-length than the three major alliances (Januszewski & Lederman, 2000). It is defined as a contract between two or more carriers that allow joint marketing by carriers but a single operating carrier. Codeshares can take various forms, such as block space, block seat, reciprocal, free flow, and freesale. Seventy percent of alliances include provisions for codesharing (OECD, 2000). In essence, it is an interline agreement consisting of marketing, distribution, and operation. One carrier may market and sell a ticket to a passenger with information implying it is the distributing carrier's flight, however the operation of the flight is carried out by another carrier: the codeshare carrier. In 2007 United Airlines had more than 20 codeshares, excluding regional partners, with carriers from all continents (Airline Business, 2007a). Codeshare agreements allow carriers to expand their network without acquiring additional resources, and may sometimes expand beyond air services to include rail or bus operators (American Airlines; RePass, 2001); for example, American Airlines has codeshare agreements in place with German and French rail operators. Codeshares offer carriers the advantage of single-ticket, seamless travel, a GDS marketing advantage by listing codesharing carriers before interline transfers, and resource collaboration and efficiency which may lead to cost reductions (Bissessur & Alamdari, 1998; F. C. Y. Chen & Chen, 2003; Goh & Yong, 2006; Goh & Yong, 2006; Park, 1997). However, cost reductions obtained through codeshare agreements may be immaterial (Goh & Yong, 2006). Research indicates that consumers benefit from codeshare arrangements through lower fares (Brueckner, 2001; Brueckner, 2003; Brueckner & Whalen, 2006; Ito & Lee, 2007). Codeshare agreements have been a common alliance form among FSCs and with selected regional carriers (Airline Business, 2007a), however recently LCCs have begun to show interest. 2002 saw the first codeshare agreement among an LCC and FSC, Virgin Blue and United Airlines (Sobie, 2007). This unique arrangement was born of circumstances; United lost its Australian codeshare partner with the collapse of Ansett in 2001 and chose Virgin Blue as a partner rather than rival Qantas to provide capacity from United's Australian destinations. Southwest Airlines' acquired stake in ATA in 2004 drove the LCC-ancestor to push for a sudden codeshare, something the carrier had vehemently avoided in the past (Sobie, 2007). Other LCCs that have codeshare agreements include JetBlue and Cape Air, and the New York-based LCC will soon have an agreement in place with Aer Lingus (Mannion, 2007; Sobie, 2007). Table 5.6 provides an overview of the LCC codeshare agreements in place in 2007 (Airline Business, 2007b).

Table 5.6: LCC codeshare agreements

LCC[1]	Codeshare partner	Date begun	Type of codeshare
Clickair[2]	Iberia	2006	One-way freesale
Gol	Copa	2005	Two-way blockspace
Jetstar[2]	Qantas	2004	Two-way freesale
Jetstar[2]	Japan Airlines	2007	One-way freesale
Jet4you[2]	Corsair	2007	One-way freesale
Southwest	ATA Airlines	2005	Two-way freesale
Virgin Blue	Malaysia Airlines	2006	One-way freesale
Virgin Blue	United Airlines	2002	One-way blockspace
Virgin Blue	Virgin Atlantic	2005	One-way freesale

[1]: Codeshare agreements with regional carriers are omitted
[2]: Not members of study group but included for informational purposes
Source: Airline Business (2007b)

Measurement

Measurement of codeshare agreements could have been determined a number of ways. The researcher could have opted to measure the number of agreements, the level of interaction based on passenger figures, revenue, or similar metrics. However, these are firm and market specific, as well as proprietary data. The researcher chose rather to measure codeshare agreements dichotomously to capture industry specifics and trends.

Capacity lift provider

It has been discussed that carriers may choose to enter into different forms of alliances which are advantageous from various perspectives. Major alliances and codesharing among carriers are but a few of the organizational options, however some carriers may opt for a third type: capacity lift provider. A capacity lift provider (CLP) often enters into a codeshare agreement, however there is a distinct differentiation. The CLP is a purely operational carrier and generally does not have any distribution functions, as opposed to a codeshare agreement among two FSCs which may distribute tickets on either other's carriers. A CLP is typically a regional carrier that provides a measurable amount of network capacity for an FSC. Sometimes a CLP is a wholly-owned subsidiary, such as American Eagle, a vertically integrated sub-contractor with a capacity purchase agreement (CPA) such as Skywest, or a franchisee, for example Denmark-based Sun-Air; however, the CLP usually has its own air operating certificate (AOC). Occasionally, a CLP may provide capacity for an FSC while maintaining a separate brand, such as US-based Express Jet or Danish carrier Cimber Air. For example, one is not able to purchase a ticket through American Eagle or Skywest as these carriers are only operators for American Airlines, and United Airlines and Delta Air Lines respectively. However, Express Jet and Cimber Air have their own distribution channels for their own network, and provide capacity for Continental and Delta, and SAS respectively.

Measurement

This meso-level measurement pertains exclusively to regional carriers and is measured trichotomously: the regional carrier provides capacity lift exclusively, such as Skywest, provides capacity lift and own-branded capacity, such as US-based ExpressJet, or the carrier provides no capacity lift, such as the Greek carrier Aegean Airlines. A codeshare agreement does not fulfill the role as a capacity lift provider. Rather, a more integrated relationship is necessary, such as an FSC-owned regional carrier, for example American Eagle, a franchise relationship, such as Danish Sun-Air (not part of the study group) and British Airways, or a capacity purchase agreement, for example US-based Skywest and United Airlines. This variable measures merely whether a regional carrier has a close relationship with an FSC.

Capacity lift taker

The explanation of capacity lift provider showed that a close, integrated alliance, often between a regional carrier and a larger partner was the mainstay of this relationship. This variable looks at the capacity lift taker (CLT), or the partner in the relationship. A CLT uses the CLP as a network supplement. The provider is often a regional carrier that operates a fleet of smaller aircraft, regional jets or turbo-prop, and complements the CLT with short-haul routes. A CLT is nearly always an FSC, although a single LCC benefited from a CLP. US-based Midwest Airlines has had a CLP agreement in place with Skyway Airlines since 1989, a wholly-owned subsidiary of the CLT (Midwest Airlines, 2007). Table 5.3 shows the regional carriers that flew for major carriers in 2006 (Airline Business, 2007b).

Table 5.7: Capacity lift takers & providers – 2006

Delta	**American**	**United**	**US Airways**	**Continental**
Comair	American Eagle	SkyWest	Piedmont	ExpressJet
ASA[1]	Executive Airlines	Mesa Airlines	Mesa Airlines	Colgan Air
SkyWest	TSA	Shuttle America	PSA	Chautauqua
Chautauqua	Chautauqua	TSA	TSA	RegionsAir
Shuttle America	RegionsAir	Chautauqua	Chautauqua	
	Air Midwest	Colgan	Air Midwest	
			Colgan Air	
			Air Wisonsin	
Northwest	**Lufthansa**	**Air France/KLM**	**Qantas**	**SAS**
Mesaba Airlines	Cityline	Regional	AirLink	Widerøe
Pinnacle	Eurowings	Brit Air	Eastern Australia	Skyways
	Air Dolomiti	CityJet	Sunstate Airlines	Blue1
	Augsburg	CCM Airlines		airBaltic
	Contact Air	Cityhopper		
British Airways	**Iberia**	**Alitalia**	**Air China**	**Air Canada**
BA Connect	Air Nostrum	Alitalia Express	Shandong Airlines	Jazz

Source: Airline Business (2007b)
[1]: Atlantic Southeast Airlines

Measurement

Similar to capacity lift provider (CLP), this variable is also measured dichotomously. The variable pertains exclusively to FSCs and LCCs as regional carriers do not have relationships to provide feed and small-lift capacity within the same strategic group. Just as in CLP, a codeshare agreement is not regarded as a capacity lift taker. FSCs and LCCs that have agreements such as wholly-owned, franchise, or CPAs are deemed to be capacity lift takers. While this variable is measured dichotomously a related multi-value variable, level of feed share, is included in the operational section.

5.3.1.2 Distribution

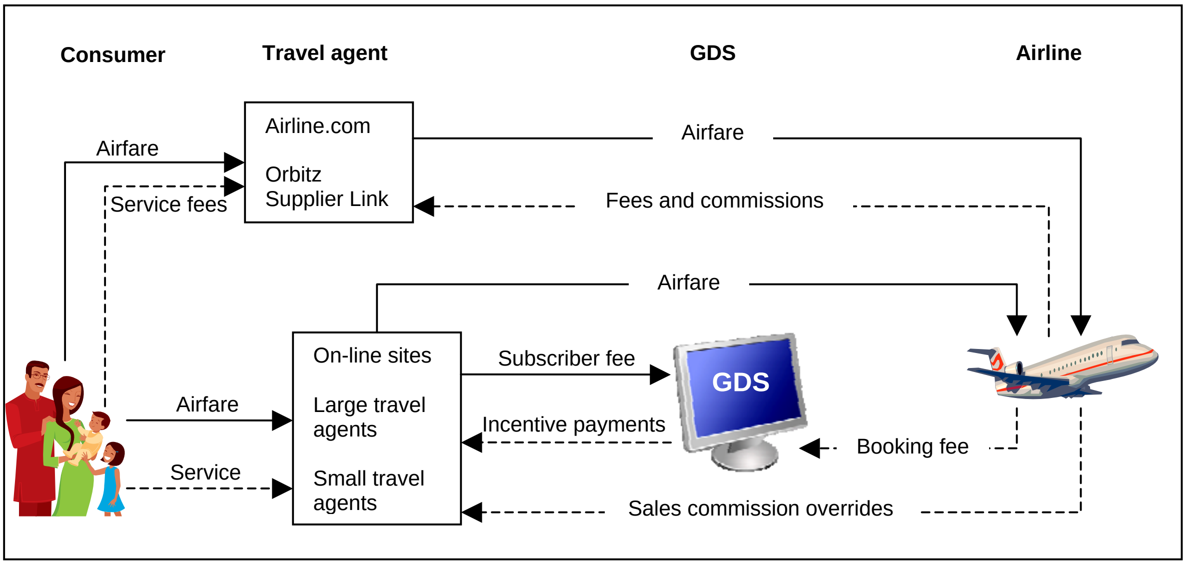
Distribution of airline tickets has progressed immensely since the inception of air travel. Just as aircraft have followed the path of aeronautical engineering so too has the technology of distribution. The two most common distribution strategies are via global distribution systems, which is described in the following section.

GDS

Prior to advanced distribution technology airline passengers purchased their tickets directly from an airline's ticket counter or own ticket office, or via a third-party travel agent. Agents scoured the Official Airline Guide, a publication listing airlines and their flights, to construct an itinerary, and used phones and later telex machines to inquire about availability of seats and make reservations (Pemberton, Stonehouse, & Barber, 2001). This process was time consuming and as the number of flights and seats increased it become an insurmountable challenge to accomplish this without electronic assistance. American Airlines was the first to experiment with this by creating Reservisor in 1946 (E. A. Boyd, 2006). Air Canada succeeded in placing automated query systems in their ticket offices in the early 1960s. However, at the same time American Airlines and IBM were creating the next step in electronic booking systems. Semi-Automatic Business Research Environment (SABRE) was to become the first widely-used and successful computer reservation system (CRS) (Pemberton et al., 2001).

The expansion of CRSs beyond airline reservations to include numerous facets of the travel cycle and their global growth has led to their name being changed to global distribution systems (GDS), while an airline's own, internal reservation system retained the CRS acronym. GDSs host itineraries and seat availability data from airlines and make that information accessible to travel agents and the public through Internet-based portals. Queries are made to the system and a booking is created for a customer if desired. The proliferation of GDSs in airline distribution strategies has garnered the systems immense bargaining power over airlines; the sale of an airline's product relies heavily on the system. As the role of travel agents became more vital for ticket distribution they became an ad hoc sales force for the airline and their GDS was the weapon used to achieve goals. Airlines used tactics such as travel agent commission overrides (TACOs) (Pemberton et al., 2001) and CRSs as competitive weapons, via information control, dissemination, and manipulation (Pemberton et al., 2001; Schulz, 1992). Regulatory interference reduced the biased competitiveness of CRSs, and although their distribution importance has diminished somewhat due to growth of other channels CRSs are still an integral distribution tool of many airlines. Today, airlines negotiate content deals with each GDS; airlines commit themselves to paying a certain transaction fee for each booking in exchange for the display of their itineraries and availability on the system. This fee is on average US$ 16 per transaction, and nearly US$ 31 including TACOs, and US airlines spent on average nearly US$ 545 million on distribution costs in 2003 (GAO, 2003). GDS costs are an average of 2.5% of revenue (Field & Pilling, 2006). Airlines may choose not to be present in all systems as their market share varies and may not coincide with a carrier's own market presence. This distribution relationship is presented in figure 5.7.

Figure 5.7: Summary of payment and fee flows in the current distribution of airline tickets



Source: Adopted from GAO (2003)

While nearly all incumbent carriers and some low-cost carriers opt to be fully present in GDSs, many LCCs are reluctant to incur the higher costs. In addition, presence implies less control over distribution, which some airlines do not prefer. However, there is an electronic compromise which allows airlines a limited presence in GDSs while maintaining greater distribution control. This compromise was constructed specifically for Southwest, as the sheer size of the carrier was of particular interest to GDSs. Therefore, Southwest has traditionally been absent from full-participation in systems, however it has had a limited presence to be visible to travel managers and the business community (Jonas, 2004). This distribution strategy is also utilized by airlines such as easyJet and AirTran (Jonas, 2004). The behavior of JetBlue, present in 2000, absent in 2002, and again present in 2006 shows the value of GDSs (ATW, 2006b; ATW, 2006c; Eye for travel, 2006; Field, 2006). The airline has stated that revenue per segment is US$ 35, minus GDS participation costs, higher than direct purchases (ATW, 2006c). This is partly explained by the propensity of business travelers to purchase tickets via GDSs, but also because price comparison is limited via such systems (M. McDonald, 2007).

Measurement

Measurement of GDS participation for airlines utilizes a three-level dummy variable: no presence, limited presence, and full presence. No and limited presence is a common distribution strategy for many LCCs, while full presence is common for FSCs. The researcher would have preferred to have included the level of GDS distribution for all airlines, however such proprietary information is difficult to obtain. Therefore, a trichotomous level of analysis was appropriate.

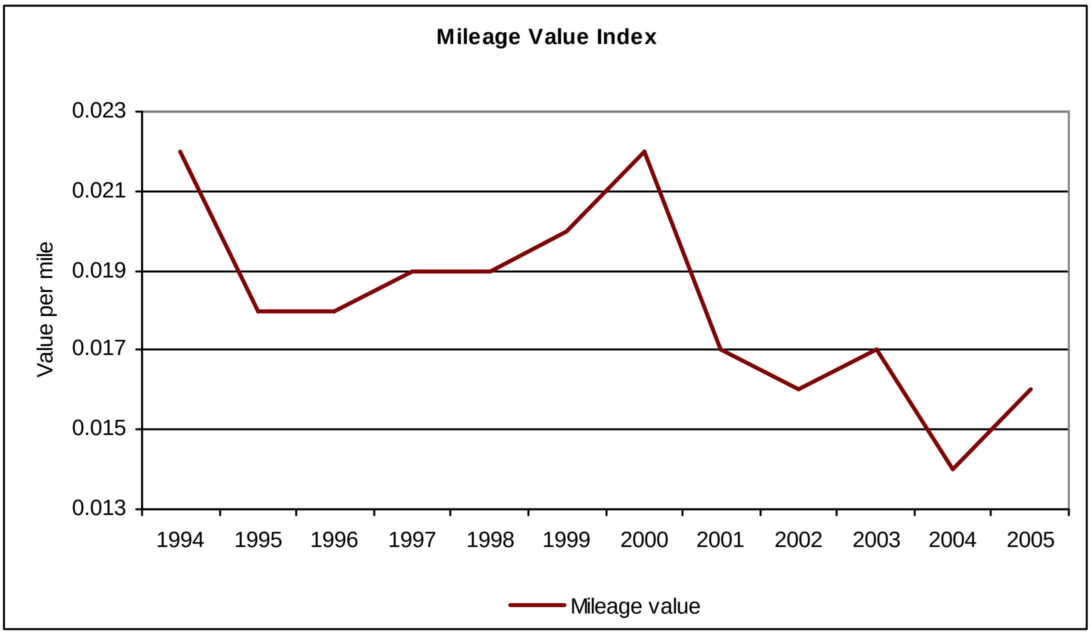
5.3.1.3 Service

Service is what helps to differentiate airlines; it can vary from the spartan to the luxurious, and everything in between. The service concept, however, does not limit itself to the transportation element from point A to point B. Features, such as loyalty programs, lounge access, in-flight classes, and airport selection all contribute to a customer's service perception.

Loyalty programs

Airlines wish to reward their loyal customers for their repetitive patronage and created frequent flyer programs (FFPs) to not only reward customers for their past business but to capture their future business. Western Airlines initiated the first FFP in early 1980 (Maps of World), however it was American Airlines that capitalized by integrating FFPs with electronic databases, such as their CRS, SABRE, and created AAdvantage (FrequentFlier.com, 1997). Programs work by allowing customers to accrue points for their past travels. Points can be in the form of miles, a simplified point system, or in the case of Virgin Blue, based on the fare purchased. Accrual is typically based on the distance flown, a longer distance allows for greater point accrual; however, some airlines, such as Southwest, have simplified the process by rewarding the number of trips taken, regardless of distance. The variation in redemption value for travel results in differing annual mileage value. Sorensen (2006) analyzed the average air fares in key US markets and frequent flier reward levels to determine a mileage value index from 1994 to 2005, as shown in figure 5.8. This analysis shows how airlines can manipulate the redemption value for a ticket and maximize the value of their members.

Figure 5.8: Mileage value index

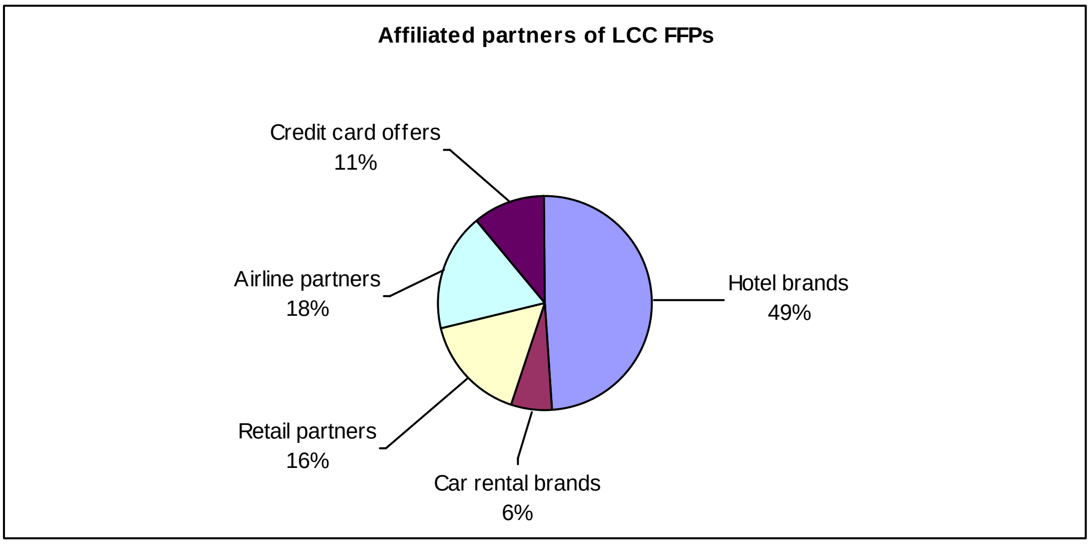


Source: Sorensen (2006)

The costs associated with programs (staff, hardware, newsletters, etc.), as well as, the potentially lost revenue from displacing a full-paying passenger and no revenue from reward redemption, initially made low-cost carriers and foreign airlines reluctant to implement similar programs. However, the success of FFPs among the US flag carriers convinced other airlines that they would be beneficial. Today FFPs are integrated with the entire travel cycle: hotels, rental car agencies, credit cards, retail outlets etc. are all affiliated members of airline loyalty programs. Such co-branding allows FFPs to expand their presence and bring loyal customers closer to the airline, essentially locking their loyalty. In addition, co-branding is a revenue source for airlines. It is estimated that some reward programs bring in more than US$ 1 billion in revenue; United Airline's, Mileage Plus, reported revenue of US $822 million through sales of miles to partners, an ancillary revenue of US $18.26 per member for the airline(Sorensen, 2005). Figure 5.9 shows the breakdown of partners affiliated with LCC FFPs.

The costs associated with FFPs have generated the belief that LCCs have omitted this from their business model. While there are a number of large LCCs that eschew such programs, there are many that have incorporated loyalty programs, such as Southwest, Jetblue, Air Berlin, AirTran, Jetstar, Virgin Blue, and WestJet. Sorensen (2005) provides a breakdown of the partners that these LCCs have affiliated themselves with.

Figure 5.9: Breakdown of LCC FFPs' affiliated partners



Source: Sorensen (2005)

Sorensen (2005) states that the number of partners per LCC varies, with JetBlue having merely two partners while Jetstar is affiliating itself with 156. LCCs that are affiliated with FSCs and share FFPs have the advantage of benefiting from the FSCs broad range of partnerships. There is a geographic split evident among LCCs and their implementation of FFPs. The North American LCC market is the most mature with nearly all LCCs offering an FFP, while the European market has yet to see this level of penetration. The two largest European LCCs, Ryanair and easyJet, have not created loyalty programs as of yet. However, Ryanair has been able to capture additional revenue from co-branded credit cards, which rewards purchases with discounted travel on the LCC.

Measurement

Measurement of FFPs among carriers is done dichotomously and captures the presence or absence of such programs.

Lounge access

One amenity that many travelers can enjoy as premium customers is a carrier's airport lounge. Such a facility is made available to pamper the upper echelons of customer segments, instill brand loyalty, and increase the service offering. Lounges may offer business facilities, refreshments, a tranquil environment, customer service assistance, and even such facilities as massages, dry cleaning, or hot tubs. Lounges are commonly owned and operated by a carrier, or a group of carriers, who lease space from the airport operator. An airline's market share at a particular airport may prohibit the operation of a lounge. In such instances access to an alliance or code-sharing partner airline's lounge may be possible. Lounge membership is commonly offered to members with high-level status in a carrier's FFP. However, a number of US carriers do allow paid membership to lounge facilities, regardless of FFP status. It is common though that first- or business class passengers are granted lounge admission on the day of their travel. The inherent operation and goals of lounges tends to preclude such an amenity among LCCs; they are commonly found among the majority of FSCs. Just as FFPs are relatively uncommon among the world's LCCs due to their associated costs and complexities, so too are lounges for the same reasons. However, a small, but growing, number of LCCs have begun to offer access to airport lounges for a nominal daily fee. Carriers, such as easyJet and WestJet, have partnered with third-party lounge operator, Servisair, to offer lounge amenities. As these carriers expand their customer segmentation focus outsourcing of various functions may allow them to offer amenities similar to FSCs at a lower cost, especially if a pay-as-you-use feature is incorporated to ensure that overall higher fares are not incurred. Mason (2001) states that although LCC business travelers do not prioritize lounge access such an amenity is significant among non-leisure travelers. In addition, findings show that although business travelers of FSCs and LCCs have subtle preference differences the two customer groups are relatively homogenous in short-haul travel, which reinforces the imitative reflection of some LCC and FSC business models.

Measurement

Access to lounges was measured on a three-level scale: free admission, paid admission, and no lounge. Carriers that offer both free admission to lounges and paid admission were coded as offering free admission. A distinction was not made as the majority of carriers that adhere to such a dual strategy continue to prioritize free lounge access to loyal or high-paying customers.

In-flight classes

Segmentation of onboard airline customers allows carriers to differentiate fare prices and maximize revenue; one segment of the aircraft may be designed to cater to higher-paying passengers and another priced to attract leisure fares. Such an increase in service level usually requires increased floor space per passenger necessitating higher fares to compensate for the loss of seats. For example, Alaska Airlines operates the 737-800 with a first and economy class, with 16 and 144 seats respectively. The seat pitch varies from 36 inches in first class to 32 inches in economy. Ryanair, on the other hand, operates the same aircraft type with a single cabin of 189 seats at a 30 inch seat pitch. Alaska Airlines has 45 fewer seats in their 737s which necessitates being able to charge passengers, commonly those at the front of the aircraft, higher fares. The number of premium class seats, the market being served, and competitive factors becomes a balancing act; too few premium seats and carriers are not maximizing their revenue, too many and they are turning away lower-paying passengers because they may not be able to accommodate them. Traditionally, FSCs have offered passengers a choice of two cabins: economy and business. A handful of carriers have implemented a premium service level on first class, while others have provided a middle ground between business and economy with premium economy. However, for the purpose of clarity and simplification carriers with a two class configuration are regarded as adhering to the traditional FSC in-flight class strategy. The common distinction between FSCs and LCCs is that the low-cost brethren opt for the simplicity of a single class cabin. An all-economy cabin increases organizational and operational simplification, such as revenue management, staffing, catering, cleaning, and aircraft configuration. However, this simplicity and lower-cost base comes at the expense of a product offering which is attractive to premium customers who are willing to pay higher fares. Some LCCs do offer their passengers the option of a business and economy class seat. US carriers such as Air Tran, Spirit, and the newly started Virgin America offer premium class seating at the front of the aircraft.

Measurement

Measurement of in-flight class structure varies by the type of analyses conducted. Adherence to the traditional strategy of the group is built on the premise that FSCs traditionally have a two class service, while LCCs offer a single class. Some FSCs opt to offer more classes on long-haul operations. In these cases the carriers are regarded as still offering a two-class product; in other words, the shorter-haul, domestic service offering takes precedence over long-haul operations. It is not possible at this time to distinguish between short-haul and long-haul operations in the analyses. When conducting configurational analyses the number of classes that carriers offer is entered into the data matrix.

Airport selection

Occasionally carriers have a range of airports they can elect to serve. Some cities, or markets, have two or more airports in acceptable proximity and the necessary infrastructure to make it feasible for passengers to choose between airports. Primary airports, such as San Francisco International or Copenhagen Kastrup, are the main airport of a city or region, while a secondary airport is usually a smaller, reliever airport, such as Oakland International or Malmø Sturup. Bonnefoy and Hansman (2006) define a secondary airport as an airport with a 1% enplanement threshold of a region's total commercial enplanement. In addition, their research limits a secondary airport to within a 50 mile radius of a primary airport, and a runway limiting distance of 5 000 feet. Sometimes a region's secondary airport is closer and more convenient than the primary airport, such as Houston's Hobby or London's London City. Historically, airport classifications may shift as new, larger, and more efficient airports may be constructed, such as Dallas Fort Worth which replaced Dallas Love Field or Houston Intercontinental which replaced Houston Hobby (Bonnefoy & Hansman, 2006). Historically, one would categorize primary airport airlines as FSC and secondary airport airlines as LCC (Calder, 2002; Doganis, 2006). The common explanation is that primary airports are large, centralized hubs that allow for connections and economies of density and scale for FSCs. On the other hand, secondary airports offer LCCs less airspace and airport congestion, lower airport charges, occasionally faster passenger handling service; overall simplicity and lower expenses (Calder, 2002; Doganis, 2006; M. E. Porter, 1996; Taneja, 2004). However, this polarization of airport selection among strategic groups is becoming blurred. While FSCs continue to prioritize primary airports as their airports of choice, LCCs have begun to migrate from sole secondary airport users to hybrid users. For example, Brazil's GOL has a large presence at Sao Paulo's primary airport, Guarulhos; easyJet and Air Berlin operate to a large number of primary airports throughout continental Europe, and Southwest has prioritized primary airports when opening new markets. This cross-over by LCCs has had a negative impact on FSCs at their primary airports; competition is gaining in strength.

Measurement

Airport selection measurement analyzes the share of ASKs that carriers operate to primary airports. This type of measurement captures the percentage of seats that a carrier operates to a distinct airport type, rather than arbitrarily giving equal weight to a once-a-week flight to a primary airport or a six-times-daily flight for an LCC. Annual ASK data per destination was obtained for the study group from APG (Seabury Airline Planning Group, 2008). Airports were coded as either primary or secondary by analyzing reports (Bonnefoy & Hansman, 2006), comparing operation with FSCs, under the assumption that an airport served by a number of incumbent carriers is a primary airport, and by using websites such as Airport Records by Position (Baudis & Eichhorn). Such a database allowed the researcher to compile percentage of ASKs at primary airports operated by each carrier. Thresholds were determined for each variable in their respective analyses to create a dummy variable.

5.3.1.4 Operational

An airline's operational characteristics reflect efficiency. Metrics are abundant in the industry, yet for analyses purposes this report focuses on fleet purity, aircraft utilization, and stage length.

Fleet purity

A carrier's fleet assets require tremendous investments and all airlines strive for a reduction in overall life-cycle costs, however a fleet must match the operational requirements of a desired network. It is uneconomical for most airlines to operate a wide-body aircraft on a short-haul route; the origin and destination markets of the majority of short-haul routes would not be able to justify such a large aircraft. In addition, some carries strive to offer higher frequencies to destinations which may justify smaller aircraft rather than large. Network design is a teeter-totter balance between market size and aircraft size (Kilpi, 2007). However, fleet composition has an impact on an airline's earnings (Seristö & Vepsäläinen, 1997). Results show that a more diversified fleet correlates to depressed financial earnings at airlines (Kilpi, 2007). The traditional LCC fleet strategy has been to operate as pure a fleet as possible (Doganis, 2006; Lawton, 2002; Taneja, 2004), while FSCs tend to have less pure fleets to accommodate their diversified networks of short- and long-haul routes. Single fleets at LCCs give carriers efficiency gains. Volume discounts, flight and cabin crew training costs, maintenance costs, and standardized operational equipment contribute to simplicity and lower costs for LCCs (Pilarski, 2001). However, recent LCC fleet strategies have varied from the traditional. For example, JetBlue acquired the 100-seat Embraer 190 to complement its Airbus 320 fleet. This venture away from the traditional LCC fleet policy allowed the carrier to expand to markets that were too small for the A320s (Arnoult, 2005; Shifrin, 2005b), and to enter markets where other LCCs were not present due to fleet restrictions. Similar fleet shifts have been accomplished by Frontier (Airline Business, 2006c; Arnoult, 2007c) and UK-based Flybe (Shifrin, 2006).

Measurement

Measurement and research of fleet purity is limited (Kilpi, 2007). The majority of literary contributions focus on network structure and fleet allocation, rather than fleet composition. Past contributions to the composition field include Adrangi (1999), Seristö (1997), and Beaujon (1987). Kilpi (2007) builds on previous research (De Borges Pan,Alexis George & Espirito Santo Jr.,Respicio A., 2004) and constructs a fleet standardization index (FSI). The FSI delves deeper than other purity measurement by incorporating four levels: manufacturer, family, models, and engines. Carriers may operate a fleet of an identical aircraft family, yet have numerous engine types. This negates the benefits of a single fleet as engine maintenance is a significant expenditure (Doig, Howard, & Ritter, 2003). Aircraft manufacturers of commercial aircraft include Boeing, Airbus, Bombardier (manufacturer of both the Canadair regional jet and De Havilland families), Embraer, and the now defunct McDonald Douglas. The next level is the family of aircraft. An aircraft family describes the group of models that are grouped together and usually require limited additional training or unique maintenance procedures and aid in cost reduction. However, the FSI takes into account model variations to capture the truly pure fleets (identical manufacture, family, model, and engine type). Sometimes carriers have the option of acquiring an aircraft with various engine types to best suit their needs. An airline may have a fleet of identical models yet various engine types, which taints fleet purity and dilutes efficiency gains. Table 5.8 lists examples of these four levels of fleet analyses.

Table 5.8: Examples of aircraft families

Manufacturer	Family	Models	Engine variations
Boeing	737-x	737-100	JT8D[1]
		-200	CFM56
		-300	
		-400	
		-500	
		-600	
		-700	
		-800	
		-900	
Airbus	A32x	A318-100	PW 6122A
		A319-100	CFM56
		A320-200	IAE V2500
		A321-200	
	A330/340	A330-200	CF6
		A330-200F	CFM56
		A330-300	PW4000
		A340-200	Trent 553
		A340-300	Trent 556
		A340-500	Trent 700
		A340-600	

[1]: 737-100 only
Source: Author's own creation

Kipli's (2007) FSI is calculated as follows:

$$FSI = \frac{\sum CSPI}{\text{number of manufacturers}}$$

The cell standardization partial index (CSPI) (De Borges Pan,Alexis George & Espirito Santo Jr.,Respicio A., 2004) of one manufacturer is based on the indices cell standardization index (CSI) for each family from that particular manufacturer:

$$CSPI = \frac{\sum CSI}{\text{number of families from the manufacturer}}$$

The CSI (De Borges Pan,Alexis George & Espirito Santo Jr.,Respicio A., 2004) of one particular family is calculated as follows. AMF is the number of aircraft *models* in the *family* and TAF is the total number of *aircraft* in the *fleet*.

$$CSI = \frac{\text{number of aircraft in the family}}{\text{AMF} \bullet \text{TAF}}$$

Kilpi (2007) recognizes the limitations of a missing fleet scale component. Lack of fleet scale integration does not factor in the size of a carrier's fleet in the FSI. A three-aircraft airline with three different families has a different expenditure structure than a 30-aircraft airline with a mix of three families. Maintenance programs are dependent on scale, which is omitted from this FSI. However, the advantage is that it allows comparison of different sized fleets, which is appropriate to the analyses. A fleet scale analysis is appropriate if the desire is to analyze and compare comparable sized fleets.

Kilpi's (2007) FSI analysis incorporates a similar engine analysis based on engine models and types. This detailed level of information is not readily available and has been omitted from this variable's FSI. However, the fleet summary from the journal Air Transport World (ATW) (ATW, 2007e) lists the world's aircraft fleet by carrier and variation between engine models is noted. This is incorporated as a different model of the same family type in the analyses. Table 5.9 is an excerpt of Thai Airway's fleet to demonstrate the incorporation of engine types.

Table 5.9: Excerpt of Thai Airways' fleet

A/C mnft.	**Family**	**Model**	**Engine type**	**# of a/c**
Airbus	A300-x	A300-600	GE	5
		A300-600R	GE	2
		A300-600R	P&W	13

Source: ATW (2007e)

In this example Thai Airways has three differing aircraft models of the same family, partly due to the varying engine types found on two identical models. Such a disparity in engine models would dilute fleet purity and lower Thai's overall FSI.

Table 5.10 is a sample FSI calculation for JetBlue.

Table 5.10: JetBlue's FSI

Level	A/C mnft.	Family	# of a/c	# of models	# of families	# of mnfts.	Index
CSI	Airbus	A32x	101	1			0.8016
CSPI	Airbus				1		0.8016
CSI	Embraer	E190/195	25	1			0.1984
CSPI	Embraer				1		0.1984
FSI	All		126			2	0.5000

Source: Author's own creation; data from ATW (2007e)

The FSI data is gathered exclusively from ATW (ATW, 2007e). Those few airlines that had freighter versions of aircraft were included in the analyses[39]. These aircraft contribute to overall fleet purity by bringing efficiency gains to the airline. The measurement for the adherence analyses uses dummy variables 0, 1, and 2. The configurational analyses use the raw data with a dichotomous segmentation. Each analysis explains in detail the threshold-setting procedure.

Average stage length

Average stage length is another operational metric that allows one to compare the networks of carriers. Stage length is a measurement of the average distance flown by the carrier. LCCs have traditionally restricted themselves to shorter stage lengths, partly reflected by their fleet attributes, while FSCs have had longer stage lengths due to their long-haul networks. Regional carriers have observably the lowest stage lengths due to their role as a short-haul network connector. Studies have shown that an increase in stage length leads to lower unit costs, which O'Conner (2001) refers to as the cost taper. Transport costs are allocated per passenger and spread over the distance traveled, therefore a shorter distance equates to a higher cost. This is a combination of many factors, including the cost of handling passengers, which does not vary by distance flown, fuel burn, which is higher on short-haul trips due to a greater number of takeoffs and landings and higher landing fees. This is compounded by the fact that short stage lengths are often in markets that are more elastic than long-haul because air travel is competing with alternative transportation modes. Cost taper may be regarded as a parabola that reaches a minimum cost at a certain stage length only to rise again as distance increases further. Total fuel burn increases with stage lengths and as a flight travels beyond the minimum cost taper point it must remove passengers to accommodate greater amounts of fuel. This leads to increased cost per passenger mile.

Measurement

Measurement of average stage length is in nautical miles. The measurement for the adherence analyses uses di- and trichotomous dummy variables depending upon the specific analysis.

[39] This carriers are: Air Canada, Air France/KLM, Alitalia, Cathay Pacific, China Southern Airlines, Emirates, Japan Airlines, Korean Air, Lufthansa, Northwest Airlines,

Feed share

Alliances, codeshare agreements, capacity lift providers, and interlining have all been described within the network heading. These variables were measured di- or trichotomously, which fails to capture the intimate relationship some carriers may have with each other. The feed share variable allows the researcher to measure the amount of capacity provided by feed carriers. These carriers often operate smaller aircraft and supplement larger carriers with passengers from outlying, short-haul communities (Graham, 1997; Pagliari, 2003; Pender, 1999). These carriers are often contracted on an interline, wet-lease, franchise, or capacity purchase agreement. Regional operators are often chosen rather than FSCs or LCCs who operate their own short-haul capacity because of their lower-cost base (Davies & Quastler, 1995; French, 1995).

Measurement

Measurement of feed share measures ASKs flown by regional carriers for FSCs or LCCs. System-wide capacity data was obtained from planning database, APG (Seabury Airline Planning Group, 2008), for the FSC and LCC study groups, which included information regarding the marketing carrier and operating carrier. Regional carriers and their ASK contribution to the marketing carrier's system were segregated to determine the share of ASK contribution. This was not done for the regional study group as they do not use feed services from other carriers. Thresholds were determined for the specific analyses.

5.3.1.5 Profit

Profit is often one of several motivating factors for a firm operating in a free-market economy (Friedman, 1970). Other motivators may be market share, product line, revenue, or costs. Airlines are no different, although it has been said that airlines are in business not to create a return on capital, but rather to acquire additional capacity (David, 2007). Operating profit margin is often used as a determinant of financial prowess of airlines (Alamdari & Fagan, 2005; David, 2007; S. A. Morrison & Winston, 1995; Suzuki, 2000). However, Roger (2007) attacks this notion and proposes that return on assets or return on total gross assets is a more appropriate measure of airline health. He does acknowledge that profit margin is an acceptable measure of safety buffer for airlines. The researcher has elected to measure business model success using operating profit margin. Although the industry is very capital-intensive the business model is comprised of more than aircraft assets. Roger's (2007) premise is based on a shareholder perspective and maximizing total shareholder return, while this research is based on an inclusive business model not fragmented by assets. Margin, rather than absolutes, is used to allow equally-weighted comparisons of airlines. An absolute profit would distort smaller carriers and not allow an accurate configurational analysis. This research utilizes operating profit margin as the dependent variable, rather than net profit margin. Thornhill and White (2007) argue that operating margin measure value creation and value capture, which is the essence of strategy, an elongation of the business model concept. These subtle differences relate to the underlying theoretical business model concept. As reviewed in Chapter 3 the business model concerns itself with a firm's activities. Operating profit and its margin is the most accurate reflection of these activities.

Measurement

Operating profit margin is determined as follows:

$$\text{Operating profit margin} = \frac{\text{Operating income}}{\text{Operating revenue}}$$

Data was gathered from the respective annual reports. If none were available ICAO financial data was obtained (International Civil Aviation Organization, 2007) for the missing carriers. For a small group of carriers current data was not available[40]. The researcher utilized the Thompson Research financial database. Averages were calculated from the data available to determine the average operating profit margin for the respective carriers.

This section has reviewed the business model variables used throughout the analyses. These variables are segmented in the main headings of network, distribution, service, operational, and profit. Each variable was described and the method of measurement was explained. There are 18 business model variables in total, however airlines in the industry were inquired about additional elements. Variables such as Internet distribution, ancillary revenue, ground services, and charter operations have not been included in the analyses and were not described in the business model description, though airlines were initially investigated on these factors. Their omission from the analyses is the result of a lack of comparable data across all the airlines in the group. The business model variables were used to create constructed variables which are described in the following section.

5.3.2 Constructed variables

In early 2007 surveys were distributed to airlines worldwide (see Appendix V for the survey). The intention was to explore the facets of business model changes through imitation and innovation taking place at airlines throughout the world and garner some useful results about the motivation and inspiration behind such changes. A database of all CEO-level executive names and addresses for airlines worldwide was gathered from the OneSource[41] business database. The standard industrial classification (US87) for scheduled air transportation (4512) for all regions of the globe was selected to capture all relevant airlines. The minimum revenue requirement was 5 million USD, which ensured that airlines of minimal relevant market significance were included. However, the database query was also run for revenue figures of 10 million USD, 20 million USD, 30 million USD, and 1 billion USD in revenue. This range of queries was to investigate the response rate at various levels to determine its generalization at varying industry levels. The query results were purged of erroneous entries by cross-checking firms with their business activities; there were numerous entries consisting of such firms as cargo airlines, trucking logistical companies, and firms no longer in operation, as well as, duplicates. The survey was distributed to the remaining firms in the database, which consisted of 208 airlines at the broadest level. The survey was distributed via mail and respondents could choose to answer in written format or a link was provided to an identical, online version.

[40] Brit Air, Lufthansa Cityline, and Régional

[41] OneSource (http://www.onesource.com) is a database that provides a breadth of information regarding companies and industries, including names and addresses of senior management.

68% chose to respond via the online version and the rest via mail. The survey included open and closed questions and can be reviewed in Appendix V. 42 airlines chose to respond after three months, which resulted in a response rate of 21% and a sample error of 11%. All respondents will remain anonymous throughout the analyses. A detailed analysis of the responses can be studied in Chapter 7.

The responses from the airlines allowed the researcher to construct measurements to analyze the level of rivalry, innovation, and imitation found in the industry. These measurements were constructed to capture the level of rivalry and imitation at the firm level both within strategic groups and among strategic groups. The following chapter will describe the variables that were constructed and used to analyze the data.

5.3.2.1 Business model purity

A purity value was created to measure which carriers adhere to the traditional, pure business model of the respective strategic groups; the group leaders. The three strategic groups in the industry have their traditional business model which is often used to compare and contrast with group members. The purity value, a percentage, was created by establishing thresholds to determine a di- or trichotomous dummy variable for each business model variable. The sum of the di- or trichotomous dummy variables was divided by the sum of the traditional business model variables. This percentage is the purity of the carrier compared to the group's traditional business model. The threshold for each business model variable is explained in detail in the respective chapter (Chapters 6 and 8).

$$\text{Business model purity} = \frac{\sum \text{Dummy business model variables}}{\sum \text{Dummy traditional business model variables}}$$

5.3.2.2 Business model purity-dummy

A dummy variable for business model purity was created. This variable allowed the researcher to categorize those airlines that were closely adhering to the traditional business model within each strategic group. Airlines with an adherence level of 90% or greater were coded as 1, while those with an 89% adherence, or less, were coded as 0, as shown in table 5.11.

Table 5.11: Purity-dummy

Adherence level	**Recoded**
90% or greater	1
89% or less	0

Source: Author's own creation

5.3.2.3 Rivalry

Two types of rivalry variables were constructed from the answers provided: within groups, or internal rivalry, and among groups, or external rivalry. Respondents were asked to categorize their carrier in one of five[42] strategic groups. They were then asked to rank the level of competitiveness of all groups found in the industry. This ranking took place on a five-point Likert scale.

Rivalry-within-groups

Dummy variables were created and responses were recoded as 1 for those respondents that ranked their own group as a direct competitor (5 out of 5) and 0 for any response of 4 or less within their own group. This measurement determined the level of perceived rivalry within a strategic group. Table 5.12 shows this relationship.

Table 5.12: Rivalry-within-groups

Response	Recoded
Respondent ranks competitors in own group as 5	1
Respondent ranks competitors in own group as 4 or less	0

Source: Author's own creation

Rivalry-among-groups

Dummy variables were again created and responses were recoded as 1 for those respondents that ranked other groups as a near or direct competitor (4 or 5 out of 5) and 0 for any ranking of 3 or less, as depicted in table 5.13. This measurement determined the level of perceived rivalry among strategic groups.

Table 5.13: Rivalry-among-groups

Response	**Recoded**
Respondent ranks competitors in one other strategic group as 4 or 5	1
Respondent ranks competitors in all strategic group as 3 or less	0

Source: Author's own creation

The variation in the thresholds utilized to establish the thresholds for the dummy variables for rivalry-within- and among-groups is explained by the spread of answers given by respondents. If the threshold for creating the rivalry-within-groups dummy had included both near and direct competitors (i.e. those ranked either 4 or 5) nearly all responses would have been recoded as a 1. In other words, most carriers regard all carriers in the same strategic group as near or direct competitors. If the threshold had been set at 4 or 5, 100% of FSCs and LCCs would regard others as near or direct competitors, and regional carriers 66%. In order to ensure variation among the answers the researcher elected to code responses of 3 as 1, while all others as 0 to measure rivalry-within-groups. On the other hand, the threshold for rivalry-among-groups was set at responses 4 and above. This enabled the researcher to widen the breadth of the perception of rivalrous behavior among groups.

[42] FSC, LCC, regional, charter, and other

5.3.2.4 Imitation

Airlines can choose to change their business model through strategic imitation. This can take place by either mimicking competitors within the same strategic group or mimicry among strategic groups.

Imitation-within-groups

Internal imitation within strategic groups was measured by questioning airlines' inspiration for changing their business models. The level of inspiration attributed to competitors was multiplied by the rivalry-within-groups dummy variable; a high figure equates to a high degree of internal imitation. In other words, airlines that perceived a high level of internal rivalry and ranked their competitors as high sources of inspiration were seen as imitating within their group.

$$\text{Imitation - within - groups} = (\text{Level of competitor inspiration}) \times (\text{rivalry - within - groups})$$

Imitation-among-groups

External imitation among strategic groups was measured by analyzing the level of change in each airline's business model activities traditionally not present in the respective strategic groups' business model. If respondents indicated that they changed activities not present in their traditional business models it is an indication of external imitation, or imitation among groups. There were three variables constructed to measure imitation among groups: external-imitation-overall, external-imitation-activity, and external-imitation-average.

External-imitation-overall

This variable was constructed by summing the level of change for each carrier in each activity not traditionally present for the respective strategic group.

$$\text{External - imitation - overall} = \sum \text{change to non - traditional business model activities}$$

External-imitation-activity

External-imitation-activity measures the average rate of change per activity not traditionally present in the business model. This was constructed by dividing the variable external-imitation-overall with the number of activities not traditionally present in each strategic group.

$$\text{External - imitation - activity} = \frac{\text{External - imitation - overall}}{\text{\# of activities not present in the tradtional business model}}$$

External-imitation-average

The constructed variable, external-imitation-average, compares the level of change per activity not traditionally present in the business model with the overall average level of change per activity not traditionally present for the entire group. A result greater than 1 indicates that the airline on average imitates among other strategic groups more than their group.

$$\text{External-imitation-average} = \frac{\text{External-imitation-overall}}{\text{Average strategic group change in activities not traditionally present}}$$

5.3.2.5 Innovation

Innovation, or change, of business model activities was determined by questioning airline management about the level of change in the traditional business model activities found in the respective strategic groups. Unlike imitative behavior, innovation can not be categorized as either internal or external, although, similar to the constructed imitation variables, there are also three innovation variables: innovation-overall, innovation-activities, and innovation-average. They were constructed in the same manner as the imitation variables, however the non-traditional activities were substituted with the traditional activities.

Innovation-overall

Innovation-overall measures the level of innovation found in each airline. It was constructed by summing the level of change in the traditional business model activities found in the respective strategic groups.

$$\text{Innovation - overall} = \sum \text{change to traditional business model activities}$$

Innovation-activities

The constructed variable, innovation-activities, measures the average level of change in each activity. It is constructed by dividing the overall innovation by the number of activities traditionally present in the business model for each respective strategic group. A higher result indicates a carrier that is generally more innovative.

$$\text{Innovation - activity} = \frac{\text{Innovation - overall}}{\text{\# of activities present in the tradtional business model}}$$

Innovation-average

The overall innovation of an airline is compared to the average innovation of the respective strategic groups to determine which carriers are more innovative than the average. The variable is constructed as follows:

$$\text{Innovation - average} = \frac{\text{Innovation - overall}}{\text{Average strategic group change in activities traditionally present}}$$

Both the business model variables and constructed variables have been described in detail. The constructed variables are segmented according to business model purity, rivalry, imitation, and innovation. These variables comprise the foundation of the forthcoming analyses and are all integral parts of varying degrees. The following section describes in detail the hypotheses and propositions that the analyses will attempt to address.

5.3.3 Control variables

This research project incorporates two control variables in the correlation analyses (see Chapter 6). The intention of this is to control for an external affect between two variables. The literature review highlighted the affect of firm size in relation to the concept of imitation, which suggests that a carrier's size may influence the analyses between business model adherence and profit. Size is an elusive concept and can be measured in a number of ways. One may look at customers served, revenue, employees, product line, or market presence. While revenue is a factor of profit, to avoid bias the researcher chose not to look at this variable. The number of employees in a carrier may represent size, however the data is occasionally elusive, especially among private carriers that do not report detailed information. In addition, outsourcing, a common strategy in today's industry, may result in inaccurate pictures of a carrier. A more accurate measurement may be passengers handled by employee, however the previously mentioned challenge preclude this. While product line may be more applicable to fast-moving-consumer-goods industries, market presence may be applicable to the airline industry. However, with highly mobile assets, namely aircraft, one is challenged to determine when an airline is present in a market. A weekly frequency between two city-pairs may not be equally weighted as an hourly frequency between two cities. In order to test and control for the varying sizes of airlines in the study the researcher has measured two variables for size, passenger figures and the aggregate fleet of each carrier in the study group. Both variables were not manipulated and the figures were entered as recorded from the sources.

5.3.3.1 Size-passengers

This variable controls for the size of airlines measured in passenger figures for the study year. Data was gathered for each carrier from Air Transport World Traffic Results 2006 (2007f). A large carrier would carry a large number of passengers.

5.3.3.2 Size-fleet

Fleet size is representative of a carrier's size; a large fleet would imply a large carrier. Fleet types are, however, not integrated in the metric. This would be similar to the FSI variable discussed previously. Therefore, a carrier with a large number of small aircraft would be considered to be larger than a carrier with few, but large aircraft. One may solve this issue by investigating the number of seats each carrier has installed in aircraft, however such data is often cumbersome to gather.

5.3.4 Variable placement

This research project utilized 33 unique variables distributed among three methods in the project. Six variables (internet, in-flight service, ancillary, charter, ground) were inquired about in the distributed survey and were intended to be used in the QCA analyses. However, the lack of necessary data and incompatibility with QCA notation made this impracticable. Table 5.14 is a composition of the variables used throughout the project and their use with respective methods.

Table 5.14: Use of variable segmented by method

Variable heading	Variable	Correlation/ regression	ANOVA	Boolean
Network	Interline	✓	✓	✓
	Online	✓	✓	✓
	Through-fare	✓	✓	✓
	Restrictions	✓	✓	✓
	Alliance	✓	✓	✓
	Codeshare	✓		✓
	CLP	✓		✓
	CLT	✓		✓
Distribution	GDS	✓	✓	✓
	Internet[2]		✓	
Service	In-flight service[2]		✓	
	In-flight classes	✓	✓	✓
	Ancillary[2]		✓	
	Lounges	✓	✓	✓
	FFP	✓	✓	✓
	Seating[2]		✓	
Operational	Service to primary/secondary a/p	✓	✓	✓
	FSI	✓	✓	✓
	Charter[2]		✓	
	Ground[1]			
	Feed share	✓		✓
	Stage length	✓		✓
Financial	Operating margin	✓		✓
Constructed	Business model purity		✓	
	Purity-dummy		✓	
	Rivalry-within-groups		✓	
	Rivalry-among-groups		✓	
	Imitation-within-groups		✓	

	External-imitation-overall		✓	
	External-imitation-activity		✓	
	External-imitation-average		✓	
	Innovation-overall		✓	
	Innovation-activities		✓	
	Innovation-average		✓	
Control	Size-Passengers	✓		
	Size-Fleet	✓		

[1]: Variable was inquired about in survey but not utilized in analyses
[2]: Used exclusively in the ANOVA analyses using answers from survey respondents
Source: Author's own creation

The hypotheses, methods, and variables have been presented. The following section describes the study groups that are used to represent the airline industry. Rather than gathering information from all scheduled passenger airlines populating the industry the researcher chose to perform the analyses on a selection of airlines, which are described below.

5.4 Study groups

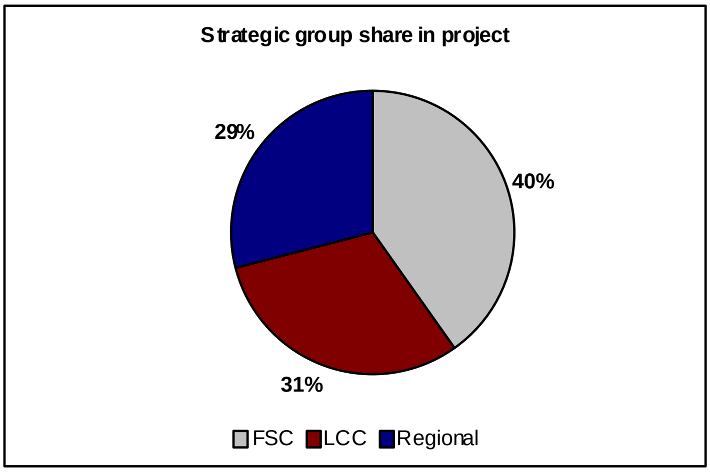
This research project utilizes two main study groups throughout the analyses. The regression, correlation, and Boolean analyses study the representative group chosen by the researcher. The empirical analysis using the ANOVA method incorporates the survey responses gathered from the industry. The primary justification for using two study groups is to ensure a sufficient study group size to analyze future configurational combinations. In addition, data access is a primary concern of the researcher. A number of survey respondents are from privately-held airlines where the necessary financial data is not publicly available. In addition, the researcher wishes to ensure a broad and equally-weighted Boolean analysis. This can only be guaranteed if the researcher selects the study group from selected criteria. The survey responses were representative of the industry, however the researcher wishes to expand the number of airlines. This section will describe in detail the two study groups and the selection criteria.

5.4.1 Researcher-chosen study group

The researcher-chosen study group is selected by choosing those carriers from the three strategic groups that have posted the greatest revenue. The researcher is interested in capturing the business model changes that the world's largest airlines implement. To avoid selection bias the researcher selected the study group according to revenue rather than profit. It is an interpretation that airlines with large revenue pools have the financial and resource capabilities to be either innovative, imitative, or both, if the airline chooses.

The researcher utilized the 2006 industry ranking presented in various publications: Airline Business (Panariello, 2007), Air Transport World (ATW, 2007d), and The Airline Industry Guide 2007/08 (Airline Business, 2006a; Airline Business, 2007b). More than one publication was utilized because some segment airlines according to strategic groups, such as a low-cost and regional airline ranking, while others geographically. These publications rank airlines according to various metrics, including 2006 revenues. The researcher tabulated the data according to the three strategic groups found in the industry. Strategic group categorization was achieved by using the publications' categorization. There were some carriers, regional especially, that did not appear in all the publications although their revenue was high enough to justify a placement. The researcher added them to the research study group[43]. In addition, two carriers were omitted from the regional study group: Republic Airways Holdings and Kras Air. Republic Airways Holdings is a holding company representing three separate regional carriers: Chautauqua Airlines, Republic Airlines and Shuttle America. Separate financial data and operational metrics were not available for these carriers and the researcher elected to omit the holding company even though the business models may be identical. Kras Air, a regional carrier in Russia, was omitted due to lack of reporting data. When possible the researcher utilized the financial data presented in the airline rankings. If no data was presented the respective annual reports were used, as in the case with Air Asia. When no annual reports were available the researcher utilized the Thompson Research database[44]. This was especially helpful when researching the regional carriers, which may not report or were erroneously omitted from the industry rankings. Some regional airlines did not report their 2006 financial figures in the Thompson Research database. In this event the researcher calculated an average of those years reported and used those figures. This method was utilized for three regional carriers[45]. The number of airlines in each strategic group varies. The researcher categorized the rankings found in the various publications and determined that the FSC group was heavily represented. Therefore, the largest strategic group chosen by the researcher is this group. The share of the respective strategic groups is shown in figure 5.10. The researcher chose the top 25 FSCs, 19 LCCs, 18 regional carriers ranked according to revenues. Table 5.15 lists the airlines according to strategic group.

Figure 5.10: Strategic group share in project



Source: Author's own creation

[43] These carriers are: Air Asia, Flybe, Air Canada Jazz, American Eagle, Brit Air, and Lufthansa Cityline
[44] Thompson Research is a database providing current and historical financial data for all firms listed on US exchanges (12,000 firms) and in 53 countries. Profiles may include business descriptions, SEC reports, financial ratios, earnings estimates, and current and historical stock information
[45] Brit Air, Lufthansa Cityline, and Régional

Table 5.15: Researcher-chosen study group

Full-service carriers (IATA code)			
Air Canada (AC)	British Airways (BA)	Emirates (EK)	Qantas (QF)
Air China (CA)	Cathay Pacific (CX)	Iberia (IB)	SAS (SK)
Air France-KLM (AF)	China Eastern Airlines (MU)	Japan Airlines (JP)	Singapore Airlines (SQ)
Alitalia (AZ)	China Southern Airlines (CZ)	Korean Air (KE)	Thai Airways (TG)
American Airlines (AA)	Continental Airlines (CO)	Lufthansa (LH)	United Airlines (UA)
ANA (NH)	Delta Air Line (DL)	Northwest Airlines (NW)	US Airways (US)
			Virgin Atlantic (VS)
Low-cost carriers (IATA code)			
Aer Lingus (EI)	EasyJet (U2)	Midwest Airlines (YX)	Sterling (NB)
Air Asia (AK)	Flybe (BE)	Norwegian (DY)	Virgin Blue (DJ)
Air Berlin (AB)	Frontier Airlines (F9)	Ryanair (FR)	Vueling (VY)
AirTran Airways (FL)	Gol Transportes Aereos (G3)	Southwest Airlines (WN)	WestJet Airlines (WS)
ATA Airlines (TZ)	JetBlue Airways (B6)	Spirit (NK)	
Regional carriers (IATA code)			
Aegean (A3)	Air Wisconsin (ZW)	ExpressJet (XE)	Régional (YS)
Air Canada Jazz (QK)	American Eagle (MQ)	Horizon Air (QX)	Skywest (OO)
Air Macau (NX)	Brit Air (DB)	Lufthansa Cityline (CL)	TSA (AX)
Air Nostrum (YW)	Comair (MN)	Mesa (YV)	
Air One (AP)	Eurowings (EW)	Pinnacle (9E)	

Source: Author's own creation

This research project analyses three strategic groups within the scheduled passenger airline industry. Although the majority of readers may agree with the classification of carriers in the study group, there are a few in particular that may cause concern. This is particularly true of the low-cost carrier group as there are often no definitive segmentation boundaries; classification parameters are permeable. Irish Aer Lingus, U.S.-based Midwest Airlines, and UK carrier Flybe are three carriers that may be cause for discussion. The researcher acknowledges that concern is warranted but classification is necessary and after a careful review all three carriers have been assigned LCC status. Aer Lingus, the Irish flag carrier, has battled bitterly with their ultra-successful, pure LCC neighbor, Ryanair, for a number of years. Aer Lingus went through a company-wide strategic transition to ensure the carrier's survivability and this transition resulted in the carrier emulating the LCC business model. Today, the carrier is often categorized as an LCC, and the CEO proclaims the airline is a leading LCC (Mannion, 2007). Midwest Airlines, based in Milwaukee, US, is a carrier that has straddled both the LCC and FSC groups. Recently, the airline was a takeover target by both an LCC and FSC, evidence of Midwest Airlines' dual role. In this research report it has been classified as an LCC. Finally, Flybe from the UK is a carrier that overlaps the regional and LCC strategic groups. The carrier has its roots in the regional industry; however due to a financial crisis the carrier implement many LCC standards. The CEO, Jim French, explains that the transition by Flybe was questioned by many, however the same shift by Aer Lingus added creditability to Flybe's own business model change (Pilling, 2007). The glaring difference between the two was merely that Aer Lingus was operating narrow-body aircraft while Flybe had a fleet of regional aircraft (Pilling, 2007). In addition, other analyses have classified Flybe as an LCC, most notably the Analysis of the EU Air Transport Industry prepared for the European Commission (European Commission, 2007a). These events have led the author to place Flybe within the LCC group.

5.4.2 Survey respondent study group

While the researcher-chosen study group was used in two of three analyses, an empirical investigation was conducted to research why business model adaptation occurs in the industry. This led to the survey-respondent study group[46]. This group consists of the 41 airlines that returned a distributed survey. The respondents were ensured anonymity however their descriptive characteristics compared to industry averages are presented in table 5.16. The figures representative of the industry are the averages from Air Transport World's, World Airline Report (ATW, 2007d; ATW, 2007f), unless otherwise indicated. The global, industry-wide data is consistently less than the researcher and respondent groups. This indicates that these two groups are more representative of the larger carriers. In addition, a number of carriers in the industry have a strong focus on charter operations, which is not always the case with the larger, scheduled carriers. The figures from the researcher and respondent groups are similar, indicating that they are representative of each other.

Table 5.16: Survey respondent study group descriptive characteristics

	Fleet size	Employee size	Passengers (mill.)	Revenue ($ mill.)	Op. profit ($ mill.)	Net profit ($ mill.)	ASK (mill.)	RPK (mill.)	Stage length (nm)
Industry									
FSC	332[1]	30,113[1]	10.7	4,301	178	274	33,222	25,665	566[1]
LCC	85[2]	7,401[2]	7.1	1,113	104	107	15,089	10,601	546[2]
Regional	144[3]	4,518[3]	2.9	638	60	15	3,842	2,193	221[3]
Researcher group									
FSC	224	36,365	42.3	16,003	871	3,487	122,359	92,277	989
LCC	86	6,939	16.9	1,940	152	180	22,854	39,676	832
Regional	106	5,207	9.1	1,350	123	22	9,470	6,960	325
Respondent group									
FSC	198	40,605	41.7	13,487	703	2,794	134,199	106,474	1024
LCC	138	11,358	32.1	1,939	152	180	89,200	108,915	689
Regional	60	5,493	4.3	693	41	26	5,306	3,775	270

[1]: Data compiled from following carrier database – AA, AS, CO, DL, FL, NW, TW, UA, US (Seabury Airline Planning Group, 2008)
[2]: Data compiled from following carrier database – B6, F9, FL, G4, HP, NK, SY, TZ, U5, WN, YX (Seabury Airline Planning Group, 2008)
[3]: Data compiled from following carrier database – 9E, AX, MQ, OH, OO, QX, XE, XJ, YV, ZW (Seabury Airline Planning Group, 2008)
Source: Author's own creation

[46] Detailed information about the process of composing and analyzing this group can be found in Chapter 7.

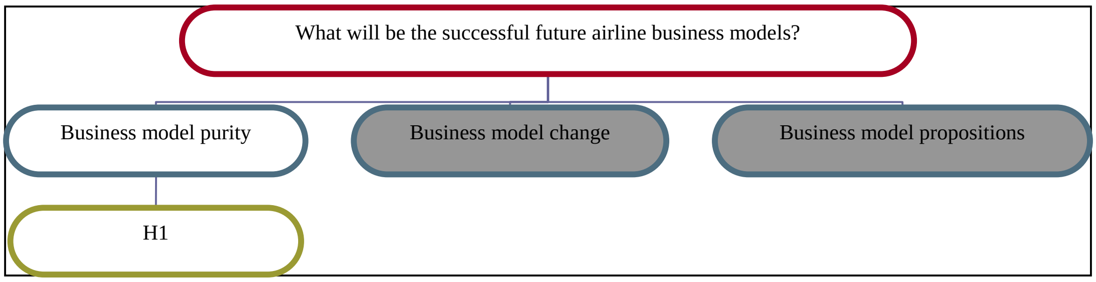
This chapter has introduced the reader to three supporting facets: hypotheses, methods, and variables, as well as, the study groups. The hypotheses should provide insight into the changes the industry may witness, while the methods were presented to describe to the reader how they were tested. The variables presented explain in detail how they were measured and constructed. Finally, the study groups that are used to gather the data are described. This chapter is the first step towards the analyses, which begin with the next chapter.

6. Business model adherence

- Singapore Airlines' flight from Newark to Singapore is the longest scheduled passenger airline flight at 16,600 kilometers and nearly 19 hours in the air; the shortest flight is said to be between Papa Westray and Westray in Scotland, a mere 3 minutes -

Adherence to an industry's strategic group's traditional business model can have either positive or negative affects on performance (Alamdari & Fagan, 2005; Stewart Thornhill, 2007). Some industries may reward firms which adhere to pure, traditional business models, while other industries may punish strict adherence to traditional ways of operating. The intent of the first of three analyses is to investigate the level of adherence among the airline industry's strategic groups. Figure 6.1, an organizational chart showing the research structure with the main research question and three sub-questions with the respective hypotheses or propositions, is presented and will precede each analysis. This shows the relationship between the main research question and the hypotheses being addressed.

Figure 6.1: Business model purity organizational chart



Source: Author's own creation

This section will present the analyses to test hypothesis 1:

H1: The more pure an airline's business model the greater the operational profit margin.

The goal of this research is to address the questions: how do airline business models vary, and how does variation impact financial performance? Past research (Alamdari & Fagan, 2005) has shown that LCCs that deviate from the pure, traditional LCC business model incur a financial penalty. While striving for differentiation LCCs accumulate costs which are often not substantially covered through higher yields or other sources of revenue. However, this analysis was conducted on only one particular strategic group and not across the other groups, or at an industry-wide level. Suzuki (2000) concludes that airlines maximize operational profit by providing either high quality or low fares, suggesting that adherence to either a pure FSC or LCC business model is best. However, this research analyzed the ten largest US carriers and did not perform the research at the strategic group level but rather meshed the airlines together. The researcher intends to complement past research by expanding the study groups to include all groups FSCs, LCCs, and regional carriers, as well as, update the findings with the most recent data. The chapter is segmented according to the analytical depth. It commences with an investigation at the strategic group level and concludes with a macro-level, industry-wide analysis.

6.1 Strategic group analyses

Each strategic group analysis utilizes 15 constructed dummy variables to measure the level of adherence to the traditional business model. The dummy variables and their thresholds are described prior to each analysis, while an explanation of the variables and the method of measurement of business model purity was provided in Chapter 5.

Although the researcher has composed an airline business model consisting of 16 variables, only 15 are included in the correlation analyses. The researcher chose to omit the variable *capacity lift provider* from the FSC and LCC strategic groups because this is not an element that is relative to these groups[47]. Whether or not the variable was included in the analyses would have no affect as no FSCs or LCCs displayed this trait. Within the regional strategic group the variable *capacity lift taker* was deleted from the analyses as this is not the role of regional carriers; they are providers rather than takers. Again, no regional carriers displayed this trait and its inclusion or omission from the analyses is redundant. Of the remaining 15 independent variables that are utilized to measure an airline's business model 10 are dichotomous. These variables are either present or not present in the carriers' business models. The remaining five variables are multi-value and require that the researcher establish thresholds to recode the data. These variables are: in-flight classes, primary airport share, feed share, FSI, and stage length. The calculation for each of the three strategic groups will be presented, however the actual thresholds are presented in the respective analyses for clarity.

In-flight classes: Each of the three groups has its traditional cabin configuration, however a number of carriers have deviated from this layout. The researcher creates a threshold of ±1 cabin from the traditional configuration. A second threshold is created for those carriers with +2 cabins from the traditional configuration.

Primary airport share: Two thresholds are created for this variable. The thresholds were determined using a simple cluster method available in TOSMANA[48]. They are presented in the respective strategic group analyses. FSCs and regional carriers with high share figures were ranked highly, while LCCs with low shares were ranked with high dummy scores. This is to reflect the traditional FSC and regional models of focusing on primary airports, and the LCC appreciation of secondary airports.

Feed share: The dummy variable for this business element was also constructed utilizing two thresholds created using the cluster method in TOSMANA. A high level of feed share among FSCs is highly ranked, while low feed shares for LCCs and regional carriers is representative of the traditional business model, and therefore highly ranked.

[47] Capacity lift provider is applicable only to regional carriers; the variable is used to analyze the production of seats, or lift, for FSCs or LCCs

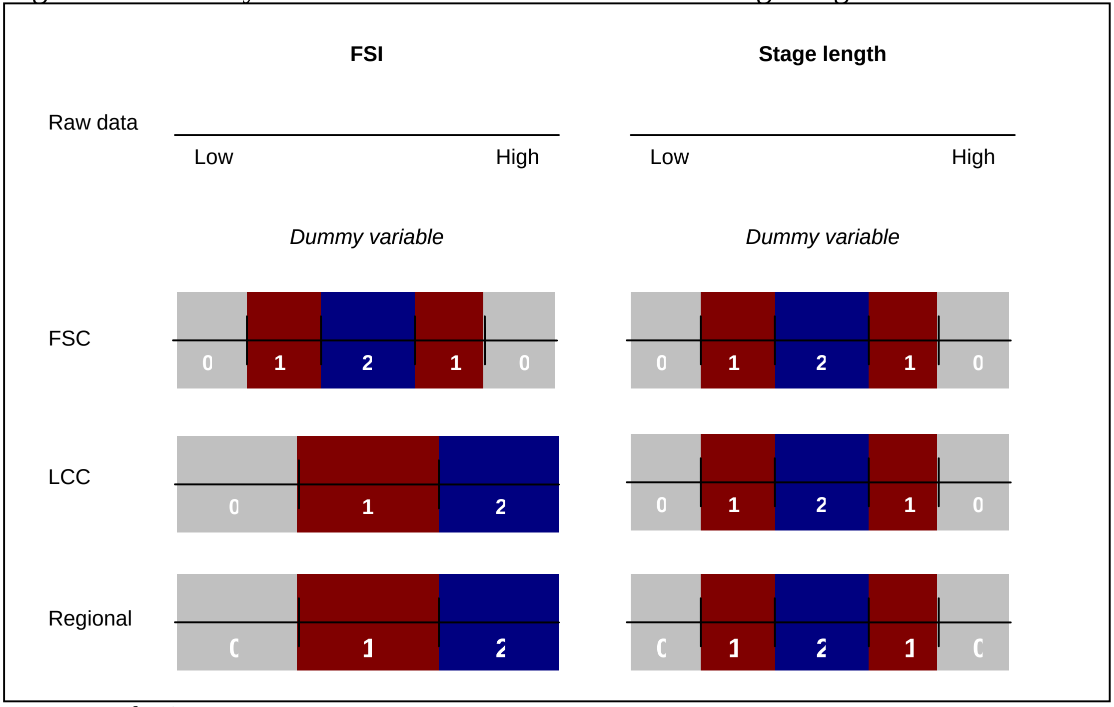
[48] The researcher utilized the threshold setting function in TOSMANA which was an efficient way for recoding multi-value data. TOSMANA was not used to conduct any correlation analyses. The researcher utilized Microsoft Excel and SPSS for correlation and regression analyses.

Fleet standardization index: The FSI thresholds among the three strategic groups vary. A traditional FSC fleet must accommodate a varied network. Therefore, a high FSI, indicating a standardized fleet, is not indicative of a traditional FSC fleet composition and not necessarily a desired fleet makeup. Therefore, the researcher calculated the average FSI for the FSC study group (0.11) and created two thresholds which are ±20% from the average. Indexes within these thresholds are recoded with a dummy variable of 2, indicating a high level of adherence to the traditional model. Two more thresholds were created, again ±20%, to create the zones recoded with dummy variable 1. FSIs lying beyond these thresholds were recoded with a 0. LCC and regional FSIs are traditionally 1, indicating a standardized fleet. For these two groups the researcher used the clustering method in TOSMANA to create two thresholds. In other words, the FSC FSI dummy variable was created with four thresholds, while the LCC and regional dummy variable used two thresholds, as shown in figure 6.2.

Stage length: The thresholds for stage length in the three groups were determined identically to the method utilized to set the FSC FSI threshold. As carriers have a varied network a threshold set near their average stage length rather than the furthest or shortest is best representative. The researcher determined the average stage length for the individual strategic groups and padded either side ±20%. Lengths within this zone were recoded with dummy variable 2. Dummy variable 1 was attributed to those carriers with stage lengths ±40%, and 0 to those carriers with outlying stage lengths. Figure 6.2 shows the thresholds determined for the strategic groups. Tables 6.1, 6.4, and 6.7 show the thresholds for the respective strategic groups. The entire raw data is available in Appendix VI.

Figure 6.2 is a graphical representation of the dummy variables utilized for the FSI and stage length variables, segmented by strategic group. As the figure shows, the average FSC FSI raw data was coded with the maximum 2, while the remaining two groups, LCC and regional, were recoded with maximum dummy variable 2 for high FSIs. The stage length raw data was averaged for all three groups, which was recoded with the maximum 2, and decreased as the raw data was further away from the average.

Figure 6.2: Dummy threshold determinants for FSI and stage length



Source: Author's own creation

6.1.1 FSC

Incumbent flag carriers often have challenges when attempting to drastically change their business models. These carriers are lethargic business model adapters compared to other strategic groups in the industry. Deregulation in the world's airline markets removed the political protection many FSCs enjoyed and introduced them to the hardships of market economics. Suppliers, partners, stakeholders, trade unions, customers, and occasionally political entities have challenged FSCs when attempting to adapt their business model to address the competitive market environment[49]. This analysis studies the correlation between full-service carriers and operational profit. The level of business model adherence among the FSC carriers will be shown and how profit is impacted. The thresholds that were used for this analysis are presented in table 6.1.

Table 6.1: FSC correlation – thresholds

Dummy variable	**0**	**1**	**2**
Online	0		1
Interline	0		1
Thru-fare	0		1
Restrictions	0		1
GDS	0		1
FFP	0		1
Lounges	0		1
In-flight classes	4 or more	3 or 1	2
Alliance	0		1
Codeshare	0		1

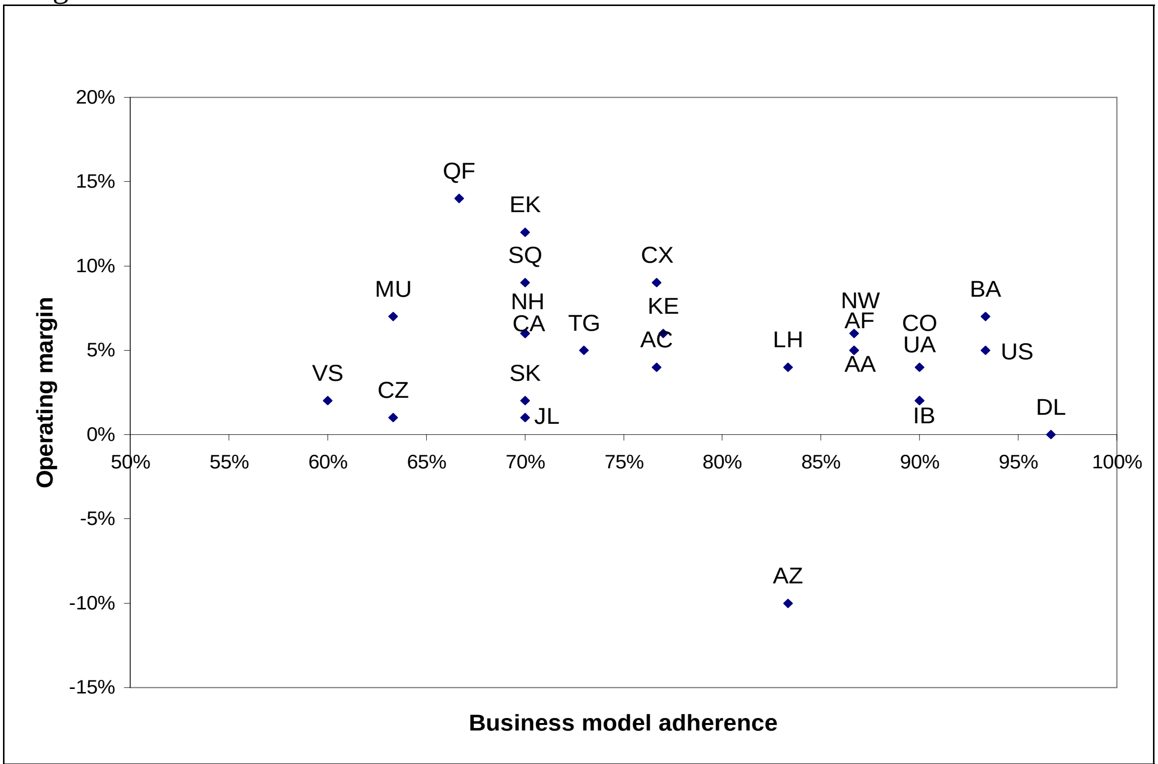
[49] A recent example of this phenomenon is the Italian government's stipulations related to a sale of the Italian carrier, Alitalia (Migliaccio, 2006; C. Walsh, 2007).

CLP	Omitted	Omitted	Omitted
CLT	0		1
Primary airport share	x<0.85	0.85<x<0.90	x>0.90
Feed share	x<0.06	0.06<x<0.13	x>0.13
FSI	x<0.06; x>0.14	0.06<x<0.08; 0.12<x<0.14	0.08<x<0.12
Stage length	x<680; x>1541	680<x<880; 1321<x<1541	880<x<1321

Source: Author's own creation

The researcher has removed one carrier from the correlation analysis as this data point was an extreme outlier. Alitalia, the flag carrier of Italy, reported an adherence level of 83% and an operating margin of -10%. This operating margin fell outside of the distribution seen in the scatter plot and was removed (Carlson et al., 2003). Prior to removal of the outlier the average business model adherence and operating margin are 78% and 4.6% respectively. Figure 6.3 is a scatter plot depicting business model adherence and operating margin which includes the outlier.

Figure 6.3: Relationship between FSC business model adherence and operating margin



Source: Author's own creation; outlier included; see table 2.2 for IATA code definition

The results indicate that there is limited variation among FSCs today. However, changes are taking place as some carriers adapt their business models. The variation seen in the strategic group ranges between 60% and 97%, although the average for the 25 carriers is 78% (outlier excluded). Virgin Atlantic (VS), based in the UK, has the lowest level of adherence. This carrier focuses on providing long-haul transit on high density routes. The carrier has an average stage length of nearly 4 000 NM, which is nearly 1 500 NM more than the second longest average stage length. In addition, VS is only one of six FSCs among the study group not to be a member of one of the three global alliances. Delta Air Lines (DL), from the US, on the other hand, has the highest level of adherence among the study group. The only category the airline deviates from the traditional FSC model is its fleet composition. DL has a slightly more diverse fleet than the average range for the group. It is possible to discern a slight geographic clustering of carriers. There are nine carriers that have an adherence level of 85% or more, and two-thirds of them are based in the United States. This may be indicative of a reluctance to adapt the US FSC business model drastically. The spread among the Asian and Middle Eastern carrier is only ten points, between 63% and 73%. Less than one-third (30%) of the Asian and Middle East carriers are members of the global alliances in the industry, and none of them have a strategic partnership with a regional carrier to provide capacity. These factors help to distinguish these carriers in figure 6.3 and contribute to a lower level of adherence. European carriers are spread throughout the spectrum, from 60% to 93%. Variation is attributed to alliance membership (VS), ticket restrictions (SK), stage length (LH), and FSI (AF). Such findings may imply that regional differences may impact business models (Berry, 2001), French (1995) makes this very statement regarding the differences in regional airline business models; historical, competitive, political, and economic differences influence the business model of FSCs. It can be stated that, in general, business model change is slow to infiltrate the FSC strategic group, although some regions are quicker to react than others, however all differences are discernable and measurable. The economic results show that the average operating margin for the group is 5.2% with a spread between 0% (DL) and 14% (QF). Table 6.2 shows descriptive metrics regarding the FSC group and adherence and margin.

Table 6.2: FSC correlation descriptives

Metric[1]	**Median**	**Mean**	**Low**	**High**
Business model adherence	76.7%	78.1%	60%	97%
Operating margin	5.0%	5.2%	0%	14%

[1]: Outlier omitted
Source: Author’s own creation

A correlation analysis measuring business model adherence and profit margin is conducted to investigate the relationship between the two variables. The analysis of the FSC group shows a weak, negative correlation between business model adherence level and operating margin. However, this contradicts the two other, forthcoming analyses and the industry-wide analysis. Therefore, the researcher is hesitant to conclude that there is a negative correlation within the FSC group as the industry’s other groups indicates otherwise. Past research (K. Hvass, 2006) and comments (M. Boyd, 2007) on the subject showed a moderate, positive relationship between business model adherence and operational profit. The correlation results are presented in table 6.3.

Table 6.3: FSC correlation results

Strategic group	**FSC**
Correlation coefficient	-0.2478
Control: Size-Passengers	-0.1670
Control: Size-Fleet	-0.1701

Source: Author's own creation

These results show that there is a weak correlation between the two factors; that business model adherence explains a portion of the financial results of FSCs. In addition, the partial correlations using size as a control are less than the regular correlation, indicating that carrier size does impact the relationship between business model purity and operating margin. This holds true for both control variables. The negative sign indicates that as FSCs transition from the traditional business model to a more diffuse model operating results should increase. Although the researcher has questioned these findings, if the negative relationship is accepted it may partly explain why FSCs transition from a pure business model to a non-pure model in an attempt to extract greater profits from the market. However, this finding contradicts the notion that FSCs strive for model impurity to achieve firm survival rather than greater success[50]. If firms achieve greater financial success with non-pure business models one may expect the business model purity in the strategic group to be more diffuse rather than so highly concentrated with pure business models. It is the operational variables that have a strong, negative affect of business model purity; the level of adherence to the traditional operational elements is lowest among feed share, FSI, and stage length[51].

The correlation between business model adherence and operational profit within the FSC strategic group has been investigated. However, the industry is comprised of two more strategic groups which are analyzed in the following sections.

6.1.2 LCC

The previous analysis showed that there is a limited amount of variation among carriers in the FSC strategic group, and that there is a weak, negative correlation between business model adherence and operational profit. The FSC group, however, is not representative of the entire scheduled passenger airline industry and the following analysis will look at a very dynamic group, LCCs. Industry observers have commented on the variation seen among the world's LCCs (Baker, 2006; Thomas, 2005). A number of self-proclaimed LCCs no longer adhere to the traditional business model, commonly accredited to Southwest Airlines. The analytical method utilized in this analysis is identical to the FSC method. The thresholds utilized in the

[50] The case of Aer Lingus and its transition from a pure FSC to a non-pure LCC is one example suggesting that firms may change their business model purity or strategic group membership entirely, in an attempt to stave off extinction rather than to maximize profits. Aer Lingus and other carries, such as Flybe, have changed their business model to avoid bankruptcy.

[51] A correlation with the four operational business model elements removed resulted in a higher correlation figure, although still negative (-0.4353).

LCC analysis are shown in table 6.4. Unlike the FSI variable in the FSC analysis, which has four thresholds (see figure 6.2) , the LCC analysis only utilizes two thresholds. This is reflective of the strategic group's traditional business model of favoring a single, standardized fleet.

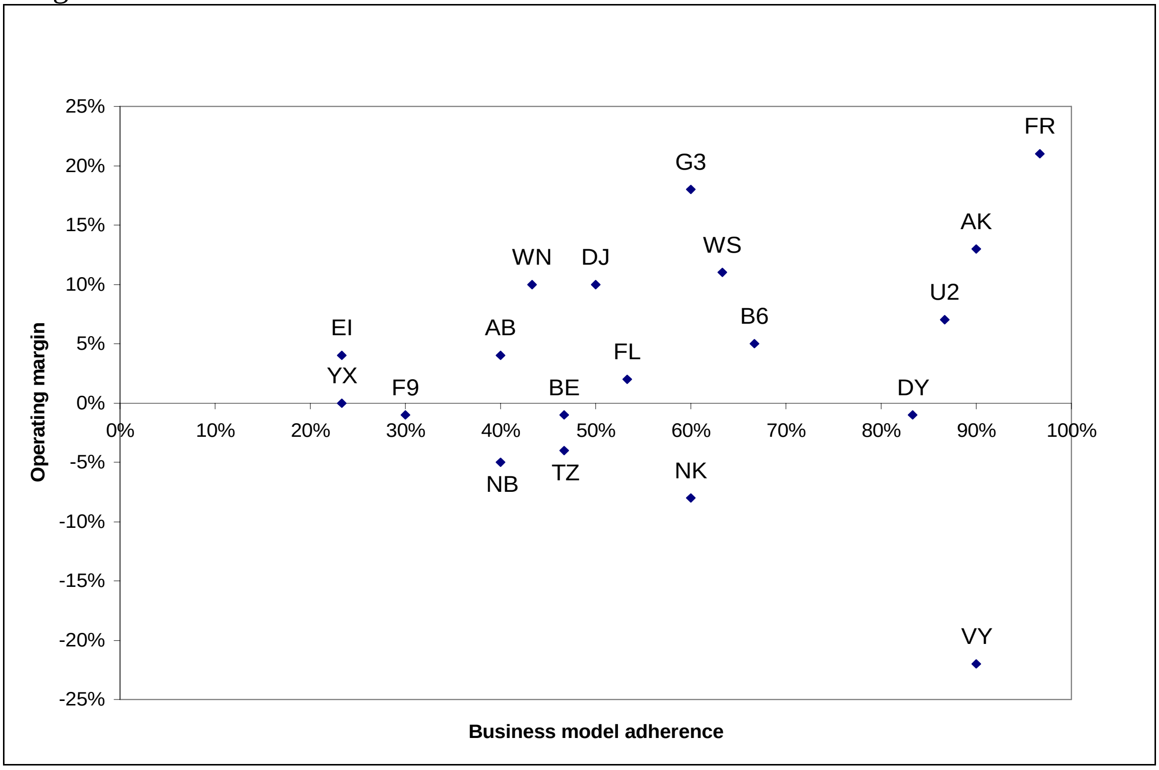
Table 6.4: LCC correlation – thresholds

Dummy variable	**0**	**1**	**2**
Online	1		0
Interline	1		0
Thru-fare	1		0
Restrictions	1		0
GDS	1		0
FFP	1		0
Lounges	1		0
In-flight classes	3 or more	2	1
Alliance	1		0
Codeshare	1		0
CLP	Omitted	Omitted	Omitted
CLT	1		0
Primary airport share	x>0.84	0.55<x<0.84	x<0.55
Feed share	x>0.07	0.03<x>0.07	x<0.03
FSI	x<0.42	0.42<x<0.75	x>0.75
Stage length	x<396; x>924	396<x<528; 792<x<924	528<x<792

Source: Author's own creation

The LCC group also contains an outlying carrier that distorts the findings. Vueling, a Spanish-based carrier, reported a -22% operating margin with a 90% adherence level. The carrier reported that costs associated with its initial public offering, scheduled for the following year, and a competitive environment hampered the newly started LCC (ATW, 2007c). The scatter plot shown in figure 6.4 shows the outlying effect the carrier has. The average adherence level is 58% and the average margin is 3.3% before removing the outlier.

Figure 6.4: Relationship between LCC business model adherence and operating margin



Source: Author's own creation; outlier included; see table 2.2 for IATA code definition

The analysis shows that there is a greater level of variation to be found among LCCs. The average level of adherence is 56%, with a low of 23%[52] and a high of 97%. This high degree of variation compared to the FSC study group shows that LCCs may be more adaptive or flexible at accommodating their business models to changing market situations. The average operating margin, 4.7%, is more than a percentage point lower than the FSC study group, which shows that the LCC business model is not a success guarantee, as some industry commentators believe. Table 6.5 shows the LCC correlation descriptives.

Table 6.5: LCC correlation descriptives

Metric[1]	**Median**	**Mean**	**Low**	**High**
Business model adherence	51.7%	55.7%	23%	97%
Operating margin	4.0%	4.7%	-0.08%	21%

[1]: Outlier omitted
Source: Author's own creation

The LCC correlation analysis shows a strong, positive correlation between business model adherence and operational profit. This result complements the findings by Alamdari and Fagan (2005), although with a different methodology based on different

[52] Aer Lingus, EI, adhered 23% to the traditional LCC model. The carrier recently made a change from FSC to LCC, which explains the low adherence level to the LCC model. If the carrier had remained an FSC it would have adhered 73% to the traditional FSC business model with its 2006 business model configuration. This is near the FSC median.

business model elements and a regression-only analysis. Table 6.6 shows the correlation coefficient for the LCC analysis.

Table 6.6: LCC correlation results

Strategic group	LCC
Correlation coefficient	0.4819
Control: Size-Passengers	0.4705
Control: Size-Fleet	0.5029

Source: Author's own creation

These findings show that those LCCs that strive for differentiation may do so at detriment to their financial success. Carriers may attempt to place themselves in an unoccupied space within their strategic group, however this may commonly entail adding complexity to the business model without necessarily a responding increase in revenue. A successful differentiation strategy (M. E. Porter, 1985) entails a successful price differentiation, which may be challenging to achieve in a price-sensitive market, such as air travel. When controlling for size the results are nearly the same as the regular correlation indicating that size has nearly no influence on the relationship between business model adherence and profit.

The LCC results show a strong, positive correlation between business model adherence and financial success. This strategic group often operates independently is not reliant on other groups. The same cannot be said of the regional carrier strategic group which often supplements the FSC strategic group.

6.1.3 Regional

If a regional carrier is not a stand-alone entity, then it is often affiliated with an FSC carrier; relatively few LCCs have utilized regional carriers to complement their business model. Again the methodology is identical to the two previous analyses. The thresholds utilized in the correlation analysis of regional carriers are shown in table 6.7. The variable *capacity lift taker* is omitted from this analysis as it contradicts the current business model function of this strategic group. The variable, *feed share* has no thresholds even though it is a multi-value variable. This is a testament to the regional airline business model as there were no multi-values for the study group; all regional carriers reported 0% feed share in their networks.

Table 6.7: Regional correlation – thresholds

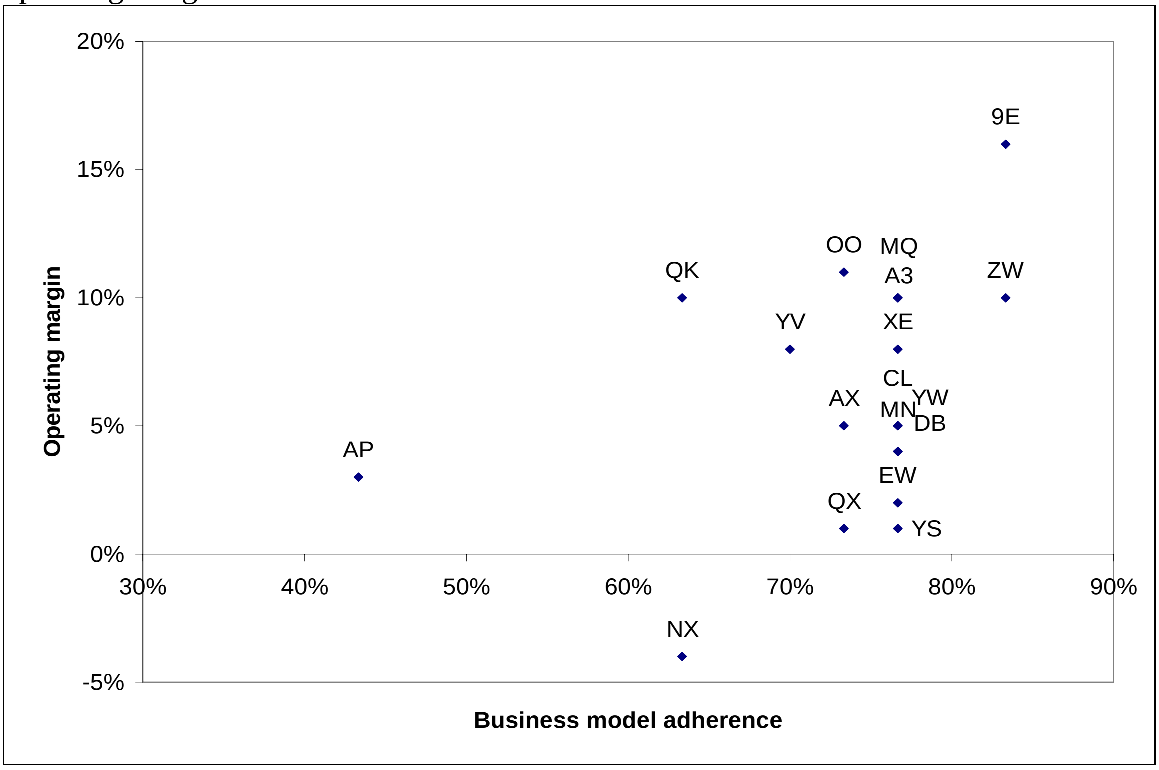
Dummy variable	0	1	2
Online	0		1
Interline	0		1
Thru-fare	0		1
Restrictions	0		1
GDS	0		1
FFP	0		1
Lounges	1		0
In-flight classes	3 or more		1
Alliance	1		0

Codeshare	0		1
CLP	0	0.5	1
CLT	Omitted	Omitted	Omitted
Primary airport share	x<0.88	0.88<x<0.97	x>0.97
Feed share	Not applicable	Not applicable	0
FSI	x<0.42	0.42<x<0.75	x>0.75
Stage length	x<195; x>455	195<x<260 390<x<455	260<x<390

Source: Author's own creation

The regional study group has no outlying data points. Figure 6.5 shows the strategic group's scatter plot.

Figure 6.5: Relationship between regional carrier business model adherence and operating margin



Source: Author's own creation; see table 2.2 for IATA code definition

This strategic group tends to follow the lead of the FSC group as the two are commonly entwined partners of varying degrees. The average adherence level, 73.1%, ranks closely to FSCs, with a spread of only 20 points. Air One (AP), an Italian regional carrier, has the lowest level of adherence within the regional carrier strategic group. The carrier distinguishes itself from the group by operating a simplified network and pricing structure, similar to LCCs, while offering various FSC-like amenities, including lounge access. The carrier is closely affiliated with Lufthansa, although it is not a closely integrated capacity lift provider as Lufthansa Cityline. Operationally, AP has a diversified fleet and operates a high percentage of its network's ASKs to secondary airports. The carrier reported a profit margin of 3% in 2006. The metrics of the entire regional group show similar trends as the FSC group. Group descriptives are shown in table 6.8.

Table 6.8: Regional correlation descriptives

Metric	Median	Mean	Low	High
Business model adherence	76.7%	73.1%	63%	83%
Operating margin	5.0%	6.1%	-4.0%	16%

Source: Author's own creation

The correlation analysis produces results similar to the LCC analysis, although the correlation is slightly weaker. The results indicate that there is a strong, positive correlation between business model adherence and operating margin. Table 6.9 depicts the correlation results for this analysis

Table 6.9: Regional correlation results

Strategic group	Regional
Correlation coefficient	0.3631
Control: Size-Passengers	0.3734
Control: Size-Fleet	0.3205

Source: Author's own creation

The results from the regional analysis complement those of the LCC analysis. There is a link between the level of business model adherence to the pure strategic group model and its affect on operational profit. Again, when controlled for size there is little to no affect on the relationship.

This primary analysis investigated the level of interdependence between business model adherence and operational profitability. The FSC results showed a weak, negative interdependence between the two variables, however findings from the two other strategic groups indicate moderate to strong, positive interdependence. Therefore, the researcher can conclude that there is a positive interdependence at the strategic group level between business model adherence and operational profitability. However, this meso-scale analysis is complemented with a macro-scale investigation at the industry level.

6.2 Industry

While the previous analyses studied individual strategic groups this correlation analysis takes a step back and looks at the correlation affect between adherence and profit in the entire industry. This analysis produced expected findings within the LCC and regional strategic groups, based on previous research (Alamdari & Fagan, 2005; Suzuki, 2000), and intriguing results within the FSC strategic group. The industry-wide analysis will study the correlation with both the FSC study group included, as well as, omitted. In all the analyses the two outlying carriers, Alitalia and Vueling, are not included.

The industry-wide correlation with the FSC group included results in a correlation coefficient of 0.2970, as shown in table 6.10. This indicates a moderate, positive correlation between the two factors. Carrier size has little affect on the relationship between the two variables, as shown by the partial correlation results.

Table 6.10: Industry correlation results – FSC included

Strategic groups	FSC, LCC and regional
Correlation coefficient	0.2970
Control: Size-Passengers	0.2675
Control: Size-Fleet	0.2770

Source: Author's own creation

If the researcher omits the FSC strategic group due to conflicting findings the results show a stronger, positive correlation. The results produce a correlation coefficient of 0.4475, seen in table 6.11.

Table 6.11: Industry correlation results – FSC omitted

Strategic groups	LCC and regional
Correlation coefficient	0.4475
Control: Size-Passengers	0.4660
Control: Size-Fleet	0.4473

Source: Author's own creation

These results indicate that at an industry level there is a relationship between business model adherence and operational profit. The interdependence between these two factors is moderately and positively strong, and strong and positive if the FSC group is omitted. The correlation analysis merely demonstrates that there is a level of interdependence but not whether there is a relationship between the two variables, this is the role of the regression analysis.

6.2.1 Regression

While the correlation demonstrated interdependence the regression analysis will show a causal relationship between business model adherence and operational profit. The researcher will again perform the analyses with the FSC strategic group included and omitted. This is to ensure that full analytical transparency exists.

The regression analysis with the FSC group included shows a significant but virtually non-existent causal relationship between the two variables. Table 6.12 depicts the analytical findings for the industry-wide regression. An R-squared of 0.0882 describes a positive yet weak causal relationship.

Table 6.12: Industry regression results – FSC included

Strategic groups	FSC, LCC, and regional
R-squared	0.0882
Significance	0.0212

Source: Author's own creation

If the FSC strategic group is omitted the regression analysis shows a stronger causal relationship, which is still significant. The results are displayed in table 6.13.

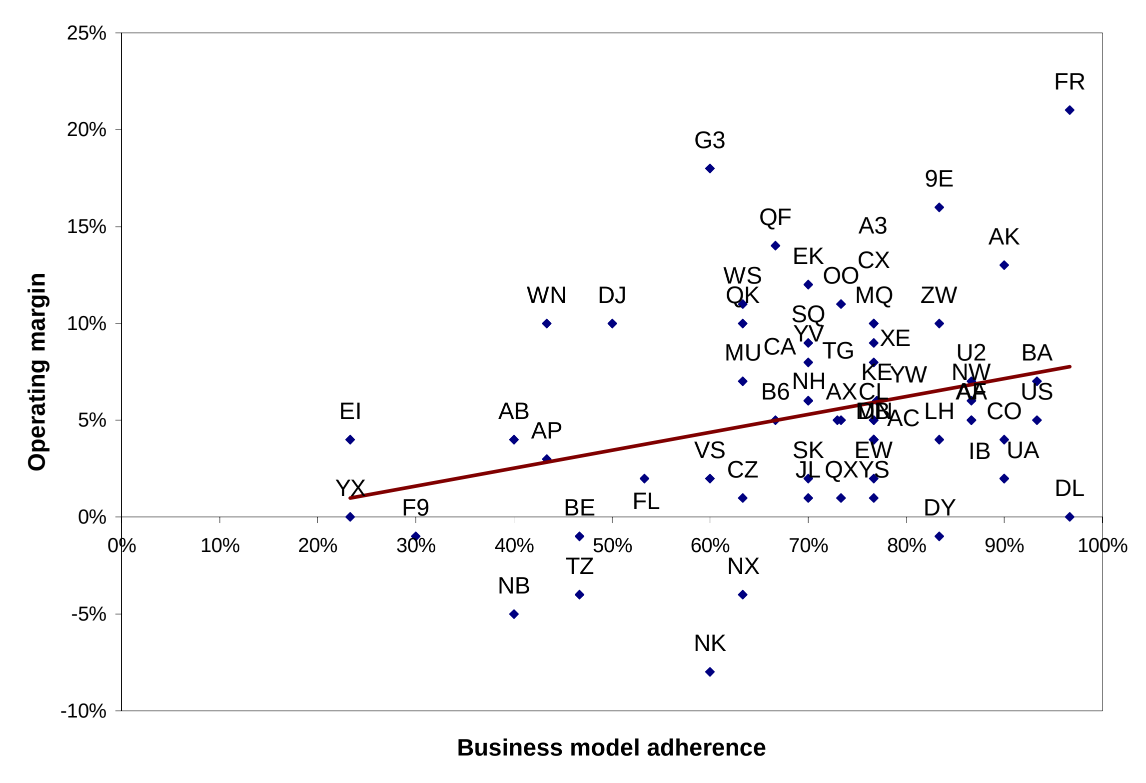
Table 6.13: Industry regression results – FSC omitted

Strategic groups	LCC and regional
R-squared	0.2002
Significance	0.0062

Source: Author's own creation

These results show that there is a moderately, positive relationship between business model adherence and operational success. This indicates that airlines with a pure business model will earn a higher profit than those carriers with a non-pure business model. This is generally true for the industry as a whole, but more so among LCCs and regional carriers. Research is divided whether this relationship is also evident in the FSC strategic group. These results are consistent with the industry-level research by Suzuki (2000) and Thornhill and White (2007). Thornhill and White's research, segmented by industry, finds that services display the same downward performance trend as strategic adherence decreases. They discovered that operating margins of pure firms exceeded hybrid firms by more than 17%. Similar results were reported at the LCC strategic group level by Alamdari and Fagan (Alamdari & Fagan, 2005). A scatter plot for the entire industry is presented in figure 6.6. The outlying carriers, Vueling and Alitalia, have been removed from the graph. It is presented to the reader as a graphical representation of the relationship in the industry between the two variables.

Figure 6.6: Industry relationship between business model adherence and operating margin



Source: Author's own creation; outliers removed; see table 2.2 for IATA code definition

6.3 Conclusion

The correlation and regression analysis has shown that there is a level of positive interdependence both at the strategic group level and the industry level, as well as a positive relationship between the two variables. Although, there is some degree of disparity with the FSC results, the researcher concludes that hypothesis 1 cannot be rejected. The findings indicate that the more pure an airline's business model and the greater the operational profit.

How does the variation of airline business models affect profit?

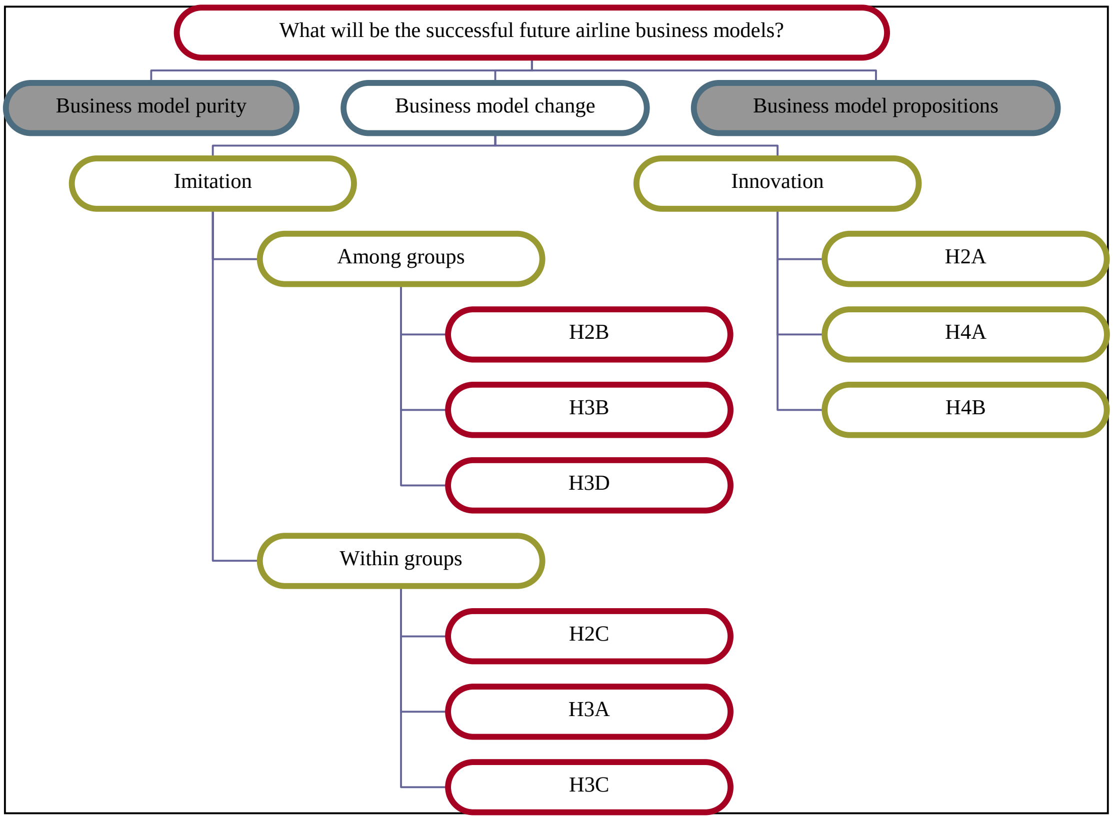
Research findings suggest that there is a positive relationship between the purity of a carrier's business model and operating margin. In other words, carriers that diverge from the traditional business model of their strategic group may experience depressed margins compared to more traditional carriers. This link has been noticed at both the strategic group level and industry level, although with varying degrees of correlation strength. The FSC group shows contrary findings which advocate additional research.

7. Survey results

- Charles Lindbergh brought 5 sandwiches and 2 canteens of water on his transatlantic crossing in 1927; an average long distance flight in a 747 today carries more than 1,000 kilograms of food and 1,300 liters of beverages -

This chapter analyzes the motivation and inspiration for changing the airline business model. An overview of the hypotheses that are addressed can be seen in figure 7.1. It begins by analyzing business model imitation among strategic groups (hypothesis 2B). The affect of rivalry, both internally and externally, is introduced (hypothesis 3B, 3D). Imitation within strategic groups follows in the same order (hypothesis 2C, 3A, 3C). Finally, business model innovation is introduced. The affect of business model adherence and its impact on innovative behavior is studied, and again with both internal (hypothesis 4A) and external (hypothesis 4B) rivalry as a moderator. Innovation as a source of business model change is not divided into *among strategic groups* and *within strategic groups* as this distinction is not possible.

Figure 7.1: Organizational chart of hypotheses addressing business model change



Source: Author's own creation

These analyses address the proposed hypotheses by utilizing the responses from the distributed survey and the constructed variables introduced in Chapter 5. Distributed surveys have been used in past research, such as market orientation investigation (Martín-Consuegra & Esteban, 2007), business traveler priorities (K. Mason, 2006), enroute airspace capacity (Majumdar, Ochieng, Bentham, & Richards, 2005), airport selection factors (Warnock-Smith & Potter, 2005), performance measurement techniques (Francis, Humphreys, & Fry, 2005), although an investigation targeting business model change based on innovation or imitation is lacking from the field. Table 7.1 provides an overview of the sample population and response rate for the various groups distinguished by revenue limitations. This is provided to give the reader a perspective of the size of respondents, all of which remain anonymous throughout the study. Five carriers chose to remain anonymous in their response and these were omitted from the response rate and sample error calculations at varying revenue levels above 5 million USD. The population size for each revenue category was determined from categorizing the query results from the OneSource database. The response rate falls from the initial 21%, however peaks at 26% for airlines with revenue exceeding one billion USD. This is testament to the high number of large airlines that responded to the questionnaire. This level of response ensures applicability within the industry.

Table 7.1: Survey response summary

	Revenue > 5 million USD	Revenue > 10 million USD[1]	Revenue > 20 million USD[1]	Revenue > 30 million USD[1]	Revenue > 1 billion USD[1]
Population	208	186	173	170	68
Response	42	26	25	24	18
Response rate	21%	14%	15%	14%	26%

[1]: excluding anonymous respondents
Source: Author's own creation

The survey analyses address two core issues: imitative behavior, internally and externally, and innovative behavior, in the presence and absence of both internal and external rivalry. The three primary strategic groups found in the airline industry, network, regional, and low-cost, are analyzed within these core issues. Within the survey there are themes that reverberate: business model purity, rivalry, market segmentation, business model activity changes, motivation and inspiration for business model changes, and business model challenges. The concepts of business model purity flow through from the previous analyses regarding adherence level and profit. The same purity measurement was utilized in these analyses. Rivalry, as a concept, is instrumental in analyzing strategic groups and is highly relevant in the context of the airline industry. Cognitive perception of rivalrous behavior within and among groups is one measurement in the analyses. A summarized response from each strategic group regarding perceptive rivalry within and among groups is presented in table 7.2.

Table 7.2: Rivalry segmented by strategic group

	# Respondents	Network*	LCC*	Regional*	Charter*	Other*
Network	26	4.96	3.65	2.72	2.24	3.75
LCC	4	4.40	4.80	2.60	3.40	0.00
Regional	10	3.89	3.89	4.30	2.78	4.00

*: 5-point Likert scale
Source: Author's own creation

As the results indicate each strategic group indicates that there is a high degree of internal rivalry, especially among network carriers. Of the respondents that identified themselves as network carriers only one ranked the competitiveness of other network carriers less than the maximum, and this ranking was four out of five. Such a response may be a testament to the particular carrier's geographic location, the periphery of Europe. In addition, the rivalrous ranking of LCCs by network carriers is affected by the low LCC penetration in some regions of the world. Those network carriers that ranked other forms of transport as competitors listed such factors as high speed trains (Román, Espino, & Martín, 2007) and competing airline alliances (Gudmundsson & Oum, 2005; Gudmundsson & Lechner, 2006). Low-cost carriers appear to struggle nearly equally with rivalrous behavior both within their own strategic group, as well as, among network carriers, while regional and charter carriers score relatively low. Regional carriers perceive members of their own strategic group as direct competitors, while network and LCC carriers are ranked equally. LCCs tend to have longer stage lengths (see table 2.3) and may not compete on a large-scale with regional carriers, while network carriers often have a level of partnership with regional carriers which may reduce competitive perception. The *Other* category was described as road transportation, a testament to the short networks that regional carriers tend to operate. Only the LCC group ranked the charter group as a moderate threat, which reflects the charter strategic group as adapting their business model to include seat-only sales, which is able to compete with the LCC model (Binggeli & Pompeo, 2002; Williams, 2001). Two measurements for rivalry were created for each strategic group with the response from the Likert scale: rivalry-within-groups and rivalry-among-groups. Table 7.3 is a summary of the average intensity of rivalry found in the industry's three strategic groups using the constructed dummy variable. The results complement table 7.3. A response closer to 1 indicates a high level of rivalry.

Table 7.3: Constructed group rivalry

Strategic group	Rivalry-within-groups (internal)	Rivalry-among-groups (external)
Network	0.958	0.792
Low-cost	0.750	0.750
Regional	0.700	0.800

Source: Author's own creation

The results show a high degree of rivalry within the same strategic group, especially among network carriers. However, rivalry among groups is also prevalent with all groups reporting that at least one other group in the industry is a near and direct competitor.

The rivalrous behavior found in the industry leads to constantly fought battles among competitors. Carriers can elect to either innovate their business model activities or imitate a competitor, either from the same strategic group or another. All three strategies were measured and analyzed. External imitation begins the analyses, followed by internal imitation, and concludes with an innovation analysis. In addition, excerpts from the survey respondents are included which address questions such as, business model descriptions, challenges to change, and expected future challenges.

7.1 Business model imitation

Airlines can display mimetic behavior in the form of imitation within strategic groups or imitation among strategic groups. Both strategies have their advantages and disadvantages.

Imitation may be used as a strategic response by carriers to reduce rivalry, disseminate signals to the market, or as a response to inadequate information. However, imitation is merely one source of inspiration when it comes to business model change. In the distributed survey carriers were asked to rank their inspiration for changes to their business models. Table 7.4 ranks the responses by strategic groups.

Table 7.4: Inspiration for business model change segmented by strategic group

	# Respondents	BoD*[1]	CEO*[2]	Employees*	Partners*	Customers*	Consultants*	Competitors*	Academia*	Other industries*
Network	26	3.84	4.46	3.50	2.71	4.12	2.84	3.31	1.86	2.60
LCC	4	4.00	3.75	3.00	2.75	3.75	2.75	3.00	1.67	1.00
Regional	10	3.90	4.30	3.10	2.40	4.00	2.10	3.40	2.11	1.50

*: 5-point Likert scale
[1]: Board of directors
[2]: Chief executive officer
Source: Author's own creation

Airlines of all strategic groups responded that inspiration comes primarily from internal sources, such as the board of directors or chief executive officer. However, external sources are not ignored; customers especially are a strong source of inspiration for specific changes to the business model. Some airlines even look beyond their own industry, such as at the hospitality, retail, or aircraft manufacturing industries. However, the results show that external inspiration from competitors is not overlooked. All carriers said that competitors have *some to medium affect* when making changes. In addition, the rankings show that competitors rank above average for all inspirational sources in all three strategic groups. It is this finding that points to mimetic behavior in the airline industry. However, it is necessary to differentiate between competitors within the same strategic group and those from other groups. As table 7.3 shows airlines, especially FSCs, rank their own group and competing groups very highly as competitors.

The traditional, or pure, business model has been described in Chapter 4 for each strategic group found in the industry. However, as the previous analysis of business model adherence uncovered, there is business model heterogeneity evident in the industry, and as table 7.4 shows, airlines turn to competitors for inspiration when changing their business model. Table 7.5 is an overview of which business model elements were traditionally not part of the respective strategic groups, yet can be found today in numerous airlines. If you compare with table 7.9 you can determine which groups have been imitated. For example, the US LCC, Frontier, is present in numerous GDSs, yet this is not part of the traditional LCC business model but of the traditional FSC model. Therefore, Frontier has displayed mimetic behavior of a rival strategic group.

Table 7.5: Imitation business model elements segmented by strategic group

	GDS[1]	Internet	Online	Interline	Through-fare	Restrictions	In-flight service	In-flight classes	Ancillary	Lounge	FFP[2]	Assigned seating	Primary airport	Secondary airport	Pure fleet	Charter	Alliance
Network									✓					✓	✓	✓	
LCC	✓		✓	✓	✓	✓	✓	✓		✓	✓	✓	✓			✓	✓
Regional									✓	✓	✓			✓		✓	✓

[1]: Global distribution system
[2]: Frequent flyer program
Source: Author's own creation

The following section will address both types of imitation, internal and external, and the influence of rivalry. The analyses will tackle the following hypotheses: 2B, 2C, 3A-D.

7.1.1 Business model imitation – among strategic groups

Analyses of the responses using the ANOVA (see section 5.3) method indicate that airlines with a low adherence to the traditional business model in their strategic group tend to be more imitative of other strategic groups. This is true for airlines that perceive both a high level of internal and external rivalry. As the strategic distance increases from a group's traditional business model, airlines tend to gather inspiration from airlines of other groups in the market. Table 7.6 provides an overview of the results.

Hypothesis 2B analyzes external imitation without introducing rivalry as a moderator. The results show significant differences of overall external imitation between non-pure and pure airlines. Non-pure airlines have a pronounced imitative behavior of other groups. In addition, there are differences between non-pure and pure airlines when measuring the average external imitation. Although, the results are nearly significant when analyzing the results at the activity level, the results do show that non-pure airlines tend to be more imitative.

When rivalry, both within and among strategic groups, is introduced as a moderator the analyses display similar results, however with even more significant differences in imitative tendencies among pure and non-pure airlines. The results are only displayed for a high level of rivalry and not for an absence of rivalry, this is because there is not one airline among the respondents that perceive a low level of internal rivalry.

Hypothesis 3B states that non-pure airlines within a highly rivalrous strategic group will imitate airlines from other strategic groups. The results show that non-pure airlines that experience a high rivalry within their own strategic group display an even greater tendency to imitate other groups in the industry, than if there was no internal rivalry. Overall imitation and average imitation per activity display significant differences and strong imitative behavior. The average external imitation also displays these significant results, yet not as large variation between non-pure and pure airlines.

Internal rivalry is not the only competitive factor airlines experience; external rivalry also influences imitative behavior as dictated by hypothesis 3D. The ANOVA analyses show that overall external imitation among strategic groups is significantly different between non-pure and pure airlines. Non-pure airlines display strong mimetic behavior of other groups, even if the perceived rivalry from outside the strategic group is high. Average activity and group imitation does not display significant differences, however non-pure airlines do show greater imitative tendencies than their pure brethren.

Table 7.6: ANOVA results – imitation among groups

			ANOVA	Test Kruskal-Wallis
H2B	Variable: External-imitation-overall	N	Mean	Mean Rank
	Non-pure business model (0)	25	12.92	23.24
	Pure business model (1)	13	7.54	12.31
			F 9.395 Sig. 0.004	Asymp. Sig. 0.004
	Variable: External-imitation-activity	N	Mean	Mean Rank
	Non-pure business model (0)	25	2.350	21.42
	Pure business model (1)	13	1.885	15.81
			F 2.256 Sig. 0.142	Asymp. Sig. 0.137
	Variable: External-imitation-average	N	Mean	Mean Rank
	Non-pure business model (0)	25	1.082	21.82
	Pure business model (1)	13	0.842	15.04
			F 3.167 Sig. 0.084	Asymp. Sig. 0.074
H3B	Moderator: High rivalry-within			
	Variable: External-imitation-overall	N	Mean	Mean Rank
	Non-pure business model (0)	20	13.45	21.08
	Pure business model (1)	13	7.54	10.73
			F 10.509 Sig. 0.003	Asymp. Sig. 0.003
	Moderator: High rivalry-within			
	Variable: External-imitation-activity	N	Mean	Mean Rank
	Non-pure business model (0)	20	2.538	19.73
	Pure business model (1)	13	1.885	12.81
			F 4.144 Sig. 0.05	Asymp. Sig. 0.042

Moderator: High rivalry-within			
Variable: External-imitation-average	N	Mean	Mean Rank
Non-pure business model (0)	20	1.156	20.03
Pure business model (1)	13	.842	12.35
		F 5.149	Asymp. Sig. 0.025
		Sig. 0.03	

	Moderator: High rivalry-among			
	Variable: External-imitation-overall	N	Mean	Mean Rank
	Non-pure business model (0)	21	14.10	18.19
	Pure business model (1)	9	9.00	9.22
			F 7.135	Asymp. Sig. 0.01
			Sig. 0.012	
	Moderator: High rivalry-among			
	Variable: External-imitation-activity	N	Mean	Mean Rank
H3D	Non-pure business model (0)	21	2.540	16.60
	Pure business model (1)	9	2.250	12.94
			F 0.839	Asymp. Sig. 0.291
			Sig. 0.367	
	Moderator: High rivalry-among			
	Variable: External-imitation-average	N	Mean	Mean Rank
	Non-pure business model (0)	21	1.179	16.95
	Pure business model (1)	9	1.005	12.11
			F 1.784	Asymp. Sig. 0.165
			Sig. 0.192	

Source: Author's own creation

The concluding result is that airlines with a low adherence to their own strategic group's traditional business model imitate business models of other strategic groups. This behavior is more pronounced if there is a high degree of rivalry within an airline's strategic group. In addition, a high degree of rivalry among strategic groups positively affects the external imitative behavior of airlines. These results have verified and partially verified hypotheses 2B, 3B, and 3D. Such findings indicate that mobility barriers may be relatively weak among strategic groups, especially from a non-pure carrier perspective. However, this research fails to investigate the underlying justification for imitation; whether it is based on information or rivalry. Behavior may suggest that external imitation is an attempt by carriers to differentiate from strategic group member peers, yet this has not been explored by the researcher. The following section studies the phenomenon of initiation within strategic groups.

7.1.2 Business model imitation – within strategic groups

While the previous analyses dealt with business model imitation among strategic groups, airlines can look internally in their own strategic group for inspiration. Such behavior may be used to reduce the strategic distance among similar competitors and dilute a differentiating aspect, or stem from the perception that competitors possess superior information. These analyses address hypotheses 2C, 3A, and 3C, as shown in table 7.7. These hypotheses state that non-pure airlines will display higher levels of imitative behavior than their counterparts.

The results for internal imitation without the influence of rivalry show significant results between non-pure and pure airlines. However, the imitative behavior is not displayed by the non-pure airlines but rather the pure airlines. It appears that airlines that have a high level of adherence to the traditional business model are more imitative than their strategically distanced counterparts.

If the same analysis is conducted with the influence of a high degree of internal rivalry in the strategic group the results no longer show a significant difference between the types of airlines. However, the mean results do indicate that pure airlines are more internally imitative than non-pure airlines. One may cautiously state that internal imitation may be practiced by all types of airlines in a strategic group if there is a high degree of internal rivalry. A reduction of competitive distance may be a goal of internal imitation, which merely compounds the rivalrous situation; an ever-tightening downward spiral.

Hypotheses 3C studies imitation within a strategic group while in the presence of high rivalry among strategic groups. The results indicate that pure airlines imitate internally significantly more than non-pure airlines. As a matter of fact, a high degree rivalry among strategic groups leads to greater internal imitation than if rivalry is not a factor. It appears as if pure airlines react to external competitive forces by changing their business model but only within the sphere of their own strategic group.

Table 7.7: ANOVA results – imitation within groups

			ANOVA	Test Kruskal-Wallis
H2C	Variable: Imitation-within	N	Mean	Mean Rank
	Non-pure business model (0)	25	2.36	16.70
	Pure business model (1)	13	3.38	24.88
			F 4.563 Sig. 0.040	Asymp. Sig. 0.025
H3A	Moderator: High rivalry-within			
	Variable: Imitation-within	N	Mean	Mean Rank
	Non-pure business model (0)	20	2.95	15.00
	Pure business model (1)	13	3.38	20.08
			F 1.281 Sig. 0.266	Asymp. Sig. 0.118
H3C	Moderator: High rivalry-among			
	Variable: Imitation-within	N	Mean	Mean Rank
	Non-pure business model (0)	21	2.57	12.90
	Pure business model (1)	9	3.89	21.56
			F 6.954 Sig. 0.013	Asymp. Sig. 0.010

Source: Author’s own creation

The analytical results of internal business model imitation surprisingly showed that pure airlines are significantly more imitative within their own strategic group than non-pure airlines. However, the research is unable to indicate whether the internal imitation of pure airlines is of other pure airlines or non-pure airlines. It is concluded that none of the hypotheses are verified, however hypotheses 2C and 3C are unverified with significant results of the opposite phenomenon.

Imitation among airlines is also reflected in how carriers describe their business model. Survey respondents were asked an open-ended question: how would you describe your business model? There is a discouraging lack of differentiation and creativity among the answers from the 39 of 42 respondents who chose to answer. The researcher segmented the reoccurring keywords in the answers, which are shown in table 7.8. The majority of carriers mentioned their service and/or product in their business model description. Fares and the network were the next two elements that airlines highlighted. Finally, punctuality and safety, two factors that are an integral part of the basic service package, are highlighted in the business model description.

Table 7.8: Recurrence of keywords in business model descriptions

Keywords	**Service/ product**	**Fares**	**Network**	**Punctuality / reliability**	**Safety**
Mentioned in business model description[1]	60%	33%	30%	20%	13%

[1]: All respondents
Source: Author's own creation

Such results can be interpreted to highlight that many airlines, regardless of strategic group, regard their business model in a similar fashion. Such descriptions may be reflective of the imitation that is taking place in the industry. Some highlights from the responses include:

> *"Leisure scheduled airline. Full service carrier but with low fares (low cost, selling through a number of channels, including Internet/agents/tour operators)."* A network carrier

> *"[omitted] is a subsidiary of [omitted], a network carrier. [Omitted] has a mission to fly to markets where [omitted] can't compete anymore with new LCCs. Although we are an LCC, we offer to our customers the attribute of our mother company (network connections, alliances, FFP, availability of tickets through the traditional channels)."* An LCC carrier

> *"A regional airline combing best practices of network/"classic" carriers with low-cost model elements, depending on competition on each route."* A regional carrier

> *"It is a traditional full service airline."* A regional carrier

Such responses indicate that carriers from all strategic groups are picking business model elements from other groups in an attempt to capitalize on changes. However, such changes may lead to an industry that is increasingly homogenous. Respondents were also asked to answer the following question: describe the tangible benefits customers obtain from using your product; answer the question, "Why should I buy this product." Some of the answers included:

> *"Safety, quality, reliability."* A network carrier
>
> *"Focused on providing quality product. Meals at mealtime, good customer service, reliable product."* A network carrier
>
> *"Attributes of a traditional network carrier with affordable fares."* An LCC carrier
>
> *"We offer: low fares, high punctuality, primary airports, low number of short shipped bags, easy access to the product (Internet), high number of high quality travel add-ons at competitive prices (hotels, car hire, insurance, etc.)."* An LCC carrier
>
> *"Quality product of a network carrier in combination with flexible pricing and yield management ensures competitive deal for each individual purchase instance."* A regional carrier
>
> *"Punctuality, reliability, e-services, frequent flyer program, hub connectivity to worldwide network."* A regional carrier

Airlines have a tendency to market similar service features of their product, which may contribute to diluting the entire message as it is muddled by nearly identical messages from competitors. There was one response which concisely describes the market, "*Because of market conditions normal competitive mechanisms are not entirely relevant,"* written by a regional carrier. In addition, only one carrier, an LCC, stressed the subjective, intimate contribution of employees to answer why one should purchase a ticket; "*…dedication to the highest quality of customer service delivered with a sense of warmth, friendliness, individual pride, and company spirit."* Although this analysis has shown that imitative behavior is evident in the airline industry, innovation does also take place, as analyzed in the following section.

7.2 Business model innovation

The previous analyses studied business model change due to imitation; however airlines can also utilize innovation as a force for change. Unlike imitation, which can take place both internally and externally, innovation only takes place internally and is therefore not segmented. Innovation was measured by noting the change in business model elements that were part of the traditional business model for the respective strategic groups (see table 7.9)

Table 7.9: Innovation business model elements segmented by strategic group

	GDS[1]	Internet	Online	Interline	Through-fare	Restrictions	In-flight service	In-flight classes	Ancillary	Lounge	FFP[2]	Assigned seating	Primary airport	Secondary airport	Pure fleet	Charter	Alliance
Network	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓				✓
LCC		✓							✓					✓	✓		
Regional	✓	✓	✓	✓	✓	✓	✓	✓				✓	✓		✓		

[1]: Global distribution system
[2]: Frequent flyer program
Source: Author's own creation

These final analyses of the empirical survey will address hypotheses 2A and 4A and 4B, which all state that more pure airlines will be more innovative. The results are displayed in table 7.10. Hypothesis 2A states that pure airlines will be more innovative than non-pure airlines. The results however indicate otherwise. They show that there are no significant differences between pure and non-pure airlines in their innovative behavior. In addition, non-pure airlines are seen as being slightly more innovative than their pure competitors, however the difference is only slight.

Rivalry within the strategic group is introduced as a moderator in hypothesis 4A. The results show similar tendencies as those from hypothesis 2A: no significant differences between pure and non-pure airlines and non-pure airlines show a slightly greater innovative tendency. However, average innovation per group shows nearly significant differences between the two types of airlines, with non-pure airlines being faintly more innovative. External rivalry, hypothesis 4B, does not have an affect on the results and it is not possible to discern any significant differences between the two types of airlines in this analysis.

Table 7.10: ANOVA results – innovation

			ANOVA	Test Kruskal-Wallis
H2A				
	Variable: Innovation-overall	N	Mean	Mean Rank
	Non-pure business model (0)	25	31.240	19.26
	Pure business model (1)	13	21.615	19.96
			F 0.008	Asymp. Sig. 0.853
			Sig. 0.929	
	Variable: Innovation-activities	N	Mean	Mean Rank
	Non-pure business model (0)	25	2.714	20.36
	Pure business model (1)	13	2.432	17.85
			F 0.963	Asymp. Sig. 0.508
			Sig. 0.333	
	Variable: Innovation-average	N	Mean	Mean Rank
	Non-pure business model (0)	25	1.058	21.04
	Pure business model (1)	13	0.888	16.54
			F 2.472	Asymp. Sig. 0.236
			Sig. 0.125	

H4A	Moderator: High rivalry-within			
	Variable: Innovation-overall	N	Mean	Mean Rank
	Non-pure business model (0)	20	33.200	17.45
	Pure business model (1)	13	31.615	16.31
			F 0.141	Asymp. Sig. 0.740
			Sig. 0.709	
	Moderator: High rivalry-within			
	Variable: Innovation-activities	N	Mean	Mean Rank
	Non-pure business model (0)	20	2.849	18.40
	Pure business model (1)	13	2.432	14.85
			F 2.059	Asymp. Sig. 0.302
			Sig. 0.161	
	Moderator: High rivalry-within			
	Variable: Innovation-average	N	Mean	Mean Rank
	Non-pure business model (0)	20	1.107	19.10
	Pure business model (1)	13	0.888	13.77
			F 3.743	Asymp. Sig. 0.121
			Sig. 0.062	
H4B	Moderator: High rivalry-among			
	Variable: Innovation-overall	N	Mean	Mean Rank
	Non-pure business model (0)	21	32.286	15.07
	Pure business model (1)	9	35.556	16.50
			F 0.594	Asymp. Sig. 0.683
			Sig. 0.447	
	Moderator: High rivalry-among			
	Variable: Innovation-activities	N	Mean	Mean Rank
	Non-pure business model (0)	21	2.824	15.95
	Pure business model (1)	9	2.735	14.44
			F 0.116	Asymp. Sig. 0.667
			Sig. 0.736	
	Moderator: High rivalry-among			
	Variable: Innovation-average	N	Mean	Mean Rank
	Non-pure business model (0)	21	1.113	16.71
	Pure business model (1)	9	0.999	12.67
			F 1.418	Asymp. Sig. 0.248
			Sig. 0.244	

Source: Author's own creation

The analyses of business model innovation among airlines show no significant differences between pure and non-pure airlines. However, this leads the researcher to conclude that all types of airlines innovate, not just pure or non-pure. This finding supports the notion that all airlines realize that innovation may be beneficial and use this strategy to adapt to their competitive landscape (Business Week, 2007; Franke, 2007). While it is accurate to state that the results also indicate that no airlines innovate the researcher draws attention to the questionnaire results that indicate that airlines do change traditional business model elements, which indicates that innovation is present. However, hypotheses 2A, 4A, and 4B are unverified.

The findings from the previous analyses are summarized in table 7.11.

Table 7.11: Summarized hypotheses confirmation

Hypothesis		Result	Comments
H2A:	The more pure the business model the more innovative an airline	Rejected	
H2B:	The less pure the business model the more imitation among strategic groups	Accepted	
H2C:	The less pure the business model the more imitation within strategic groups	Rejected	Opposite findings though with significant results
H3A:	A high rivalry within a strategic group will negatively affect internal imitation of airlines with a pure business model	Rejected	
H3B:	A high rivalry within a strategic group will negatively affect external imitation of airlines with a pure business model	Accepted	
H3C:	A high rivalry among strategic groups will negatively affect internal imitation of airlines with a pure business model	Rejected	Opposite findings though with significant results
H3D:	A high rivalry among strategic groups will negatively affect external imitation of airlines with a pure business model	Accepted	
H4A:	A high rivalry within a group will positively affect innovation of airlines with a pure business model	Rejected	Opposite findings though with insignificant results
H4B:	A high rivalry among groups will positively affect innovation of airlines with a pure business model	Rejected	

Source: Author's own creation

7.3 Challenges to business model change

Whether an airline elects to maintain their current business model or implement changes, whether via imitation or innovation, challenges may appear. Change management may be useful in some carriers as they attempt to adapt their business model to accommodate market forces (Franke, 2007). As one network carrier described, *"Change is the only constant in the airline business and time needs to be spent on 'selling' change internally. This is the biggest challenge for any large corporation."* Survey respondents were asked to describe the challenges with implementing business model changes:

> *"Getting the customer to accept change and conform behavior."* A network carrier
>
> *"Securing government/political buy in and approvals. Converging customer expectations across different market segments. Transition change management on people and processes."* A network carrier

> *"Changing the inertia of current practice often needs great effort to change the mindset. Convincing board of directors is also a big challenge. Market situation changes so quick and accurate decision making is critical. Power and leading edge simulation tools for quick decision are essential but difficult to keep improving them."* A network carrier

> *"Main challenge is to follow the industry trend and where/how to grow."* A network carrier

> *"Hard to cover all segments, trying to be best in all."* A network carrier

> *"Paradigm shift; unifying the thought."* A regional carrier

> *"High flexibility demands to apply an aggressive 'low-cost' model on one route (with high competition) and a classical high-fare on monopoly routes. Lack of revenue management systems. Lack of specialists with profound knowledge of low-cost model. Adaption to market differences, e.g. high Internet sales in Western Europe and practically no Internet sales in C.I.S/Middle East markets."* A regional carrier

As airlines have explained, change is a challenge, regardless if it is imitation or innovation. Even carriers that are convinced a change is appropriate and will generate rewards, implementation may stifle such benefits. Imitation, as explained by one regional carrier, is not as easy as one may expect.

7.4 Conclusion

The analyses of the survey results show that there are varying degrees of imitation and innovation among pure and non-pure airlines, all of which contribute to business model change. It can be stated that there is variation among the types of airlines and their imitative behavior. Non-pure airlines are more imitative of business models from other strategic groups, while pure airlines are more imitative within their own strategic group. Non-pure airlines display greater imitative tendencies among groups when both internal and external rivalry is present. Pure airlines, on the other hand, only show pronounced imitative behavior when there is strong rivalry among strategic groups. Such imitative behavior is reflected in the business model descriptions provided by the survey respondents. There was a high level of descriptive repetition, with the majority of carriers focusing on the product offered and a third of the carriers stressing fares and the network. Innovation, on the other hand, was not significantly different between pure and non-pure airlines. Rather, it can be stated that all types of airlines are innovative, however non-pure airlines tend to show slightly greater innovative traits. Despite the type of change, imitation or innovation, airlines are challenged to adapt their business model. Factors include changing customers' momentum, employee reluctance and hesitation, and industry uncertainty. Future challenges, such as operating a hybrid model, competition, and infrastructure will test future management. These findings contribute to the understanding of *how* airlines change their business models and one can make predictions of what traits the future airline business models may display. The next chapter will address precisely this question using a structured method to propose what kinds of business models may appear in the industry grounded in the results of imitation and innovation from the survey.

Why is there variation in airline business models?

Research based on survey responses from industry actors indicates that business model variation is grounded in innovation and imitation. Results show that both pure and non-pure carriers innovate, while external imitation by non-pure carriers is present and only strengthened by increased rivalry. Internal imitation by pure carriers of group peers is also evident in the industry, however it is not possible to discern whether this is of pure or non-pure peers.

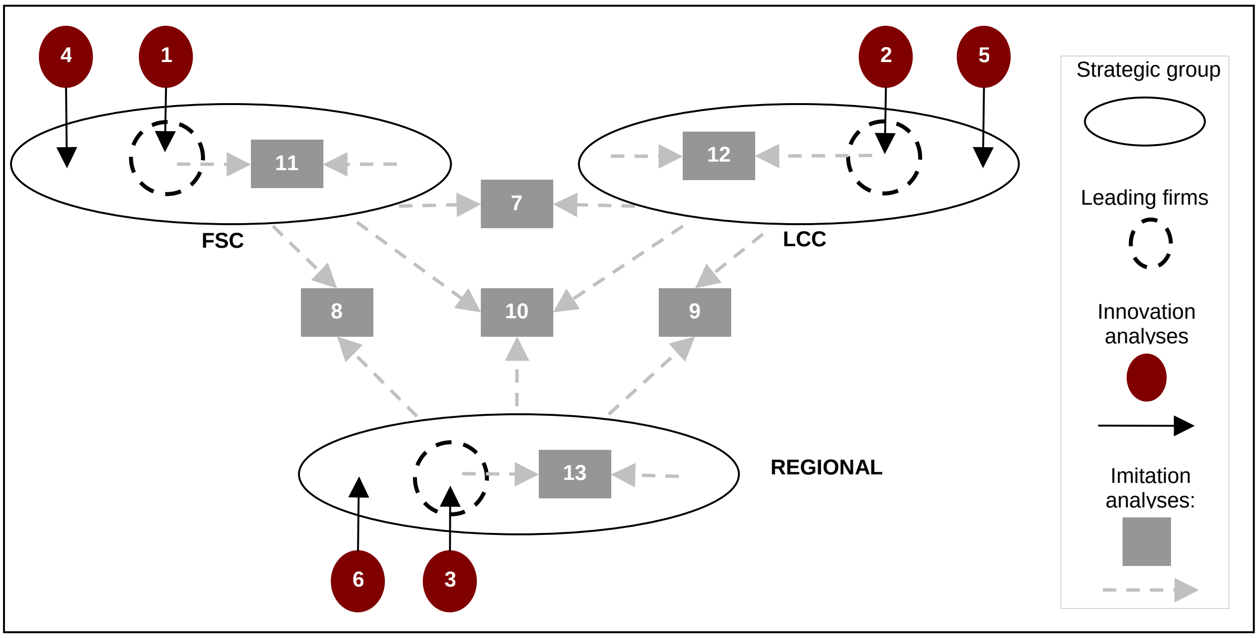
8. Configurational comparative analysis

- The wingspan of a 747 becomes 60 centimeters longer while being fully fueled as the wings sag from the added weight; the wings are strong enough to flex up to 26 feet while the metal at the wingtip is only 2 millimeters thick -

The previous chapters have shown how strategic positioning of airlines within strategic groups impact profit, and empirical evidence was presented supporting the presence of the concepts of business model imitation and innovation among all groups found in the scheduled passenger airline industry. This contribution brings the field's current boundary into view, yet to surpass the threshold it is necessary to analyze outcomes grounded in innovation and imitation that will impact the industry in the near future. Current literature (Franke, 2007; J. Gimeno & Chen, 1998; Taneja, 2004) agrees that these two forces are present in the airline industry, with Gimeno and Chen (1998) concluding that both forces are present simultaneously in the industry, however there lacks an analytic method to propose what potential business models will appear in the future as a result of such behavior. These configurational analyses and propositions are made possible by utilizing MVQCA and the TOSMANA software, as presented in Chapter 5. The intention is to identify which configurations lead to profitability among full-service, low-cost, and regional carriers, identifying elements that are deserving of innovation, and to combine strategic groups resulting in new business models grounded in imitative behavior. Figure 8.1 shows the types of analyses that will be conducted using this method. Each of the three strategic groups is segmented according to leading and secondary airlines based on operational profit margins, as demonstrated in Chapter 6. The justification for utilizing profit margin as the segmentation criteria rather than business model adherence is grounded in the theoretical understanding that imitative firms are potentially mimetic of successful rivals. Carriers in the industry may be more prone to imitate competitors that post profits, as discussed in Chapter 4. However, this method may be challenged if applied to a study group with no profitable carriers.

The analyses begin by analyzing which business model elements deserve innovative solutions for both leading and secondary airlines (analyses 1-3 for leading airlines and analyses 4-6 for secondary airlines). This results in six innovation-themed analyses. The following analyses are based on imitation, both among and within strategic groups. Imitation among strategic groups is based on secondary airlines. There are four analyses of this type (analyses 7-10). The final analyses, of which there are three, are based on imitation within strategic groups (analyses 10-13).

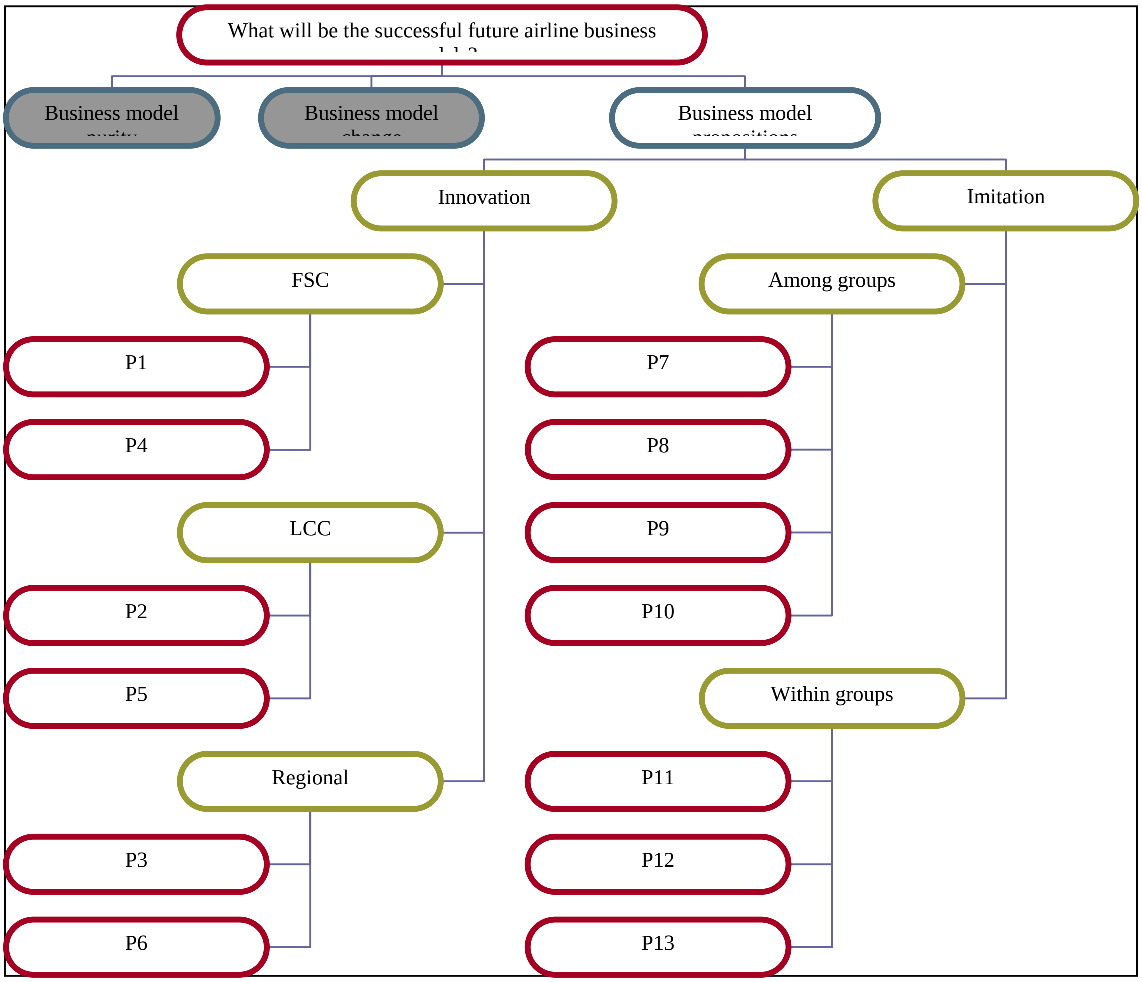
Figure 8.1: Configurational Boolean analyses based on imitation and innovation



Source: Author's own creation

Figure 8.2 depicts the organizational chart of these analyses. It is the third, and final, analyses supporting the main research question. There are two main themes, innovation and imitation. Innovation is sub-divided into the three strategic groups and further segmented by leading airlines and secondary airlines. Leading airline innovation is addressed in propositions 1-3, and secondary airline innovation in propositions 4-6. Imitation is sub-divided into imitation among groups, which consists of propositions 7 through 10, and imitation within groups, propositions 11-13. Refer to table 5.10 for detailed descriptions of propositions.

Figure 8.2: Configurational Boolean analyses configurational chart



Source: Author's own creation

Use of configurational comparative analysis requires that the researcher establish thresholds for conditions or outcomes, regardless if dichotomous or multi-values are utilized. Table 8.1 provides an overview of the conditions that are incorporated into the Boolean analyses, the type of notation utilized, and how to interpret the notation. The specific thresholds for each condition are not shown in table 8.1 as these are specific to each analysis and can vary; rather, they are presented prior to each specific analysis. Half of the 16 conditions are dichotomous while three are trichotomous. The remaining six conditions are multi-value and the thresholds were determined by the researcher prior to beginning the analyses. Appendix VI lists the raw data and truth tables for the respective analyses.

Table 8.1: Threshold settings

Condition	Notation	Notation interpretation
Online transfer	Dichotomous	0 = absence; 1 = presence
Interline transfer	Dichotomous	0 = absence; 1 = presence
Through-fare discount	Dichotomous	0 = absence; 1 = presence
Ticket restrictions	Dichotomous	0 = absence; 1 = presence
GDS presence	Trichotomous	0 = absence; 0.5 = presence via third-party; 1 = presence
Frequent flyer program	Dichotomous	0 = absence; 1 = presence
Lounge access	Trichotomous	0 = absence; 0.5 = paid membership; 1 = free membership
Cabin numbers	Multi-value	Varying thresholds – see specific analysis
Alliance membership	Trichotomous	0 = no membership; 1 = global alliance member
Codeshare agreements	Dichotomous	0 = absence; 1 = presence
Capacity lift provider	Dichotomous	0 = non-provider; 0.5 = FSC brand & own brand ops; 1 = provider
Capacity lift user	Dichotomous	0 = non-user; 1 = user
ASK % to primary airport	Multi-value	Varying thresholds – see specific analysis
ASK % by partner	Multi-value	Varying thresholds – see specific analysis
Fleet purity	Multi-value	Varying thresholds – see specific analysis
Stage length	Multi-value	Varying thresholds – see specific analysis
Outcome		
Operating margin	Multi-value	Varying thresholds – see specific analysis

Source: Author’s own creation

Analyses of truth tables with non-dichotomous outcomes may result in a large number of contradictions which are not presented to the TOSMANA user. To alleviate this problem trichotomous outcomes (0, 1, 2) are recoded by the researcher as dichotomous prior to minimization. In the innovation and external imitation analyses the research attempts to minimize for outcomes of 1 (i.e. secondary firms), however with trichotomous or multi-value outcomes the truth table is generated prior to minimization, and the TOSMANA software interprets multi-value outcomes as a binary outcome. In other words, within this research stream the researcher attempts to minimize outcome 1, however TOSMANA regards outcomes 0 and 2 as a 0 when minimizing. This may result in a high number of contradictions; however the TOSMANA user is unaware of this predicament because the generated truth table is presented as trichotomous. This fault is a result of the solution sequence performed by the software. To alleviate this, the researcher recoded outcomes 2 as 0, in effect creating a dichotomous truth table. This allowed the researcher to capture any contradictions and attempt to reduce their impact prior to minimizing for 1. This procedure was done for all innovation and external imitation analyses[53].

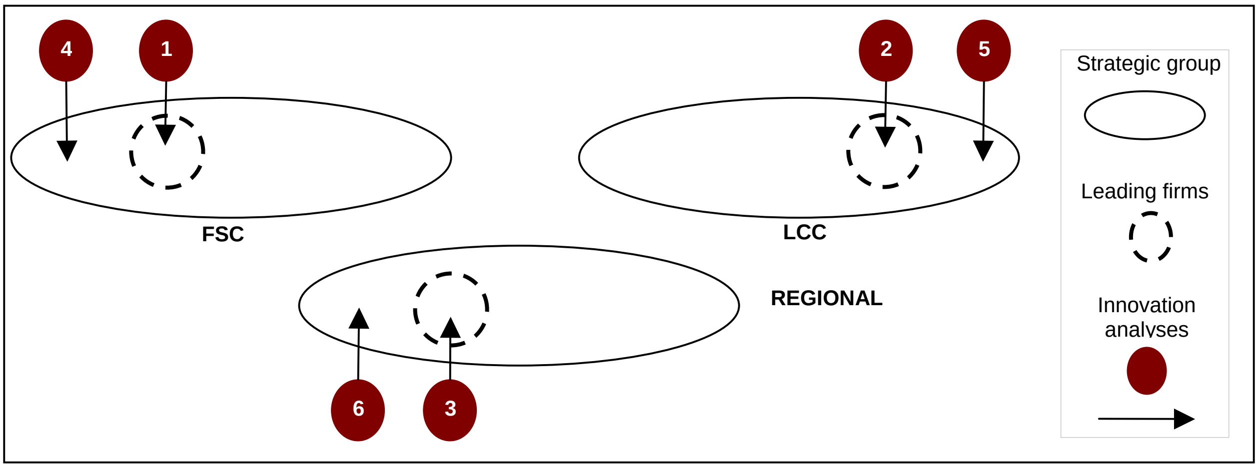
8.1 Innovation

Innovation within firms has been shown to be a leading contributing factor to firm success (H. W. Chesbrough, 2006; H. Chesbrough & Rosenbloom, 2002; Christensen et al., 2004; Fagerberg et al., 2005; Franke, 2007), however management may be challenged to envision innovative moves. Figure 8.3 is a graphical representation of

[53] The author wishes to thank Dr. Lasse Cronqvist for assistance in this matter.

the types of analyses conducted. Analyses 1-3 will propose which business model elements and their configurations are consistently present in successful leading airlines, while analyses 4-6 will do the same for secondary airlines.

Figure 8.3: Innovative configurational analyses



Source: Author's own creation

The following sections are segmented according to strategic group and leading and secondary firms. Prior to each strategic group analyses a table shows the thresholds used.

8.1.1 FSC

The propositions for analyses 1 and 4 are presented in table 8.2.

Table 8.2: Overview of propositions 1 & 4

Variable headings	Network	Distribution	Service	Operational
P1	Sustained integration	Sustained GDS availability	Sustained service levels	Fleet standardization and longer stage lengths
P4	Increased ticket flexibility	Sustained GDS availability	Sustained service levels	Fleet non-standardization

Source: Author's own creation

The researcher proposes that pure FSCs will continue to strive for network integration, traditional distribution tactics, differentiated service and in-flight classes, and fleet standardization coupled with longer stage lengths. Non-pure FSCs, on the other hand, will increase network flexibility through restriction-less travel, maintain status quo GDS distribution strategies, simplified service offerings, and fleet standardization and secondary airport service.

Table 8.3 shows the thresholds utilized in the full-service carrier analyses. The thresholds are identical for both pure and non-pure FSCs. They were determined by analyzing the spread of the individual business model element data for the study group and placing the threshold accordingly. The truth table for this analysis is available in Appendix VI. Research shows there is currently limited variation in the FSC business models, as discussed in Chapter 6. All airlines in the study group continue to adhere to the traditional FSC business model of offering onlining, interlining, GDS distribution, FFPs, lounges, and codeshares. This means that the configuration analyses results will not incorporate these specific elements in the results.

Table 8.3: FSC innovation – thresholds

Dummy variable	0	1	2
Online transfer	0	1	
Interline transfer	0	1	
Through-fare discount	0	1	
Ticket restrictions	0	1	
GDS presence	0	1	
Frequent flyer program	0	1	
Lounge access	0	1	
Cabin numbers	2	3	
Alliance membership	0	1	
Codeshare agreements	0	1	
Capacity lift provider	0	1	
Capacity lift user	0	1	
ASK % to primary airport	x<0.94	x>0.94	
ASK % by partner	x<0.13	x>0.13	
Fleet purity	x<0.26	x>0.26	
Stage length	x<1200	x>1200	
Operating margin	x<0.00	0.00<x>0.03	x>0.03

Source: Author's own creation

Two carriers with contradicting outcomes were removed from the analyses. This practice allows users of qualitative comparative analysis to capture a more representative snapshot of the industry. However, rather than remove contradicting observations the research may elect to adjust the thresholds in an attempt to reduce the number of contradictions, or add more conditions. The complication with QCA is that contradictory cases are analytically omitted; therefore researchers wish to limit the number of contradictions observed. Contradictions occur when cases with identical conditions report differing outcomes. In this case, airlines with identical business models reported both positive and negative operating margins. Two carriers, Italy-based Alitalia (AZ) and U.S.-based United Airlines (UA), were creating a contradiction of results among eight observations. Six of the eight observations reported margins greater than 3% (i.e. an outcome of 2) while Alitalia and United Airlines reported lower margins, less than 0% (i.e. an outcome of 1) and between 0- and 3% (i.e. an outcome of 0), respectively (see table IV in Appendix IV for the raw data). This resulted in the unacceptable omission of eight observations, caused by two contradicting cases. With the removal Alitalia and United Airlines from the analyses the researcher ensured that the six remaining observations were included in the analyses and results, rather than omitted as contradictions. The researcher will delve deeper into these two omitted carriers in an attempt to explain in greater detail why their business models were identical to others yet failed to generate similar operational profits.

The configurational FSC innovation results are segmented according to pure and non-pure airlines. The purity threshold was determined from the spread of the airlines' operating results and the threshold shown in table 8.3. Pure airlines are those with an operating margin greater than 3% and non-pure those with a margin between 0% and 3%. Carriers with a margin below 0% are not of interest, as the researcher is of the opinion that unsuccessful (i.e. loss-making) carriers are most likely not of innovative or imitative interest to other carriers. These results report the specific combinations of business model elements that result in the specified outcome (operating margin).

8.1.1.1 Pure FSC

The analyses present the following results shown in figure 8.4.

Figure 8.4: Configurational pure FSC innovation results

Pure (P1):

Thru-fare (0) + Primary a/p share (0) {In-flight classes (0) + Alliance (1) + CLT (1) + Feed share (1)} +

Stage length (1) {Fleet (0) + Primary a/p share (1)} + Restrictions (1) In-flight classes (1) Alliance (1) +

Alliance (1) CLT (0) + Alliance (0) CLT (1)

Source: Author's own creation

The interpreted business model combinations from figure 8.4 that lead to an operating margin greater than 3% are the following:

- No through-fare pricing *OR*
- An ASK percentage to primary airports less than 94% *AND* a 2-class cabin configuration *OR*
- An ASK percentage to primary airports less than 94% *AND* membership of one of the three major alliances *OR*
- An ASK percentage to primary airports less than 94% *AND* capacity purchase agreements with regional carriers *OR*
- An ASK percentage to primary airports less than 94% *AND* an ASK percentage flown by regional partners greater than 13% *OR*
- An average stage length greater than 1200 NM *AND* an FSI less than 26% *OR*
- An average stage length greater than 1200 NM *AND* an ASK percentage to primary airports greater than 94% *OR*

- Ticket restrictions *AND* a 3-class cabin configuration *AND* membership of one of the three major alliances *OR*
- Membership of one of the three major alliances *AND* an ASK percentage flown by regional partners less than 13% *OR*
- Non-membership of one of the three major alliances *AND* an ASK percentage flown by regional partners greater than 13%

Future innovation of pure FSC business models will either focus on simplifying the network by eliminating through-fares and introducing single-leg pricing or operating to outlying airports combined with varying forms of partnerships, such as alliance membership, capacity purchase agreements, and regional feed providers. FSCs may also elect to lengthen their network by operating longer stage lengths coupled with a reduction in an airline's FSI. As an FSC may choose to expand to outlying markets a diversified fleet may be necessary to meet operational requirements. Finally, the traditional FSC business model will continue to exist as indicated by the Boolean analysis results of a model with ticket restrictions, a 3-class configuration, and alliance membership. The calculated Boolean results are to some extent innovative. While, pure FSCs may benefit from transitioning to a simplified network, others may be better placed transitioning to the traditional FSC model. This can be interpreted to indicate that carriers in selected markets that have not fully adopted the traditional FSC model, may be prone to innovative their business model in this manner. Examples may include some Asian, Middle Eastern, and African carriers that have not yet entered into global alliances or utilize. While the results may not appear innovative at the industry level, specific carriers may regard such business model changes as innovations.

8.1.1.2 Non-Pure FSC

Non-pure FSC carriers are those with an operating margin between 0-3%. The configurational analysis results are as follows (see figure 8.5):

Figure 8.5: Configurational non-pure FSC innovation results

Non-pure (P4):

Thru-fare (1) Restrictions (0) + Alliance (0) Primary a/p share (0)

Source: Author's own creation

Non-pure FSCs will focus their innovative attention on the following areas:

- Through-fare pricing *AND* removal of ticket restrictions *OR*
- Non-membership of one of the three major alliances *AND* an ASK percentage to primary airports less than 94%

These results indicate that future innovation of non-pure FSCs will combine select LCC business model elements. These include a focus on extending flexibility to passengers via restriction-less travel, or departure from the industry's three major alliances (Buyck, 2006), and increased focus on secondary airports. However, various traditional FSC business model elements will be retained, such as through-fare discounts.

8.1.1.3 Proposition confirmation

The propositions for these analyses, as presented in table 8.2, are partially confirmed. Table 8.4 presents a checklist over those variable headings that were confirmed by the configurational analyses.

Table 8.4: Confirmation of propositions 1 & 4

Variable headings	Network	Distribution	Service	Operational
P1	Confirmed	Confirmed	Unconfirmed (status quo)	Partially confirmed
P4	Confirmed	Confirmed	Confirmed	Unconfirmed

Source: Author's own creation

The FSC innovation propositions were partially confirmed. Sustained network integration among pure FSCs was confirmed with the continued membership in the global alliances and continued use of capacity purchase agreements among pure FSCs supports this proposition. GDS presence among pure FSCs will continue[54]. A focus on service elements among pure FSCs is not part of the innovation results, rather the current status quo appears to be maintained. Pure FSCs will not initiate fleet standardization, however an increase in the average stage lengths will occur. This proposition was partially confirmed. Among non-pure FSCs network flexibility will receive innovative attention in the future. GDS presence will continue. Fleet standardization will not be a core innovative focus among non-pure airlines in the future. This may coincide with future focus on non-alliance membership and increased ASKs to secondary airports. This direction suggests a non-standard fleet may be necessary.

8.1.2 LCC

The low-cost strategic group in the industry has shown a propensity for greater diversity compared to their FSC brethren. One explanation may be that LCCs strive for differentiation in an attempt to maximize revenue and create a strategic distance (Alamdari & Fagan, 2005). The propositions for the LCC analysis are presented in table 8.5.

[54] The lack of any variation in GDS presence among the study group entails that it will not be a condition in the results

Table 8.5: Overview of propositions 2 & 5

Variable headings	Network	Distribution	Service	Operational
P2	Sustained network segmentation	Sustained GDS absence	Sustained "no-frills" concept	Sustained fleet standardization
P5	Restricted network integration	Restricted GDS presence	Restricted unbundled service	Fleet non-standardized & longer stage lengths

Source: Author's own creation

The propositions state that leading LCCs will maintain a segmented, point-to-point network, with a focus on non-GDS distribution, while maintaining a limited service concept, and single fleet focus; in essence, the traditional LCC business model. However, the secondary LCCs will lean towards an integrated network and a limited GDS presence, as well as, providing unbundled service attributes, and a non-standardized fleet with longer stage lengths.

Table 8.6 shows the thresholds utilized in the LCC analyses. The thresholds are identical for both leading and secondary LCCs. As explained in Chapter 5 the measurement of business model variables vary between the various strategic groups. The LCC group has been integrating unbundled services, which enables customers to purchase specific elements at their leisure, such as with lounge access. Distribution tactics among LCCs vary as well, third party access to traditional distribution systems is a strategy followed by some carriers.

Table 8.6: LCC innovation – thresholds

Dummy variable	0	1	2
Online transfer	0	1	
Interline transfer	0	1	
Through-fare discount	0	1	
Ticket restrictions	0	1	
GDS presence	0	0.5	1
Frequent flyer program	0	1	
Lounge access	0	0.5	1
Cabin numbers	1	2	
Alliance membership	0	1	
Codeshare agreements	0	1	
Capacity lift provider	0	1	
Capacity lift user	0	1	
ASK % to primary airport	x<0.55	x>0.55	
ASK % by partner	x<0.03	x>0.03	
Fleet purity	x<0.75	x>0.75	
Stage length	x<740	x>740	
Operating margin	x<0.00	0.00<x>0.08	x>0.08

Source: Author's own creation

The segmentation of results into pure LCCs and non-pure LCCs is explained in the following section.

8.1.2.1 Pure LCC

Figure 8.6 shows the Boolean results for pure LCCs which suggests that in the future pure LCCs will adjust their business model in specific areas.

Figure 8.6: Configurational pure LCC innovation results

Pure (P2):

Primary a/p share (0) + GDS (1) $\left\{ \text{Online (1) + Thru-fare (1) + FFP (1)} \right\}$ +

GDS (0) Fleet (0) $\left\{ \text{FFP (0) + Stage length (0)} \right\}$

Source: Author's own creation

Pure LCCs will maintain the status of their business models with a few exceptions. The traditional business model and its focus on secondary airports, GDS-free distribution, and standardized fleets will be one option; however some network and service changes may take place. The results of pure LCC innovative focus is as follows:

- An ASK percentage to primary airports less than 55% *OR*
- GDS presence via a third-party *AND* passenger onlining *OR*
- GDS presence via a third-party *AND* through-fare ticketing *OR*
- GDS presence via a third-party *AND* a frequent flyer program *OR*
- No GDS presence *AND* a standardized fleet *AND* a frequent flyer program *OR*
- No GDS presence *AND* a standardized fleet *AND* a stage length less than 740 NM

These results indicate that service to secondary airports by pure LCCs will continue to be of primary focus. However, distribution tactics may change to allow access to GDS systems. This may encourage an increase in high-yield business travel, which would necessitate network integration by providing through-fare discounts and on-lining functions, as well as a frequent flyer program. In addition, the traditional LCC business model will survive in an opaque form. Internet-only distribution will be coupled with an amenity-free model, however short stage lengths and a diversified fleet is an option.

8.1.2.2 Non-Pure LCC

The LCC pure/non-pure innovation analyses do not contain contradictions and therefore no carriers were removed from the analyses, as in the FSC analyses. Figure 8.7 shows the results for non-pure LCCs.

Figure 8.7: Configurational non-pure LCC innovation results

Non-pure (P5):

Online (0) + Thru-fare (0) GDS (1) + Lounges (1) +

Lounges (1) Interline (0) + FFP (0) + Codeshare (0) +

Restrictions (0) Stage length (1) + In-flight classes (1) Stage length (0) + GDS (1) FFP (0)

Source: Author's own creation

Non-pure LCCs will innovate their business model by changing the following business model elements:

- No passenger onlining *AND* GDS presence via a third-party *OR*
- No passenger onlining *AND* lounge access via payment *OR*
- No passenger through-fare *AND* GDS presence via a third-party *OR*
- No passenger through-fare *AND* lounge access via payment *OR*
- Lounge access via payment *AND* no passenger interlining *OR*
- Lounge access via payment *AND* no frequent flyer program *OR*
- Lounge access via payment *AND* no codeshare agreements *OR*
- No ticket restrictions *AND* a stage length greater than 740 NM *OR*
- 2 class cabin configuration *AND* a stage length less than 740 NM *OR*
- GDS presence via a third-party *AND* no frequent flyer program

These results indicate that non-pure airlines can elect to maintain a segregated network, however self-paid amenities may be offered, in addition to a GDS presence via a third-party. In addition, a go-it-alone strategy of no partnerships is an option for carriers. Finally, it is discovered that non-pure LCCs lengthen their stage lengths while maintaining restriction-free travel or shorten their stage lengths and provide a dual-class service.

8.1.2.3 Proposition confirmation

The proposition confirmations are presented in table 8.7, which shows that some business model headings are confirmed while others are unconfirmed.

Table 8.7: Confirmation of propositions 2 & 5

Variable headings	Network	Distribution	Service	Operational
P2	Partially confirmed	Partially confirmed	Partially confirmed	Partially confirmed
P5	Unconfirmed	Confirmed	Confirmed	Partially confirmed

Source: Author's own creation

The network proposition of pure LCCs is partially confirmed with the result showing that some carriers may elect to offer through-fares, coupled with a limited GDS presence. In addition, the potential for pure LCCs to offer an FFP is high, which limits the confirmation of the proposition. The Boolean analysis partially confirms the operational proposition of sustained fleet standardization with the results showing that successful pure LCCs have an FSI of less than 0.75. One explanation for this seemingly contradictory finding is that some LCCs may strive to reduce aircraft manufacturer supplier bargaining power by diversifying its fleet. Non-pure LCCs will continue to operate a segmented network, however these carriers will attempt to seek distribution channels that provide limited GDS access. Ancillary revenue though unbundled service features is an option that some non-pure LCCs may seek. Finally, there is a potential that secondary LCCs will attempt to operate longer stage lengths, although a non-standardized fleet is not a viable option in the foreseeable future.

8.1.3 Regional

The final innovation analysis concerns the regional airline strategic group. These carriers often provide supplemental capacity to larger FSC carriers (Davies & Quastler, 1995), although a select few LCCs are also attempting to benefit from similar arrangements (Arnoult, 2006; Karp, 2006; Ranson, 2006). This division among regional carries is reflected in the researcher-proposed propositions, shown in table 8.8.

Table 8.8: Overview of propositions 3 & 6

Variable headings	Network	Distribution	Service	Operational
P3	Network integration with CLT	Sustained CLT reliance	Sustained CLT reliance	Fleet standardization
P6	Network integration as stand alone carrier	Sustained GDS presence	Sustained complementary service	Fleet non-standardization

Source: Author's own creation

The researcher proposes that pure regional carriers will continue their close relationship as capacity lift providers with FSCs. This will result in limited innovative moves, although changes in fleet composition will take place. Non-pure regional carriers, on the other hand, will attempt to continue network integration as stand-alone carriers, while maintaining complementary service. A non-standardized fleet will allow these carriers to provide the necessary operation to meet market demands.

Table 8.9 shows the thresholds utilized in the regional carrier analyses. The thresholds are identical for both leading and secondary regional carriers. The variable, capacity lift provider, is a trichotomous measurement as some carriers operate as branded feed carriers for FSCs, as well as, operating as an own-branded carrier, denoted as a 1 in the Boolean dummy variable. A Boolean dummy variable of 2 would indicate a regional carrier that operates solely as a capacity lift provider, while a 0 would signify a stand-alone operator.

Table 8.9: Regional innovation – thresholds

Dummy variable	**0**	**1**	**2**
Online transfer	0	1	
Interline transfer	0	1	
Through-fare discount	0	1	
Ticket restrictions	0	1	
GDS presence	0	1	
Frequent flyer program	0	1	
Lounge access	0	1	
Cabin numbers	1	2	
Alliance membership	0	1	
Codeshare agreements	0	1	
Capacity lift provider	0	0.5	1
Capacity lift user	0	1	
ASK % to primary airport	x<0.88	x>0.88	
ASK % by partner	0		
Fleet purity	x<0.75	x>0.75	
Stage length	x<383	x>383	
Operating margin	x<0.00	0.00<x>0.06	x>0.06

Source: Author's own creation

Two regional carriers were removed from the QCA analysis which led to contradictions, just as in the FSC analyses. Table IV in Appendix IV shows the raw, contradictory data. These two carriers, Skywest and American Eagle, pure capacity lift providers in the U.S., with profit margins of 11% and 10%, respectively had identical business models with other capacity lift providers yet better performance results which surpassed the designated threshold. Eight observations risked being omitted from the analyses due to their classification as contradictory observations. With the removal of the contradictory carriers the number of observations with an outcome of 1 was doubled; a larger number of observations increase explanatory power. The removal of these two regional carriers ensured greater analytical parsimony. The next three sections will provide the analytical results of pure and non-pure regional carriers, and proposition confirmation.

8.1.3.1 Pure regional

The Boolean configurational results for pure regional carriers are presented in figure 8.8.

Figure 8.8: Configurational pure regional innovation results

Pure (P3):

$$\text{CLP (1)} + \text{Thru-fare (0)} \left\{ \text{Online (1)} + \text{Lounges (0)} + \text{Primary a/p share (1)} \right\} +$$

In-flight classes (0) Fleet (1)

Source: Author's own creation

The analysis provides the following results:

- Capacity lift provider *OR*
- No passenger through-fare *AND* passenger on-lining *OR*
- No passenger through-fare *AND* no lounges *OR*
- No passenger through-fare *AND* an ASK to primary airports greater than 88% *OR*
- A single cabin class *AND* an FSI greater than 0.75

The results show a surprising finding that pure regional carriers will continue with the traditional capacity purchase agreement coupled with a stand-alone brand (i.e. CLP designated with a 1). This is similar to the business model shift that US regional carrier, Express Jet, is attempting (Airline Business, 2007d; Field, 2007). This stand alone brand may operate a business model with regional carriers providing a point-to-point operation with single-leg pricing and limited amenities to a high level of primary airports. At the same time, the regional carrier will maintain an agreement to provide short-haul capacity to a mainline partner. This may emulate to some extent an LCC model, however possibly with ties to a larger partner. The remaining results indicate that regional carriers will focus on single-segment pricing but provide on-lining capabilities, while continuing to focus on providing service to primary airports.

8.1.3.2 Non-Pure regional

The Boolean findings for non-pure regional carriers are presented in figure 8.9.

Figure 8.9: Configurational non-pure regional innovation results

Non-pure (P5):

Online (0) + In-flight classes (0) Fleet (0) + In-flight classes (1) Fleet (1) +

CLP (2) { In-flight classes (1) + Fleet (0) { Thru-fare (1) + Restrictions (1) } }

Source: Author's own creation

The results that indicate which business model elements non-pure regional airlines will innovate are shown to be:

- No passenger on-lining
- A single cabin class configuration *AND* an FSI less than 0.75
- A dual cabin class configuration *AND* an FSI greater than 0.75
- A capacity lift provider *AND* a dual cabin class configuration *AND* ticketing through-fares
- A capacity lift provider *AND* a dual cabin class configuration *AND* ticket restrictions
- A capacity lift provider *AND* an FSI less than 0.75 *AND* ticketing through-fares
- A capacity lift provider *AND* an FSI less than 0.75 *AND* ticketing ticket restrictions

Again the results of the non-pure regional carrier MVQCA analysis show eye-opening results. Carriers may elect to operate a business model with a diversified fleet and a single cabin configuration, or a standardized fleet and dual-class configuration. However, non-pure regional carriers can also elect to operate as pure capacity lift providers with a dual-class configuration and diversified fleet. Although pure regional carriers also operate as a capacity lift providers they have a diversified model with own-branded operations. Some regional carriers with lower operating margins have maintained the model of sole capacity lift providers.

8.1.3.3 Proposition confirmation

The proposition confirmation for the final innovation analyses are presented in table 8.10.

Table 8.10: Confirmation of propositions 3 & 6

Variable headings	Network	Distribution	Service	Operational
P3	Partially confirmed	Confirmed	Confirmed	Confirmed
P6	Partially confirmed	Confirmed	Confirmed	Partially confirmed

Source: Author's own creation

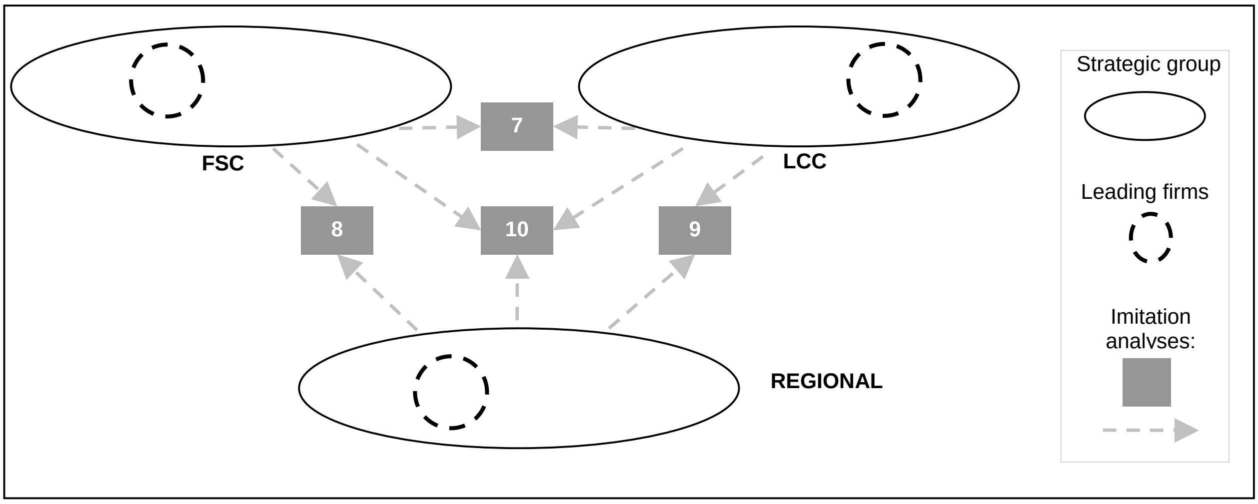
The findings among pure regional carriers indicate a partially confirmed network model due to a dual-role business model as a capacity lift provider and self branded-operator. The remaining propositions are confirmed by the Boolean analysis, with a reliance on the mainline carrier for a significant share of business model functions. The findings for non-pure regional carriers suggest that network integration will not only happen as a stand-alone carrier but also as a pure capacity lift provider, which partially confirms the proposition. Distribution and service attributes of the business model will continue to rely upon the traditional features of GDS distribution and complementary service features, while some carriers will focus on fleet standardization and others will not. Those carriers that will operate a non-standardized fleet are the pure capacity lift providers, which may be a testament to the unique agreements that these regionals enter into with mainline carriers. For example, many North American FSC pilot unions have scope clauses in place which limit the equipment that regionals may operate. If a regional carrier provides capacity for more than one FSC it may operate various equipment platforms to conform to the individual agreements (Airline Business, 2002; Airline Business, 2004; Field & Pilling, 2003; Shifrin, 2005a).

This section was the first analysis of three using the Boolean method to propose which unique configurations the airline industry may witness among innovating carriers. The findings suggest that FSCs may look to innovate those business model elements that LCCs have used to their advantage, such as ticket restrictions or through-fare pricing, while others may continue to focus on the traditional business model. The low-cost strategic group will focus on the traditional LCC business model, as well as, ancillary revenue, new distribution tactics, and limited network integration. The final segment, regional carriers, will begin to experiment with self-branded operations while maintaining an FSC supportive role, while others will continue to provide pure lift capabilities for FSCs. The following section will analyze the unique configurations resulting from imitative behavior, which is evident in the industry following the survey analyses (see Chapter 7).

8.2 Imitation among strategic groups

The empirical findings expressed in Chapter 7 show that mimetic behavior is rampant in the airline industry. Although this may not be a surprise to astute industry observers, its implications for future industrial development have not been studied. The MVQCA method allows the researcher to study what affect imitation among strategic groups will have. Figure 8.10 shows the four analyses, 7-10, that this section addresses. Each analysis will again be preceded with a description of the thresholds utilized.

Figure 8.10: External imitative configurational analyses



Source: Author's own creation

These analyses differ from the previous innovation analyses in that only one analysis is conducted and it is for those carriers that are reporting an operating margin greater than zero yet below the appropriate threshold for pure airlines. In other words, the QCA method is used to determine the combination of business model elements that leads to an operating margin dummy variable of one. Carriers with higher operating margins are deemed as having a more pure business model and show a lower propensity to imitate among groups (see tables 7.6 and 7.10). It is non-pure airlines that imitate externally.

8.2.1 FSC – LCC imitation

This is the first of four analyses studying imitation among strategic groups in the airline industry. The four analyses are all the possible combinations that can take place. The first one, FSC-LCC imitation, analyses and proposes how the future business model will be shaped as these two groups close the gap between them. Table 8.11 reviews the propositions of this analysis.

Table 8.11: Overview of proposition 7

Variable headings	Network	Distribution	Service	Operational
P7	Increased network integration	Increased GDS presence via third-parties	Unbundled service features	Fleet standardization

Source: Author's own creation

The researcher proposes that a business model grounded in both the FSC and LCC models will display an increased level of network integration and GDS presence via third-party providers. The service and operational features of the model will resemble LCCs. Carriers will provide passengers with unbundled services features and strive for fleet standardization.

The thresholds utilized in the analysis are presented in table 8.12. They were determined in the same way as for the other analyses.

Table 8.12: FSC-LCC imitation – thresholds

Dummy variable	0	1	2
Online transfer	0	1	
Interline transfer	0	1	
Through-fare discount	0	1	
Ticket restrictions	0	1	
GDS presence	0	0.5	1
Frequent flyer program	0	1	
Lounge access	0	0.5	1
Cabin numbers	1	2	3
Alliance membership	0	1	
Codeshare agreements	0	1	
Capacity lift provider	0	0.5	1
Capacity lift user	0	1	
ASK % to primary airport	x<0.85	x>0.85	
ASK % by partner	x<0.13	x>0.13	
Fleet purity	x<0.17	x>0.17	
Stage length	x<1530	x>1530	
Operating margin	x<0.00	0.00<x>0.16	x>0.16

Source: Author's own creation

A single carrier was removed from the analysis which was creating a contradiction for a group of four airlines. Alitalia had an identical business model to US carriers Northwest and Continental and Spanish Iberia. However, Alitalia's operating margin was much lower and beyond the threshold determined for the three other carriers. This was causing a contradiction and would have omitted the entire group of airlines from the analysis. The researcher chose to omit the Italian carrier to ensure a more encompassing analysis.

Figure 8.11: Configurational FSC-LCC imitation results

FSC-LCC (P7):

GDS (1) + In-flight classes (2) + Alliance (1) Feed share (0) + In-flight classes (0) Fleet (0) +

FFP (1) Interline (0) + Restrictions (0) + Codeshare (0) + Restrictions (0) GDS (2)

FFP (1) In-flight classes (1) Feed share (0) Thru-fare (1) + GDS (2) + Primary a/p share (1)

Source: Author's own creation

The results indicate that if the FSC and LCC strategic groups were to merge the business model elements that lead to an operating margin between 0% and 16% would be as follows:

- GDS presence via a third-party *OR*
- A triple class configuration *OR*
- Membership of one of the three major alliances *AND* an ASK percentage flown by partner carriers less than 13% *OR*
- A single class configuration *AND* an FSI less than 0.17 *OR*
- A frequent flyer program *AND* no interline agreements *OR*
- A frequent flyer program *AND* restriction-less travel *OR*
- A frequent flyer program *AND* no code-share agreements *OR*
- Restriction-less travel *AND* GDS presence *OR*
- A frequent flyer program *AND* a dual class configuration *AND* an ASK percentage flown by partner carriers less than 13% *AND* through-fare pricing *OR*
- A frequent flyer program *AND* a dual class configuration *AND* an ASK percentage flown by partner carriers less than 13% *AND* GDS presence *OR*
- A frequent flyer program *AND* a dual class configuration *AND* an ASK percentage flown by partner carriers less than 13% *AND* an ASK flown to primary airports greater than 85%

The MVQCA analysis shows that a carrier grounded in both the FSC and LCC business model will show network traits of LCCs. There will be no inter-line, ticketing restrictions, and no codeshare agreements, although a frequent flyer program for this type of carrier is an option. A frequent flyer program can also be combined with a dual class configuration, through-fare ticketing, GDS access, and a focus on primary airports, all elements that attract high-yield business travelers. Finally, these carriers in the future may opt to merely change their distribution to include GDS access via less expensive third-parties, or entering into a large-scale alliance with equal partners. Such combinations of business model elements indicate that the two models, FSC and LCC, will inspire carriers to imitate each other to achieve positive synergies. The QCA results indicate that the carriers would diversify their fleets, which is a surprising finding. This may indicate that the higher costs associated with a diversified fleet outweigh the benefits of operating in markets that otherwise would be inaccessible. This fleet diversification may aid in explaining the lack of feed share QCA results provide. A diversified fleet would allow a carrier to operate in smaller markets and enable the carrier to capture passengers that a feed carrier would otherwise provide.

8.2.1.1 Proposition confirmation

Review of the proposition confirmation is presented in table 8.13.

Table 8.13: Confirmation of proposition 7

Variable headings	Network	Distribution	Service	Operational
P7	Partially confirmed	Partially confirmed	Unconfirmed	Unconfirmed

Source: Author's own creation

The results indicate that the propositions proposed by the researcher are only partially confirmed in some elements. Network integration is only partially confirmed in that one model indicates that through-fares may be offered to integrate a network, however another model indicates that no interlining should be offered, a segregation of the network. GDS distribution via third-parties is one channel that a combined FSC-LCC carrier can utilize, although another variation indicates that full GDS access is an option, which results in only a partial confirmation of the proposition. Finally, the service and operational results do not confirm the propositions in that the results show that a combined carrier may retain complementary service features and that a low FSI is a feature of the business model.

An FSC-LCC combination is not the only possibility. FSC and regional carriers may also look to each other to imitate the respective models, which is shown in the following analysis.

8.2.2 FSC – regional imitation

Although regional carriers often play a supporting role for FSCs there is also the opportunity for the carriers to emulate each other. FSCs may wish to operate an efficient short-haul route, while regional carriers may desire to expand their networks and operate beyond the scope of an FSC partner. The propositions for this analysis are displayed in table 8.14.

Table 8.14: Overview of proposition 8

Variable headings	Network	Distribution	Service	Operational
P8	Increased network integration & CLP	Sustained GDS absence	Sustained reliance on partner providers	Fleet standardization

Source: Author's own creation

A combined FSC-regional carrier will display network characteristics of increased network integration while maintaining a role as a capacity lift provider. Distribution channels will bypass the GDS systems, while the service level will continue its reliance on partners, all the while attempting to obtain a higher FSI. Unlike the previous FSC-LCC analysis this grouping of carriers did not require the omission of a carrier to reduce contradictions. The thresholds utilized in this analysis are presented in table 8.15.

Table 8.15: FSC-regional imitation – thresholds

Dummy variable	0	1	2
Online transfer	0	1	
Interline transfer	0	1	
Through-fare discount	0	1	
Ticket restrictions	0	1	
GDS presence	0	1	
Frequent flyer program	0	1	
Lounge access	0	1	
Cabin numbers	1	2	3
Alliance membership	0	1	
Codeshare agreements	0	1	
Capacity lift provider	0	0.5	1
Capacity lift user	0	1	
ASK % to primary airport	x<0.92	x>0.92	
ASK % by partner	x<0.13	x>0.13	
Fleet purity	x<0.75	x>0.75	
Stage length	x<3150	x>3150	
Operating margin	x<0.00	0.00<x>0.13	x>0.13

Source: Author's own creation

Using the thresholds provided in the table above in the TOSMANA software produces the results shown in figure 8.12.

Figure 8.12: Configurational FSC-Regional imitation results

FSC-Regional (P8):

CLP (1) + Primary a/p share (0) + In-flight classes (2) Thru-fare (1) +

Fleet (0) $\left\{ \text{In-flight classes (0) + GDS (0) + FFP (0) + Lounges (0) + CLP (2)} \right\}$ +

In-flight classes (1) $\left\{ \text{Thru-fare (0) + GDS (0) + FFP (0) + Lounges (0) + CLP (2) + Fleet (1)} \right\}$

Source: Author's own creation

A combined FSC-regional carrier will display the following business model:

- A capacity lift provider with own branded flying *OR*
- An ASK to primary airports less than 92% *OR*
- A triple class configuration *AND* through-fare ticketing *OR*
- An FSI less than 0.75 *AND* a single class configuration *OR*
- An FSI less than 0.75 *AND* no GDS presence *OR*
- An FSI less than 0.75 *AND* no frequent flyer program *OR*
- An FSI less than 0.75 *AND* no lounge access *OR*
- An FSI less than 0.75 *AND* a capacity lift provider *OR*
- A dual class configuration *AND* no through-fare ticketing *OR*
- A dual class configuration *AND* no GDS presence *OR*
- A dual class configuration *AND* no frequent flyer program *OR*
- A dual class configuration *AND* no lounge access *OR*
- A dual class configuration *AND* a capacity lift provider *OR*
- A dual class configuration *AND* an FSI greater than 0.75 *OR*

These results show that some combined FSC-regional carriers will continue to provide lift capacity, however this will be augmented by own-branded flying. Some carriers will acquire capacity from smaller carriers, but adapt their business model to operate without ticket restrictions, which coincides with the results of the business model innovation that will take place at non-pure FSCs (see figure 8.5). The remaining results are segmented according to class configuration. Results show that those hybrid carriers with a single class will continue to operate solely as capacity lift providers, while a dual class configuration carrier will attempt to provide capacity and streamline operations through a standardized fleet. Finally, those carriers with a triple class configuration may drop their role as capacity lift providers while introducing an integrated network by providing through-fares or ticket restrictions.

8.2.2.1 Proposition confirmation

Proposition 8, an FSC-regional hybrid, is partially confirmed, as shown in table 8.16.

Table 8.16: Confirmation of proposition 8

Variable headings	Network	Distribution	Service	Operational
P8	Confirmed	Confirmed	Confirmed	Partially confirmed

Source: Author's own creation

The results point to a hybrid model that will focus on network integration, either through own-branded flying and through-fare tickets, or by operating as a sole capacity lift provider. Distribution via GDSs is not an option in the FSC-regional business model. Carriers can rely on their partners to distribute their tickets or use other means, such as the Internet. The results also indicate that the service level of the hybrid carrier will continue to rely on their partner airline, and factors such as lounges and FFPs will not be offered by the hybrid carrier. Operationally, some hybrid carriers will attempt to standardize their fleet while others will not strive for a high FSI. Such contradictions may be grounded in the type of operations the carrier conducts. Some regional carriers that provide capacity may have to adhere to aircraft requirements from their mainline partner, which necessitates a diversified fleet in operating for more than one carrier.

8.2.3 LCC – regional imitation

Some regional carriers may wish to transform their business model from either a supporting role or a niche market player to a more efficient low-cost model. Likewise, carriers at the fringes of the LCC strategic group may wish to capitalize on an opportunity to transform their business model to that of a regional carrier. Such a combined business model will display the characteristics presented in table 8.17.

Table 8.17: Overview of proposition 9

Variable headings	Network	Distribution	Service	Operational
P9	Network segregation	Increased GDS presence via third-parties	Unbundled service features	Fleet standardization

Source: Author's own creation

A hybrid LCC-regional carrier will display such characteristics as network segregation which allows for simplification. Regional carriers are generally characterized as point-to-point carriers, although their O&D traffic often enplanes/deplanes at a hub airport. Distribution will be through GDSs but access will be gained via less expensive third-parties. Service features will be unbundled to capitalize on the simplified LCC model. Finally, a standardized fleet of a hybrid carrier will be the goal. Table 8.18 presents the thresholds used in this QCA analysis.

Table 8.18: LCC-regional imitation– thresholds

Dummy variable	0	1	2
Online transfer	0	1	
Interline transfer	0	1	
Through-fare discount	0	1	
Ticket restrictions	0	1	
GDS presence	0	0.5	1
Frequent flyer program	0	1	
Lounge access	0	0.5	1
Cabin numbers	1	2	
Alliance membership	0	1	
Codeshare agreements	0	1	
Capacity lift provider	0	0.5	1
Capacity lift user	0	1	
ASK % to primary airport	x<0.55	x>0.55	
ASK % by partner	x<0.03	x>0.03	
Fleet purity	x<0.75	x>0.75	
Stage length	x<740	x>740	
Operating margin	x<0.00	0.00<x>0.15	x>0.15

Source: Author's own creation

No contradicting carriers were omitted from this analysis and there were 28 unique business model combinations. The TOSMANA software generates the following hybrid results presented in figure 8.13.

Figure 8.13: Configurational LCC-regional imitation results

LCC-Regional (P9):

GDS (1) + CLP (1) + CLP (2) Fleet (0) + Restrictions (1) In-flight classes (1) Stage length (0) +

Restrictions (0) { Stage length (1) + Online (0) Fleet (0) + Thru-fare (0) Fleet (0) } +

FFP (1) In-flight classes (0) Feed share (0)

Source: Author's own creation

An LCC-hybrid carrier will display the following business model traits:

- GDS access via third-party *OR*
- A capacity lift provider and own-brand operator *OR*
- A pure capacity lift provider *AND* an FSI less than 0.75 *OR*
- Ticket restrictions *AND* a dual class configuration *AND* stage lengths less than 740 NM *OR*

- No ticket restrictions *AND* stage lengths greater than 740 NM *OR*
- No ticket restrictions *AND* no onlining *AND* an FSI less than 0.75 *OR*
- No ticket restrictions *AND* no through-fares *AND* an FSI less than 0.75 *OR*
- A frequent flyer program *AND* a single class configuration *AND* a feed share less than 3% *OR*

The results show that a hybrid LCC-regional carrier will capitalize on the new distribution agreements that allow GDS access via a third-party, imitating the GDS distribution model. This type of carrier may continue cooperation with FSC partners as capacity lift providers, however it will branch out to operate as an LCC-regional hybrid under its own brand. Fleet standardization is not a priority for this type of carrier, especially when operating as a capacity provider. If the hybrid limits its network size to less 740 NM then it will maintain a restrictive ticket policy, however if it expands to more distant markets its network will be simplified. It appears as if this hybrid carrier will elect to either operate a combined model as a capacity lift provider and own-branded operator, or continue its role as a pure capacity lift provider.

8.2.3.1 Proposition confirmation

The confirmation of proposition 9 is presented in table 8.19.

Table 8.19: Confirmation of proposition 9

Variable headings	Network	Distribution	Service	Operational
P9	Partially confirmed	Confirmed	Partially confirmed	Unconfirmed

Source: Author’s own creation

A hybrid carrier will focus on either providing integrated capacity lift for partners or own-branded flying with a segregated network with no through-fare ticketing. This result only partially confirms the proposition that the network will be segregated since some LCC-regionals will continue as capacity lift providers in a limited form. Distribution will pass through lower cost GDS third-parties, which confirms the researcher’s proposition. Service features will not feature prominently in the hybrid business model, although a frequent flyer program is an option. Finally, fleet standardization is not an aspect that a hybrid carrier will prioritize. It appears that a diversified fleet is more accommodating to the prospective network.

8.2.4 FSC – LCC – regional imitation

The final external mimetic business model configuration is the triple overlap of the FSC, LCC, and regional strategic groups. This conglomerate may not be the most likely imitative configuration, but the researcher elected to include it to cover all feasible external configurations. The details of proposition 10 are presented in table 8.20.

Table 8.20: Overview of proposition 10

Variable headings	Network	Distribution	Service	Operational
P10	Increased network integration	Sustained GDS presence	Unbundled service features	Fleet standardization

Source: Author's own creation

An FSC-LCC-regional hybrid would display increased network integration, similar to the FSC-regional partnership witnessed currently. Distribution via GDSs, similar to current FSCs, will continue. This type of business model will imitate the LCC practice of unbundling service features and striving for fleet standardization. The thresholds utilized in the analysis are presented in table 8.21.

Table 8.21: FSC-LCC-regional imitation – thresholds

Dummy variable	**0**	**1**	**2**
Online transfer	0	1	
Interline transfer	0	1	
Through-fare discount	0	1	
Ticket restrictions	0	1	
GDS presence	0	0.5	1
Frequent flyer program	0	1	
Lounge access	0	05	1
Cabin numbers	1	2	3
Alliance membership	0	1	
Codeshare agreements	0	1	
Capacity lift provider	0	0.5	1
Capacity lift user	0	1	
ASK % to primary airport	x<0.55	x>0.55	
ASK % by partner	x<0.13	x>0.13	
Fleet purity	x<0.75	x>0.75	
Stage length	x<3150	x>3150	
Operating margin	x<0.00	0.00<x>0.15	x>0.15

Source: Author's own creation

This analysis has one carrier, Italian Alitalia, removed to ensure that there is a minimum of contradictions present in the truth table (see Appendix VI). If this carrier had not been removed from the analysis then four carriers with identical business models but differing operating margins would have been omitted. Alitalia was one carrier of four that differed in the outcome. It will be analyzed separately in an attempt to explain why an identical business model resulted in a differing outcome. The results of the QCA analysis of the remaining 61 carriers with 38 unique business model combinations are presented in figure 8.14.

Figure 8.14: Configurational FSC-LCC-regional imitation results

FSC-LCC-Regional (P10):

GDS (1) + CLP (1) + In-flight classes (2) + In-flight classes (1) Fleet (1) +

CLP (2) {In-flight classes (1) + Fleet (0)} +

Restrictions (0) {Thru-fare (0) Fleet (0) + FFP (1) {Lounges (0) + In-flight classes (0)}} +

Restrictions (1) GDS (2) FFP (1) In-flight classes (1) Feed share (0)

Source: Author's own creation

A triple hybrid carrier, in other words, a carrier that overlaps with the FSC-, LCC-, and regional business models would be comprised of the following elements:

- GDS access via third-party *OR*
- A capacity lift provider and own-brand operator *OR*
- A dual class configuration *AND* an FSI greater than 0.75 *OR*
- A pure capacity lift provider *AND* a single class configuration *OR*
- A pure capacity lift provider *AND* an FSI less than 0.75 *OR*
- No ticket restrictions *AND* no through-fares *AND* an FSI less than 0.75 *OR*
- No ticket restrictions *AND* a frequent flyer program *AND* no lounge access *OR*
- No ticket restrictions *AND* a frequent flyer program *AND* a single class configuration *OR*
- Ticket restrictions *AND* GDS access *AND* a frequent flyer program *AND* a dual class configuration *AND* an ASK feed share less than 13%

The combinatory analysis shows that a tri-business model configuration will consist of carriers that continue to adhere to the traditional FSC model (seen in the last line of figure 8.14), pure capacity lift providing regional carriers, and a group that will focus on a segregated network and amenities. This analysis shows that although a combined FSC-LCC-regional business model is possible it will continue to adhere to one of the three main models rather than becoming an intimately entwined model; the combinatory configuration will continue to display sub-groupings.

8.2.4.1 Proposition confirmation

Table 8.22 is a confirmation of proposition 10 segmented in the four main headings.

Table 8.22: Confirmation of proposition 10

Variable headings	Network	Distribution	Service	Operational
P10	Partially confirmed	Partially confirmed	Unconfirmed	Partially confirmed

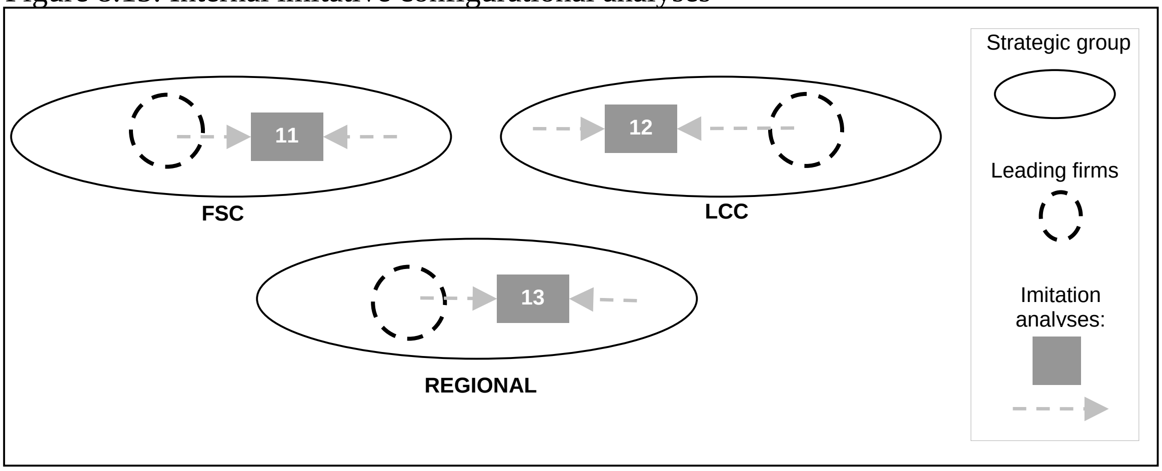
Source: Author's own creation

The network proposition called for an FSC-LCC-regional hybrid focusing on an integrated network, however this is only partially confirmed. Some carriers will focus on providing an integrated lift capacity, or integrated network, while others will focus on a simplified network of single-leg pricing and no restrictions. The results show that some triple-overlapped hybrid carriers will utilize traditional GDS distribution tactics, while others will benefit from third-party access. QCA results show that unbundled services are not an element within this type of hybrid, as a matter of fact, some carrier will continue to integrate them if operating as feed partners while others will omit them entirely. The final measured category, operations, proposed that carriers will focus on a standardized fleet. However, findings suggest that this will only hold true for some carriers.

8.3 Imitation within strategic groups

The final analyses are grounded in the findings that imitation of peer group members is present in the airline industry, as shown in figure 8.15. The results showed that imitation between group leaders and secondary airlines takes place and these analyses will investigate what specific business model configurations can appear. This investigation is bi-directional; it is not possible to differentiate between pure airlines imitating non-pure or vice versa. Each analysis is segmented according to the three strategic groups and a table is presented which shows the thresholds utilized in each analysis.

Figure 8.15: Internal imitative configurational analyses



Source: Author's own creation

8.3.1 FSC

Proposition 11 and its specifics are presented in table 8.23. Imitation among FSCs will focus primarily on network segregation and fleet standardization, while distribution and service levels will remain relatively unchanged.

Table 8.23: Overview of proposition 11

Variable headings	Network	Distribution	Service	Operational
P11	Network segregation	Sustained GDS presence	Sustained service levels	Fleet standardization

Source: Author's own creation

Table 8.24 shows the thresholds that the internal FSC MVQCA analysis utilized. Unlike the previous innovation and external-imitation analyses which utilized three thresholds for operating margin, the internal-imitation analyses only incorporate a single threshold. This is grounded in the fact that both pure and non-pure carriers will mold together, rather than focusing on either category specifically. This analysis only utilizes a single threshold, 0% operating margin, to ensure that those carriers that were financially unsuccessful were not imitated.

Table 8.24: FSC internal imitation – thresholds

Dummy variable	0	1	2
Online transfer	0	1	
Interline transfer	0	1	
Through-fare discount	0	1	
Ticket restrictions	0	1	
GDS presence	0	1	
Frequent flyer program	0	1	
Lounge access	0	1	
Cabin numbers	2	3	
Alliance membership	0	1	
Codeshare agreements	0	1	
Capacity lift provider	0	0.5	1
Capacity lift user	0	1	
ASK % to primary airport	x<0.90	x>0.90	
ASK % by partner	x<0.1	x>0.1	
Fleet purity	x<0.26	x>0.26	
Stage length	x<1210	x>1210	
Operating margin	x<0.00	x>0.00	

Source: Author's own creation

The results from the Boolean analysis are shown in figure 8.16.

Figure 8.16: Configurational FSC imitation results

FSC (P11):

Thru-fare (0) + Restrictions (0) + In-flight classes (1)

Source: Author's own creation

If FSCs are going to imitate within their own strategic group the carriers will be comprised of the following business model elements:

- No through-fares *OR*
- No ticket restrictions *OR*
- Triple class configuration

These results show that imitation within the FSC strategic group leans towards non-pure airlines as it is a segregated network and its combinations that contribute to financial success.

8.3.1.1 Proposition confirmation

Confirmation of the four categories comprising proposition 11 are presented in table 8.25.

Table 8.25: Confirmation of proposition 11

Variable headings	Network	Distribution	Service	Operational
P11	Confirmed	Confirmed	Confirmed	Unconfirmed

Source: Author's own creation

The results indicate that imitation within the FSC strategic group will focus on a segregated network. FSCs may elect to simplify their network by transitioning to single-leg pricing, similar to LCCs, or removing their ticket restrictions while maintaining a triple class configuration. Distribution and service levels will continue to adhere to the traditional FSC strategy in future FSC business model compositions. Finally, fleet standardization is not a distinguishing feature of future FSC business models.

8.3.2 LCC

Internal imitation among LCCs will focus on providing a greater seamless travel experience through network integration, while carriers will adapt their distribution strategies to be more present within GDSs, although only via third-parties rather than direct access. Service features will be offered to customers in unbundled packages and available for purchase, while operationally the carriers will focus on standardizing their fleets. These characteristics are summarized in table 8.26.

Table 8.26: Overview of proposition 12

Variable headings	Network	Distribution	Service	Operational
P12	Network integration	GDS presence via third-parties	Unbundled services	Fleet standardization

Source: Author's own creation

The thresholds utilized in this analysis are summarized in table 8.27. No carriers were removed from the analysis as there were no contradicting business models among the 19 study group carriers, which is a testament to the diversity within the strategic group.

Table 8.27: LCC internal imitation – thresholds

Dummy variable	0	1	2
Online transfer	0	1	
Interline transfer	0	1	
Through-fare discount	0	1	
Ticket restrictions	0	1	
GDS presence	0	0.5	1
Frequent flyer program	0	1	
Lounge access	0	0.5	1
Cabin numbers	1	2	
Alliance membership	0	1	
Codeshare agreements	0	1	
Capacity lift provider	0	0.5	1
Capacity lift user	0	1	
ASK % to primary airport	x<0.55	x>0.55	
ASK % by partner	x<0.03	x>0.03	
Fleet purity	x<0.75	x>0.75	
Stage length	x<740	x>740	
Operating margin	x<0.00	x>0.00	

Source: Author's own creation

The results for internal imitation within the LCC strategic group are presented in figure 8.17.

Figure 8.17: Configurational LCC imitation results

LCC (P12):

GDS (1) + Primary a/p share (0) + Restrictions (0) Fleet (0) + Stage length (0) In-flight classes (1) +

Stage length (0) Online (1) {CLT (0) + Feed share (0)} +

FFP (1) Stage length (0) {CLT (0) + Feed share (0)} +

Thru fare (1) Feed share (0) {FFP (1) + Stage length (0)} + Thru-fare (1) Stage length (0) CLT (0)

Source: Author's own creation

Internal imitation within the LCC strategic group results in the business model configurations:

- GDS access via third-party *OR*
- ASK to primary airports less than 55% *OR*
- No ticket restrictions *AND* an FSI less than 0.75 *OR*
- Average stage length less than 740 NM *AND* a dual class configuration *OR*
- Average stage length less than 740 NM *AND* on-line tickets *AND* no capacity lift taker *OR*
- Average stage length less than 740 NM *AND* on-line tickets *AND* an ASK feed share less than 3% *OR*
- A frequent flyer program *AND* an average stage length less than 740 NM *AND* no capacity lift taker *OR*
- A frequent flyer program *AND* an average stage length less than 740 NM *AND* an ASK feed share less than 3% *OR*
- Through-fare ticketing *AND* an ASK feed share less than 3% *AND* a frequent flyer program *OR*
- Through-fare ticketing *AND* an ASK feed share less than 3% *AND* an average stage length less than 740 NM *OR*
- Through-fare ticketing *AND* an average stage length less than 740 NM *AND* no capacity lift taker

These results show that imitation within the LCC strategic group will result in carriers that continue to follow the LCC mantra with a few caveats. Distribution channels may be adapted to capture higher-yielding segments, however carriers will continue to focus on short stage lengths to secondary airports, restriction-less tickets, and limited feed from other carriers. Network integration though appears to be on the agenda though for future LCC business models, as some carriers will offer through-fare ticketing and on-lining, as well as, a frequent flyer program.

8.3.2.1 Proposition confirmation

Table 8.28 reviews the confirmation of proposition 12. The results show that the proposed integration of future LCC networks is confirmed with the introduction of though-fare ticketing and on-lining. Third-party access to GDSs also confirms the distribution tactics of future LCCs, while the services offered is unconfirmed. The results show that unbundled, pas-as-you-go features are not necessarily a prominent feature of this type of business model change. Operationally, LCCs elect to diversify their fleets rather than focus on standardization.

Table 8.28: Confirmation of proposition 12

Variable headings	Network	Distribution	Service	Operational
P12	Confirmed	Confirmed	Unconfirmed	Unconfirmed

Source: Author’s own creation

8.3.3 Regional

Imitation within the regional strategic group proposes two categories of business models: to continue the current supporting role as a feeder for larger carriers or to operate as an integrated stand-alone carrier. Table 8.29 reviews proposition 13. This suggests that regional carriers in the future will continue to offer an integrated network, either via larger partner carriers or within their own network. Distribution via GDSs and service features will continue to be offered as regional carriers rely upon their FSC partners. Fleet standardization among regional carriers is proposed to be a future goal.

Table 8.29: Overview of proposition 13

Variable headings	Network	Distribution	Service	Operational
P13	Sustained network integration	Sustained GDS presence via partners	Sustained bundled services via partners	Fleet standardization

Source: Author’s own creation

No regional carriers were removed from the analysis for contradictory reasons (see Appendix VI). There were 13 unique business model element combinations among 18 carriers, which is a relatively diverse field. The thresholds utilized in the analysis are shown in table 8.30. As with the other two internal-imitation analyses the outcome is measured as a dichotomous condition, and the threshold is set at 0.

Table 8.30: Regional internal imitation – thresholds

Dummy variable	**0**	**1**	**2**
Online transfer	0	1	
Interline transfer	0	1	
Through-fare discount	0	1	
Ticket restrictions	0	1	
GDS presence	0	1	
Frequent flyer program	0	1	
Lounge access	0	1	
Cabin numbers	1	2	
Alliance membership	0	1	
Codeshare agreements	0	1	
Capacity lift provider	0	0.5	1
Capacity lift user	0	1	
ASK % to primary airport	x<0.93	x>0.93	
ASK % by partner	0		
Fleet purity	x<0.75	x>0.75	
Stage length	x<383	x>383	
Operating margin	x<0.00	x>0.00	

Source: Author’s own creation

The results for this analysis are shown in figure 8.18.

Figure 8.18: Configurational regional imitation results

Regional (P13):

Online (0) + Thru-fare (0) + Restrictions (1) + GDS (0) + FFP (0) + Lounges (0) + Stage length (0) +

In-flight classes (0) + Primary a/p share (0) + CLP (1,2)

Source: Author’s own creation

Mimetic behavior within the regional carrier strategic group will result in the following combinations of business model elements:

- No onlining *OR*
- No through-fares *OR*
- Ticket restrictions *OR*
- No GDS access *OR*
- No frequent flyer program *OR*
- No lounge access *OR*
- An average stage length less than 383 NM *OR*
- A single class configuration *OR*

- An ASK percentage to primary airports less than 93% *OR*
- Capacity lift provider with own-branded flying *AND* a pure capacity lift provider

This QCA analysis indicates that imitation within the regional strategic group will result in carriers that will continue to operate a business model in a supporting capacity for FSCs, while some may explore own-branded flying. The results are segmented into single conditions, although the CLP condition indicates an entire business model. Both types of results indicate that imitation within the regional group will most likely result in carriers that continue to act purely as feed partners for FSCs, or those that will continue to feed FSCs while branching off to operate their own-branded flying. This may incorporate those aspects from the analysis results: a segregated short-haul network with a focus on secondary airports, no GDS distribution, and no amenities.

8.3.3.1 Proposition confirmation

Proposition 13 is only partial confirmed by the QCA analysis, as shown in table 8.31. Those carriers that elect to continue to operate as capacity lift providers will have integrated networks, however for those carriers that may operate using their own brand they will most likely offer no through-fare ticketing and no on-lining, indicating a segregated network. The segregation of a CLP or CLP coupled with own-branded operations continues. Own-branded operators will elect to bypass the GDSs, even via third-parties, and focus on other forms of distribution. Services will either be provided by FSC partners or not at all. Finally, fleet standardization among future regional carriers is not a high priority according to the QCA results.

Table 8.31: Confirmation of proposition 13

Variable headings	Network	Distribution	Service	Operational
P13	Partially confirmed	Partially confirmed	Confirmed	Unconfirmed

Source: Author’s own creation

8.4 Contradicting airlines

Contradictions within a Boolean analysis are omitted and therefore limit the number of observations that are used to determine a unique configuration. One practice is to remove the observations which are causing the contradiction. Other solutions include the establishment, or moving, of thresholds, or addition of conditions. These analyses saw four carriers removed from three analyses in order to improve the results. These carriers are presented in table 8.32.

Table 8.32: Contradicting carriers

Carrier	Analysis	Section
Alitalia	Pure/non-pure FSC innovation	8.1.1
United Airlines	Pure/non-pure FSC innovation	8.1.1
American Eagle	Pure/non-pure regional innovation	8.1.3
Skywest	Pure/non-pure regional innovation	8.1.3
Alitalia	FSC-LCC imitation	8.2.1

Source: Author's own creation

These carriers will be analyzed separately in an attempt to discover what unique features or situations were causing a contradiction. These analyses will review the carriers presented in the order they appear in table 8.32.

Alitalia, the Italian flag carrier, had an identical business model to US carriers Continental and Northwest in the innovation analysis, along with Spanish carrier, Iberia, and the two US carriers in the imitation analysis. However, Alitalia's poor financial outcome was causing a contradiction among the carriers. In 2006 it reported an operating margin of minus 10% while the average for airlines with similar business models was 4%. The carrier has struggled for years with increasing competition and labor unrest, and has often been held captive by political disorder[55] (Baker, 2007; Endres, 2006). In 2006 the carrier suffered a number of labor disputes and saw a 3.4% decline in yields, and the government had to propose two new business models for the carrier while seeking to create an attractive carrier that was sellable (Airline Business, 2006b); however, constraints (i.e. labor, political, etc.) have hampered business model change while the financial situation soured. This carrier was therefore removed from the analysis as its strategic struggle has hampered an analysis with the carrier included.

United Airlines, the third largest airline in the world ranked by passenger numbers in 2006, reported an operating margin of 2%, which was one percentage point below the researcher-established threshold. The carrier was forcing a contradiction among four other carriers, which would have otherwise been omitted from the analysis. United entered Chapter 11 bankruptcy at the end of 2002 in an attempt to stem the financial hemorrhaging it was suffering. Five years later the airline exited bankruptcy at the start of 2006 and had managed to cut US $7 billion from its annual expenses, although some analysts state that it had not cut costs as effectively as its nearest FSC competitors (USA Today, 2006). The Research and Innovative Technology Administration (RITA)[56] department of the U.S. Department of Transportation provides performance measurements of the U.S. airline industry (U.S. Department of Transportation & RITA, 2006) and its data for 2006 show that United Airlines, system-wide, reported a profit of US $11.47 per originating passenger, which was more than one dollar less than the FSC average. This income metric is complemented by expense metrics which shows that United has failed to lower its costs significantly compared to its competitors. The carrier had the highest system-wide operating

[55] The Italian government owns 49% of the carrier
[56] RITA (http://www.rita.dot.gov/)

expenses and fuel expense per passenger. These figures are shown in table 8.33. These figures show that the carrier has not lowered its costs enough compared to carriers with identical business models; the result is a operating margin below that of other carriers.

Table 8.33: 2006 United Airlines performance metrics

Metric	System operating profit/loss per originating passenger ($ US)	System operating expense per originating passenger ($ US)	Fuel cost per originating passenger ($ US)
United Airlines	11.47	392	123
Network average[1]	12.56	321	98

[1]: Average of US Airways, Northwest, Continental, American, United, Delta, Alaska
Source: U.S. Department of Transportation (2006)

American Eagle, the wholly-owned regional subsidiary of American Airlines, had a 2006 business model that was identical to three other carriers, all of which were closely affiliated in some manner with a full-service carrier (Davies & Quastler, 1995; French, 1995); however the carrier reported an operating margin of 10%, twice as much as the next highest reported margin in the group. American Eagle is the largest regional carrier among the four carriers with identical business models in terms of passenger numbers[57]. Although, the agreement between American Eagle and its FSC affiliation with American Airlines is confidential it can be assumed that the size of the mainline carrier is of a benefit to the regional partner. Although the business model may be identical to the other three carriers the sheer size of American Eagle's mainline affiliation may aid in pushing the regional carrier's operating margin higher.

Another US regional with strong ties to numerous full-service carriers is SkyWest. This carrier was grouped with three other regionals with affiliations to European full-service carriers, however SkyWest reported a margin of 11%, which was causing a contradiction among the remaining carriers which had lower performance results. Skywest operates as a contractual feeder carrier for United Airlines, Delta Air Lines, and Midwest Airlines[58]. The 2006 operational figures show that the carrier increased its ASMs by nearly 60%, which is a result of its acquisition of Atlantic Southeast Airlines in late 2005. This resulted in nearly an equal percentage increase in revenues for 2006, while the carrier managed to decrease its operating expense, excluding fuel, by 2%. These features, combined with the expansion of the carrier in 2006, and the fee-per-departure revenue model enabled SkyWest to report a margin greater than others with an identical business model.

8.5 Interpretation of results

The analyses of innovative and imitative behavior using the MVQCA technique have shown promising findings. MVQCA has the ability to determine specific combinations of conditions that lead to a predetermined outcome; financial success, in this project's case. The results, as a whole, are interesting and may aid in improved understanding of industry evolution in a number of industries, the airline industry

[57] 2006 passenger figures were 18,765,715 for American Eagle
[58] The agreement with Midwest Airlines was entered into in 2007; outside the timeframe of the analysis

included. It is concluded that it is possible to extend the method to other industries, where classification of business model elements is feasible. The method is dependent upon the researcher's underlying theoretical basis for establishing conditions and thresholds. This enables the method to complement other analyses in very specific contexts, however it may limit its use by non-experts in respective fields. The method is dynamic and allows a researcher to conduct research both at the firm level and industry level. However, this wide, methodological expanse requires the researcher to be intimately familiar with a subject prior to initiating analyses. Some limitations of the method appear though at firm-level analyses, the number of conditions utilized and the number of conditions present in results, which are discussed below.

A researcher is required to strive for a balance between detail and parsimonious solutions when using the Boolean method. Three to five conditions may work well in some contexts, however such a low number may fail to capture the nuances of firm strategy. The airline analyses utilized 16 conditions, which may be near the limit of the method (Marx, 2005). While fewer variables may have resulted in more parsimonious results, it may have diluted the depth of understanding of business models in the industry. The construction of meta-variables may help to alleviate this limitation of the method, however deciphering the results may prove challenging. Reverse-engineering of Boolean results using meta-variables may not be feasible.

One limitation of the method and its applicability at the firm-level is its inability to produce results that incorporate all conditions, which is a key feature of QCA. Rather, results state specifically the presence or absence of a condition, while the omission of a condition in a result implies inconsequence. No results analyzing airline business models contain all 16 conditions, which is regarded as a method restraint since all airlines were measured using 16 business model elements[59]. While useful in studies that research cases where theory does not dictate the presence of all elements, the method is less applicable to those theories that require the full spectrum of conditions. This may challenge application of the method to strategic contexts where theories often incorporate all conditions to explain outcomes. This is displayed, for example, among the future airline business model results that fail to incorporate the FSI condition. This may imply that the specific business model can be flown with any composition of aircraft, including no aircraft at all, a standard fleet (i.e. a high FSI), or a non-standard fleet (i.e. a low FSI). While operationally possible, it may not be financially responsible, as certain aircraft types are better integrated to specific route distances. For example, a business model that recommends short-haul flights (i.e. a low stage length), yet does not specify an FSI, implies that an airline either not have any aircraft in a fleet or may choose to have both short-haul and long-haul aircraft to operate very short flights, which is seldom economical. One solution to this problem may be an increased number of thresholds, as determined by the researcher. An increase in the number of thresholds may have ensured the inclusion of additional conditions in the results, however parsimony may have been lost. This is again a balance the researcher must strike, which requires strong knowledge in the theoretical foundation of the cases.

[59] The reader should not interpret this to mean that all airlines had all 16 business elements present, merely that 16 elements were used to measure an airline's business model; for example, the absence of a specific element, such as GDS distribution, indicates that a carrier was studied and no element was found.

The Boolean analyses attempted to investigate the impact of both innovative and imitative behavior among airlines populating the industry. The method proposed what business model elements are present in successful carriers, implying which elements are deserving of innovative attention. On the other hand, the analyses attempted to construct future business models based on imitative behavior displayed both within strategic groups and among strategic groups. While the analyses have successfully constructed possible future business models, the method is lacking in integrating various theoretical aspects.

The innovation analyses in this research are based on internal innovations. However, inspiration for innovation may be rooted externally from the industry. For example, Internet distribution, well integrated in nearly all carriers worldwide, was an externally inspired innovation in the mid-1990s. If this analyses had been conducted in the early 1990s it would have failed to identify Internet distribution as it was not a part of the established 1990-business model. The Boolean method, however is not able to incorporate external influences, unless the theoretical foundation justifies creating conditions from external sources for measurement. Innovation was investigated by researching combinations that consistently lead to financial success, which highlight those business model elements airlines should implement. However, this would have been the identical method utilized if one investigated imitation among similarly grouped airlines, for example imitation by pure FSCs of other pure FSCs[60]. This limitation is addressed below.

The airline industry displayed imitative traits, both within groups and among groups. While the MVQCA method is adaptive to investigate the impact of imitation among groups, it is poorly tailored to explore the effect of imitation within a strategic group among peers. While the airline industry showed that pure airlines are internally imitative of non-pure airlines it is not possible to establish the direction of imitation. In other words, the MVQCA results are identical if it is pure airlines imitation of non-pure airlines, or non-pure airlines imitating pure airlines; it is bi-directional. However, differences may exist, yet the method is unable to discern such variation. Another challenge that MVQCA is unable to address is internal imitation within a strategic group among similarly categorized carriers. For example, the method is unable to analyze the imitation results of pure airlines that imitate pure airlines. This distinction is lacking.

Despite the limitations that appear in analyses at the firm-level, the researcher is confident that the Boolean method can add to both firm and industry understanding. Additional researching using the method may allow precision in applying QCA and MVQCA in strategic management contexts. Understanding of the theoretical underpinnings used to justify the selection and creation of conditions is important, while knowledge of potential limitations found in results will facilitate applicability.

[60] This exact analysis was used to investigate innovation in carriers. If the ANOVA analyses had shown, for example, that pure FSCs imitate pure FSCs it would not have been possible do perform both an innovation and imitation analysis as they would have been the same.

8.6 Conclusion

This chapter attempts to extend the understanding of business model change within the airline industry by introducing the MVQCA method utilizing Boolean algebra. The goal of this method is to indentify those business model elements that are present, and their unique combinations, in successful carries, which may provide guidance to future carriers wishing to innovate their models. In addition, the method allows one to propose those business model elements, and their combinations, that may appear in carriers that base their business model change on imitation, both externally among strategic groups and internally within the strategic group. The findings suggest that the industry composition is changing and that distinct business model definitions will become blurred in the future. For example, innovation among FSCs indicates that some carriers may reconsider their alliance membership or the ticket restrictions that has served some carriers well for so long. This hints at the idea that some FSCs may migrate closer towards a semi-LCC business model. LCCs, on the other hand, may adopt some of the FSC business model elements, such as amenities, differentiated classes, and network integration. At the same time, regional carriers may attempt to create their own brand and operations, while continuing to provide a capacity platform for larger carriers. This conjoining of business models, evidenced by the findings in Chapter 7, forms the basis for the business model propositions based on imitation. While the Boolean results are grounded in behavior indicated by industry actors, the author wishes to investigate the validity of such findings with airline and trade organization executives. The following chapter explores how the industry interprets the MVQCA results.

What future airline business models can be proposed?

The findings indicate that there will not be one defined successful business model in the future but many. Rather, the three strategic groups in the industry show a tendency of decreasing the strategic distance between the members, from a business model perspective. This distance will decrease due to both innovation and imitation, both internally and externally among strategic groups. The gamut of proposed future business models can be found in Chapter 8.

9. Validity

- Statistics state that the chance of being involved in an airline accident are approximately 1 in 11 million while the chance of being in an automobile accident are 1 in 5,000; your chance of being struck by lightening is 1 in 700,000 -

This chapter attempts to extract recurring themes from the MVQCA analyses which present future possible scenarios and multiple directions for carriers in the industry. The goal with this exercise is to validate the Boolean findings, which utilized data from 2006, by complementing the results with the latest primary and secondary data. Although it is not possible to validate the future until it has happened, and this research has not defined a specific terminating future point[61], it is desirable, nonetheless, to highlight current events that corroborate or negate the analyses results. The data is gathered from brief[62], open interviews with airline and trade organization executives representing the three strategic groups. These interviews focus primarily on the present condition of the respective strategic groups, and views regarding future direction. Airline representatives were assured anonymity, however a brief overview of the carriers is provided. In addition to interviews, secondary data from trade journals, newspapers, and other media is presented. The chapter is segmented according to strategic group, with each group segment commencing with a review of the business model change themes, followed by the primary and secondary data. Prior to group validation a review of theme creation and an interview overview are presented.

The author has created themes which present the specific business model elements that dominate the MVQCA results. In other words, themes are a simplification of the Boolean findings that highlight business model elements that carriers are most likely to focus on in the future. Themes of future business model change are segmented by *depth* and *breadth*, and are classified as *strong, moderate*, or *weak* themes depending on the number of times present. A deep theme is defined as a business model element that is present in a high number of unique business model combinations within a specific analysis[63]. In other words, a strong deep theme is heavily represented in a specific analysis pertinent to a particular strategic group, while a weak theme may only be present in a limited number of business model combinations in the same analysis and strategic group. While a deep theme refers to those business model elements present within a particular analysis and strategic group, a broad theme refers to those business model elements present across all analyses within a strategic group. For example, a deep theme may indicate reoccurring business model elements among pure FSCs or the LCC-Regional combination, while a broad theme refers to reoccurring business model elements present among all FSCs or regionals.

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[61] The researcher has stated that the results are applicable during the next five to 10 years.

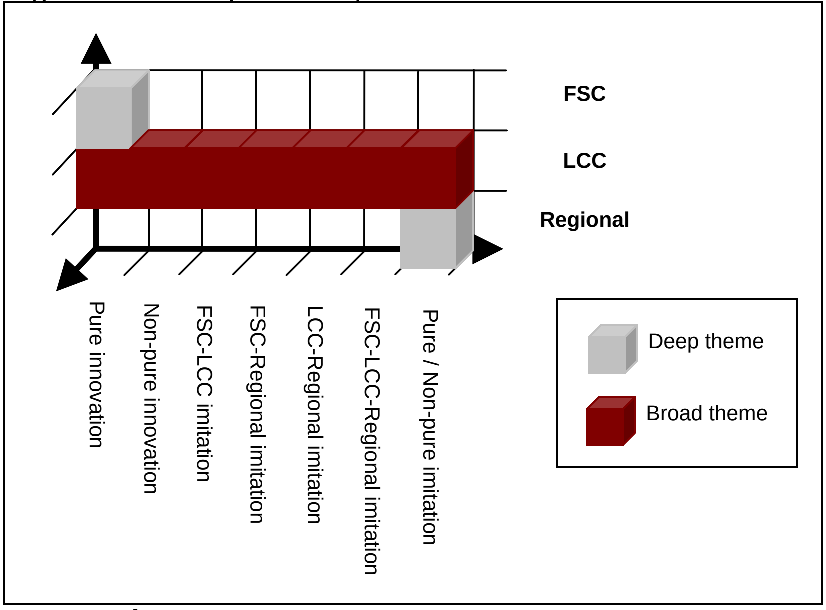
[62] Approximately one hour

[63] These analyses include: innovation of pure and non-pure business models, external imitation among FSC-LCC, FSC-Regional, LCC-Regional, FSC-LCC-Regional, and the internal imitation within strategic groups; there are 9 unique analyses (i.e. innovation and internal imitation for each strategic group) and 3 repeating analyses present in each external imitation analyses (i.e. the 3 external imitation analyses).

Themes were created by listing the individual business model elements for each Boolean result segmented by strategic group and analysis type. This resulted in six lists per strategic group: three unique to the group (i.e. innovation and internal imitation), two lists that repeated within two groups[64], and one list that repeated in each group[65]. Within each list the condition of the business model element was noted[66], while conjunction was ignored[67]. It is important to note that themes are a simplification of the Boolean findings and that the themes are often not stand-alone business model elements but frequently accompanied by combinations of other elements, which is the strength of the Boolean method. The themes however are simplified by removing the combinations; the researcher stresses to the reader that the themes should be reviewed in conjunction with the Boolean results. The objective of this exercise is to create general themes to discuss with industry experts. Duplicates of business model elements are used to create theme strengths (i.e. strong, moderate, or weak). A strong deep theme is a business model element that is repeated the greatest number of times within the particular analysis, moderate themes are those elements repeated one less than the greatest number, and weak themes repeated two less than the greatest number. While duplicates *within* each analysis are used to create deep theme strengths, duplicates *across* analyses are used to create broad theme strengths. A strong broad theme is a business model element that is present within a strategic group across all analyses; in other words, an element that is present six times for each strategic group. A moderate theme is present five times, and a weak theme four times. The concepts of deep and broad themes are reflected in figure 9.1. The deep themes are represented by the two single cubes which analyze reoccurring business model elements in innovation among pure FSCs or reoccurring elements in internal imitation among regional carriers. The broad theme, depicted by the rectangle, highlights the reoccurring business model elements across all analyses within the LCC strategic group. Readers may notice that there are occasionally contradictions presented among themes, as well as, MVQCA results. This stems from the power of the MVQCA method, which identifies the combinations of business model elements that will be present in the future, however conjunctions are omitted from the validation themes. In addition, one may interpret such results as indicating that there is not one particular element that ensures success, rather a business model must be adapted to meet the market and competitive environment at hand.

[64] External imitation among two strategic groups (e.g. FSC-LCC imitation)
[65] External imitation among the three strategic groups (FSC-LCC-Regional imitation)
[66] Conditions of a business model element are the *literal*; for example, the a GDS distribution presence is noted with a 1, while an absence with a 0.
[67] Conjunction (i.e. the *AND* in the Boolean results, signified by the implied multiplication symbol) was ignored to bring clarity and simplicity to the themes.

Figure 9.1: Example of deep and broad themes



Source: Author's own creation

Airlines representing all three strategic groups were interviewed. The researcher personally interviewed two individuals at FSC A, FSC A_1 (FSC A1, 2008)and FSC A_2 (FSC A2, 2008), and individuals at LCC and regional carriers. All interviewed were middle to upper managers. Individuals and carriers will remain anonymous, although table 9.1 presents key performance indicators (KPIs) of the carriers, displaying their applicability.

Table 9.1: KPIs of validation interviews

Strategic group Carrier	**FSC** FSC A	**LCC** LCC A	**Regional** Regional A
~ Fleet size	300	30	20
~ Employee size	25,000	1,300	700
~ Revenue (USD mill)	9,000	800	180
~ Operating profit (USD mill)	210	-35	7

~: Approximate
Source: Author's own creation

In addition to the carrier interviews the researcher conducted an interview with the president of the US Regional Airline Association[68] (RAA), Roger Cohen (R. Cohen, 2008). The following section presents the themes and primary and secondary data of the three strategic groups in an attempt to validate the research findings.

9.1 FSC

The creation of a list of business elements present among all FSC analyses results in 28 unique elements. A categorization indicates five strong themes which reverberate throughout four analyses, the maximum number of reoccurring business model elements across all analyses, rather than six. These themes focus on the FSCs'

[68] http://www.raa.org/

network, cabin configuration, and fleet standardization. In addition, there are three moderate themes, present in three of six analyses. Again, the focus is on the network, cabin configuration, and operations. There were 12 weak broad themes, present in only two of six analyses, however the researcher was of the opinion that such a low reoccurrence of business model elements and a high number of specific elements does not offer a parsimonious result[69]. However, there are two additional business model elements that the researcher elected to designate as deep themes, GDS distribution (moderate theme) and capacity lift provider (strong theme). The GDS element was present in two of three analyses where it was possible for the element to be measured, while the CLP element was present in both analyses where possible[70]. The moderate themes include a focus on in-flight classes and ticket restrictions, while weak themes are fleet standardization and ASK to primary airports. A summary is presented in table 9.2.

Table 9.2: FSC broad themes

Strong themes 4 of 6 analyses	**Moderate themes** 3 of 6 analyses
Single & dual cabin configuration[1]	Triple cabin configuration
Fleet non-standardization	Relative high percentage of ASKs to secondary airports[2]
Removal of ticket restrictions	Presence of through-fares
Removal of through-fares	
Pure capacity lift provider and capacity lift provider and own branded operations	GDS presence through traditional channels and 3rd parties

[1]: Both cabin configurations are mentioned as strong themes because of the differences in threshold settings among strategic groups; for example, the element condition *in-flight classes (0)* was noted in both the Pure FSC and FSC-LCC headings, which have varying thresholds (compare tables 8.3 and 8.15).
[2]: It is not possible to specify the exact ASK percentage, as was done in the thresholds, because they are unique to each analysis; the business model element condition, *ASK % to primary airport (0),* was present in the Pure FSC, Non-pure FSC, and FSC-Regional headings
Source: Author's own creation

The results indicate that more than half of future business model change will focus on desegregation of the FSC pricing structure and removal of through-fares, which will be driven by innovation among pure FSCs, internal FSC imitation, or external FSC-LCC-Regional imitation, which may be combined with the removal of ticket restrictions. While, on the other hand, fewer business model changes will be built on the opposite, namely an integration of the network via through-fares. This will take place among non-pure FSCs, as well as, FSC-LCC and –Regional combinations. In addition, FSCs fleets will continue to be segregated in the future, which allows for a network of short-, medium-, and long-haul routes. Future FSC cabin configurations strive for simplification in the form of single or dual configurations, while slightly

[69] These elements are: alliance (0), alliance (1), CLP (1), CLP (2), Feed share (0), FFP (1), GDS (1), GDS (2), Lounge access (0), ASK share to primary airports (1), and ticket restrictions (1).
[70] All FSC carriers utilize GDSs as a distribution channel, which resulted in its omission from all MVQCA analyses because it would always be a contradicting condition. However, within the LCC and regional strategic groups the GDS condition is an integral business model element in results. Therefore, the author elected to include it as a strong theme because it was present in all possible analyses (FSC-LCC, and FSC-LCC-Regional). The same reasoning is behind the inclusion of the CLP condition, which was present in the two analyses possible (FSC-Regional and FSC-LCC-Regional).

fewer business model changes will be focused on expanded cabin configuration offerings. Operational change will also include a moderate focus on a relatively large presence at secondary airports. This is true for pure and non-pure FSCs and FSC-Regional carriers, indicating that an external FSC imitation of regional carriers will attempt to operate in potentially less dense markets. Table 9.3 presents the deep themes present in the unique FSC analyses.

Table 9.3: FSC deep themes

		Strong	Moderate	Weak
Innovation	**Pure FSC**	Relative high percentage of ASKs to secondary airports	Alliance membership	Capacity lift taker from regional partners Relative long stage lengths
	Non-pure FSC	No reoccurring elements[1]		
External imitation	**FSC-LCC**	Presence of an FFP	Relative low percentage of feed share	Dual cabin configuration
	FSC-Regional	Dual cabin configuration Fleet non-standardization	Single cabin configuration Pure capacity lift provider	Triple cabin configuration Capacity lift provider with own-brand flying
			Absence of an FFP GDS absence	Fleet standardization Relative high percentage of ASKs to secondary airports
			No lounge access	Presence of through-fares
				Removal of through-fares
	FSC-LCC-Regional	Removal of ticket restrictions	Dual cabin configuration	Single cabin configuration
			Presence of an FFP Non-standard fleet	Capacity lift provider No lounge access Removal of through-fares
Internal imitation	**FSC**	No reoccurring elements[1]		

[1]: No reoccurring elements signifies that there are no repeating elements present in the particular analysis, however there are individual elements; the author omitted these as they were regarded as non-parsimonious
Source: Author's own creation

The deep themes among FSC analyses show that the pure FSC business model will continue to find its place within the industry in some shape. For example, FSCs will continue to utilize capacity production from regional partners, which introduce a lower cost production and flexibility. As one FSC manager said:

> *"That [regional carrier capacity production] is one way forward for Europe's national carriers. It gives increased flexibility which has been a big advantage for LCCs. Many national carriers are too slow to react. The national carrier would be able to cater to specific markets through regional carriers. This is because national carriers know that they are not best in class when it comes to production, while LCCs are best in class in production"* (FSC A2, 2008).

The use of regional partners may allow an expanded presence in secondary airports, which aids in explaining the presence of this business model element among innovative pure FSCs. The relationship between FSCs and regionals may accompany some FSCs as they transition closer to an LCC business model, indicating that LCCs may entertain the notion of utilizing regional-produced capacity. Although there were no reoccurring deep themes within the non-pure FSC innovation analyses one interesting finding is the suggestion that non-pure FSCs should consider departing the major alliances in the industry.

Although there are no recurring business model elements among the analysis results investigating innovation among non-pure FSCs some interesting findings are presented none the less. This includes the result that non-pure FSCs may cancel their alliance membership[71]. This behavior has been reiterated by United Airlines' CEO, Glenn Tilton, that the carrier would consider leaving Star Alliance if necessary to consummate a merger with another carrier (Johnsson, 2008). Such a statement is noteworthy as the US carrier is a founding member of the alliance, along with Air Canada, Lufthansa, SAS, and Thai.

Table 9.4 shows the FSC results from the distributed survey regarding recent business model changes in early 2007. These results highlight that Internet distribution among FSCs is a high focus area, however it was omitted from the Boolean analyses due to lack of data. Onlining and fleet purity are the business model elements that receive the second-most level of focus. Fleet purity is present within the Boolean results among FSC-Regional imitation. This implies that if FSCs were to migrate into a regional carrier role they would likely adopt a single fleet.

[71] Additional results include a relatively high ASK percentage to secondary airports, removal of ticket restrictions, and the presence of through-fares.

Table 9.4: Recent FSC business model changes – survey results

	GDS	Internet	Online	Interline	Through-fare	Restrictions	In-flight service	In-flight classes	Ancillary	Lounge	FFP	Assigned seating	Primary airport	Secondary airport	Pure fleet	Charter	Alliance
FSC[1]	2.58	3.96	3.33	2.92	3.00	3.00	3.12	2.19	2.43	2.36	2.92	1.81	2.38	2.48	3.27	2.11	2.71

[1]: 5-point Likert scale
Source: Author's own creation

FSC survey respondents were also asked to comment on the challenges they experienced related to initiating business model change within their carrier. These statements may indicate challenges that accompany future business change among FSC strategic group members as well.

> *"Getting the customer to accept change and conform behavior."*
>
> *"Difficulties to change organizations or relationships with supply chain without interrupting production"*
>
> *"While implementing the electronic ticketing within our organization: initial lack of internal experience and expertise; discovering new training needs; staff resistance to the implementation of the new working procedures."*
>
> *"Difficulties in obtaining supervisory board approval for strategic changes. Trade unions' opposition to changes."*
>
> *"Change is the only constant in the airline business and time needs to be spent on 'selling' change internally. This is the biggest challenge for any large organization."*
>
> *"Main challenge is to follow the industry trend and knowing where and how to grow."*
>
> *"Changing the inertia of current practice often needs great effort to change the mindset. Convincing board of directors is also a big challenge. Market situation changes so quick and accurate decision making is critical. Powerful and leading edge simulation tools for quick decision are essential but difficult to keep improving them."*
>
> *"Getting employees and other stakeholders (tour operators, agents, hotel, etc…) to accept the change process."*
>
> *"Managing expectations of employees, customers, and partners."*

These statements from various FSCs all indicate that managing change, both internally and externally, is the greatest business model challenge that carriers face. This suggest that future change, whether grounded in innovation or imitation, necessitates FSC managers focus on promoting and advising employees, customers, and suppliers on the importance of business model change and the anticipated outcomes.

9.2 LCC

The broad LCC themes, shown in table 9.5, indicate that this strategic group will focus strongly on accessing traditional distribution channels, and less so on their fleet composition, amenities, and partnering with regional carriers.

Table 9.5: LCC broad themes

Strong theme 6 of 6 analyses	**Moderate theme** 5 of 6 analyses	**Weak theme** 4 of 6 analyses
GDS presence through a 3rd party	Fleet non-standardization	Relative short stage lengths[1]
	Removal of ticket restrictions	Relative low percentage of ASK production by a regional partner
	Presence of an FFP	
	Dual cabin configuration	

[1]: Less than 740 NM (the thresholds for the 4 of 6 analyses were identical)
Source: Author's own creation

The broad themes complement those found among the deep themes. These are presented in table 9.6. This indicates that innovative LCCs, both pure and non-pure, will investigate the implementation of GDS distribution in their business model. However, with the caveat that it will bypass traditional GDS feed. SITA, an air transport IT solution provider, developed a portal aimed at LCC inventory distribution that allows travel agents to book directly on airline websites. This shift by GDSs is a response to the threat of travel-buyer fragmentation brought on by LCCs and the Internet, which forced GDSs to accommodate the LCC needs and requirements. The GDSs Amadeus and Galileo were able to accommodate easyJet's needs, which convinced the airline to sign agreements with the systems rather than develop their own travel management link. As one LCC executive stated:

> *"If you compare low-cost carriers with traditional carriers, they [FSCs] have always had their distribution in these systems, but they haven't had control over their inventory. If a carrier is present in a GDS then it's the agency that owns the reservation. The inventory is placed with a third-party and they have the control. LCCs did the opposite and pulled their distribution in-house. They [LCCs] know their customers and prefer a one-to-one or one-to-many relationship. This was done by going online or via the call-center. A network carrier may only know the names of 10% of their customers while we know the names of maybe 90%. GDSs experienced that a large*

number of travel agents questioned why they can't book with an LCC, and realized they [GDSs] only needed access to the LCC inventory. LCCs have been able to stipulate that they retain inventory control in their own reservation systems but they [GDSs] can have a link. I think you'll see more of this type of distribution because LCCs are able to keep the benefit of reservation ownership" (LCC A1, 2008).

A GDS presence displays LCC inventory to the business traveler, which is often higher-yielding. In addition, it has the added advantage that GDS distribution offers economies of scale. Southwest Airlines, the LCC patriarch, recently added the Galileo GDS as a channel in an attempt to reach more corporate travelers, and the airline states that 10% of its revenue is from GDSs (Field, 2008). Kevin Healy, senior vice-president of planning and marketing at AirTran, stated:

"We changed the old model. We have business class on every flight, and wanted to sell to higher-yielding business travelers…We didn't really want to be in the GDSs, but we have to be realistic. We could try to go down our own path or make a middle ground. The Southwest business model makes simplicity important but their brand is known, and is very much in the minds of travelers, while we or someone like a JetBlue may not be known everywhere" (Field, 2008).

While JetBlue has re-entered the GDS distribution channel in an attempt to access a larger proportion of business travelers, just as Kevin Healy of AirTran stated, the carrier has also created a virtual business class, one moderately broad-themed focus. This is an attempt to cater to the business segment and sell seats for a premium, and to increase its 20% business-traveler customer base (Ray, 2008). This enhanced cabin configuration increases legroom at the front of the cabin, a slight emulation of a pure business class cabin without the added expenses.

Within an LCC network future business models many will aim for greater integration via through-fares and onlining. This will take place among innovating pure LCCs and internal imitation. This adds complexity to a business model but it also allows carriers to capture a higher share of a market by expanding destination options for passengers. This has been seen recently among European LCCs. Danish LCC, Sterling, announced in spring 2008 its Sterling Connect service, which allows passengers from Aalborg and Gothenburg to online via Copenhagen to destinations beyond (Sterling, 2008), and recently stated that it wishes to expand its network by possibly cooperating with other carriers and operate flights between European points outside of Scandinavia (Jørgensen, 2008b). Aer Lingus recently announced the combination of its web-only fares. Previously the Irish carrier operated two distinct networks: Ireland to continental US or Europe and US to Ireland. The carrier will now integrate the two and offer US originating passengers onward travel to continental Europe by way of Ireland (Airline Business, 2008a; Sobie, 2008a). In addition, Clickair of Spain is planning to introduce a new combination fare that will take passengers between two European points via Barcelona (Sobie, 2008a). Many LCCs have seen that passengers are conducting *own-onlining* and *own-interlining*. This entails that passengers purchase two point-to-point tickets, not necessarily with the same carrier, and transfer their own baggage and are at their risk in the case of a missed connection. LCCs are aware of this and may use it as a gauge of how many are interested in such a feature. Dohop, an IT provider to the air transport industry, has developed the Dohop Connection Platform, which is aimed at offering LCCs an alternative interline and codeshare solution than the FSCs'. This allows passengers to see their connection options on an LCC website. Although the Boolean findings did not indicate that interlining will be a theme of future business model change, one LCC executive stated:

> *"As the technology becomes more flexible you'll see it [onlining and interlining]. I would call it virtual interlining. One LCC retains its own reservation, another carrier its reservation and a solution is added on top so that it's a virtual interline. From a passenger perspective it's one reservation. It's a technological hindrance that exists because it's possible to interline today. I can screen scrape one LCC website and screen scrape another LCC website and make my own connection, but the technology is lacking where the two carriers communicate. For example, talk to each other to transfer baggage or if there is a schedule change. It's that technology that is missing. When the technology is available there will be virtual interlining"* (LCC A1, 2008).

Industry consultant, Doug Abbey, supports this statement by saying:

> *"Southwest will eventually be flying outside the confines outside of the 48 states, and that may beg other alliances going forward. I just don't think it's safe to assume that the LCCs are going to operate independently exclusively going forward. There's plenty of room for cooperative types of agreements across disparate geographical areas"* (Abbey, 2008).

This interline feature has just been demonstrated by the tie-up between JetBlue and Aer Lingus (Sobie, 2008b). This agreement will allow Aer Lingus passengers to purchase tickets on Jetblue for onward travel in the US, or JetBlue passengers to Dublin, and eventually continental Europe. The carriers have announced that the door is open for additional partners, and JetBlue anticipates adding up to seven partners in 2008. US-based Frontier has stated that the carrier may entertain similar alliances (C. Walsh, 2008). In addition, successful South American LCC, Gol, has entered into interline agreements with three FSCs, Continental, Delta, and Aerolineas Argentinas (Airline Business, 2007e). While at the same time talks are taking place between Virgin Blue and Air Asia (Thomas, 2008).

Analyses results also indicate that LCCs will experiment with the use of regional carriers as capacity producers, though to a limited degree. One advantage of using a regional partner is that they often complement an LCC network with routes to less dense markets using smaller aircraft. The LCC is free from purchasing and operating these aircraft. Recent regional start-ups have been in connection with LCCs. Frontier in the US founded Lynx, which is a subsidiary tasked with operating to markets close to their Denver, Colorado hub with less competition and provides connecting traffic (Airline Business, 2008b; Low-Fare and Regional Airlines, 2008b). UK-based Flybe recently entered into a franchise agreement with Loganair of Scotland, the first of its kind among LCCs. Loganair will assume the commercial risk for the flights under the agreement and its allows the LCC to expand its presence in the Scottish market, while Loganair benefits from the established brand of Flybe (Low-Fare and Regional Airlines, 2008a). The challenge facing LCCs that are in search of regional partners is often the oversight from an FSC partner. The mainline partner may not be willing to allow a regional partner to operate for an LCC competitor, or the regional partner may not wish to offend an existing partner. One LCC executive commented on this phenomenon:

> *"It's a definite possibility that cooperation between regional carriers and LCCs will happen. The problem is that there are few independent regional carriers who do not cooperate with network carriers. The network carriers have control over their regional partners and will stop their partnership if they [regional carriers] cooperate with an LCC competitor"* (LCC A1, 2008).

Table 9.6: LCC deep themes

		Strong	**Moderate**	**Weak**
Innovation	**Pure LCC**	GDS presence via 3rd party	Fleet non-standardization GDS absence	Presence of an FFP Absence of an FFP Presence of onlining Relative high percentage of ASKs to secondary airports Relative short stage lengths Presence of through-fares
	Non-pure LCC	Lounge access for payment	GDS presence via 3rd party	Absence of an FFP Absence of onlining Absence of through-fares
External imitation	**LCC-FSC**	Presence of an FFP	Relative low percentage of ASK production by a regional partner	Dual class configuration
	LCC-Regional	Fleet non-standardization Removal of ticket restrictions	No reoccurring elements	No reoccurring elements
	LCC-FSC-Regional	Removal of ticket restrictions	Dual cabin configuration Presence of an FFP Fleet non-standardization	Single cabin configuration Capacity lift provider No lounge access Absence of through-fares
Internal	**LCC**	Relative short stage	Relative low	Capacity lift taker

imitation	lengths	percentage of ASK production by a regional partner	
			Presence of an FFP Presence of through-fares

Source: Author’s own creation

Table 9.7 shows the results from the survey inquiry about what areas LCCs have focused on when changing their business models in early 2007. These findings show that LCCs, as a strategic group, have focused strongly on integrating their network through onlining. These findings aid in verification of the Boolean findings, although the business model element was not indicated as strongly in the survey results. Interestingly, fleet standardization was reported as the second greatest business model change among survey respondents, while both a broad and deep theme focus on fleet non-standardization was reported by the Boolean findings. The Boolean results may be grounded in the analyses showing that a less pure fleet is consistently a factor among successful LCCs. Although beyond the scope of this research, it may be stated that a pure LCC fleet positions the carrier negatively in future fleet renewal negotiations. The final element, which was not incorporated in the Boolean analyses, is the focus among LCCs on ancillary revenue. This has allowed LCCs to transition beyond the concept of merely providing air travel but into retail. Stressed by one LCC executive:

> *“Add-ons [lounges, FFPs, catering selection, etc.] are elements that we will see more of in the future. Flying supermarkets. In the future passengers will experience an identical product as FSCs’ but at a lower cost and it will be purchased add-ons”* (LCC A1, 2008).

One add-on that some LCCs are weighing is the implementation of an FFP by some European LCCs. Danish Sterling has recently announced that it will implement an FFP (Jørgensen, 2008a). The intention is reward loyal customers with discounted travel or other purchases.

Table 9.7: Recent LCC business model changes – survey results

	GDS	Internet	Online	Interline	Through-fare	Restrictions	In-flight service	In-flight classes	Ancillary	Lounge	FFP	Assigned seating	Primary airport	Secondary airport	Pure fleet	Charter	Alliance
LCC[1]	1.75	2.50	3.67	1.00	2.00	2.00	2.25	1.00	3.00	2.33	2.33	1.50	1.75	1.50	3.00	1.75	1.00

[1]: 5-point Likert scale
Source: Author’s own creation

The LCC survey respondents from 2007 are quoted regarding the challenges executives faced with implementing business model within the organization. The findings are identical to the FSC group: current business model inertia and culture challenges change within the organizations.

> *"Inertia of mother airline. Opposition of unions. Reconcile LCC model with prevailing practices and policies of mother airline."*

> *"Since we merged two airlines with very different cultures, the biggest challenge has been to re-align cultures."*

9.3 Regional

The themes present in the regional strategic group are presented. The broad themes focus on service, network, and operational aspects. The strong broad theme is present in all regional carrier analyses, indicating that business model change will be strongly grounded in this element, while the moderate and weak themes will still weigh heavily in future change. Table 9.8 lists the business model elements present in the broad themes.

Table 9.8: Regional broad themes

Strong theme 6 of 6 analyses	**Moderate theme** 5 of 6 analyses	**Weak theme** 4 of 6 analyses
Single class configuration	Capacity lift provider	Dual cabin configuration
	Capacity lift provider with own-brand flying	Fleet non-standardization
	Absence of through-fares	Fleet standardization
		No lounge access
		Presence of ticket restrictions

Source: Author's own creation

The strong broad themes indicate that a focus on the service offering by regional carriers will dominate future business model change. This focus will be on a single class configuration, which brings simplicity to a regional carrier's business model, both operationally and within back-office functions. Moderate themes are tied to network elements and include a focus on offering capacity for larger carriers, both FSC and LCC. As Mr. Cohen (2008), of the RAA, stated:

> *"Lynx [a regional carrier] is part of Frontier [an LCC]. Cape Air [a regional carrier], one of our independent, small turbo-prop operators, is growing increasingly its partnership with JetBlue [an LCC]. So, there is no one-size-fits-all. You get virtually every variety of relationship you can possibly imagine."*

This statement shows that regional carriers' business model will focus on producing capacity for larger carriers, often due to their lower cost base. However, this production may be the sole activity of a regional carrier, as in the case of Lynx, or it may be a share of the regional carrier's overall business. This is the case of US-based regional carrier, ExpressJet, which produces some capacity for Continental and Delta, as Continental Express and Delta Connection respectively, while maintaining and building its own brand at the same time. This business model has the advantages that it is not entirely reliant upon the whims of the contracting carrier. As the CEO of a regional carrier said:

> *"A regional carrier's role in the industry varies depending on their stage of development. Many started initially as pure capacity providers, often during the period of regulation, however during a downturn it is often the contracted regional carriers that are pushed out so it is necessary for them [regional carriers] to own their own customers. It is important to be capable of more than merely provide capacity or operate one's own routes. One should be able to operate a little bit of everything"* (Regional A1, 2008).

In addition to the regional carrier group's focus on capacity lift production the group will ground future change in network simplicity through an absence of through-fares. This may challenge passengers to travel onwards in a regional carrier's network, however it offers simplicity. The final category of themes among regional carriers includes a weak focus on a dual cabin configuration, ticket restrictions, and no lounge access, while operationally regional carriers will elect to either standardize or diversify their fleet. This contradictory, operational theme may stem from the close relationship regional carriers have with contracting, mainline carriers, as fleet decisions and restrictions are often dictated by the larger partner.

The deep themes found in the regional analyses are presented in table 9.9. The results show that there future business model change among regional carriers will be spread among all business model element headings; network, service, distribution, and operational elements are all represented in future models. There will be varying degrees of focus on cabin configuration, especially among innovative non-pure regionals and models grown out of imitative behavior of FSC-Regional and FSC-LCC-Regional carriers. One regional carrier has found a distinctive balance; the CEO says:

> *"We have focused on providing a near single-class of service which has proven to be beneficial, especially when competing with low-cost carriers. We do provide a business class, however all our passengers receive something complimentary"* (Regional A1, 2008).

Within the network, future regional business models will be focused on producing capacity for other carriers, with some continuing to develop their own regional carrier brand. Non-pure regionals, FSC-Regionals, and FSC-LCC-Regionals will have a focus on pure capacity production, while solely FSC-Regionals may also focus on capacity production for others and themselves. There is no indication that regionals will operate as pure stand-alone operators with no FSC or LCC affiliation. As Roger Cohen (2008) stated:

> *"All [regional carriers] are affiliated in some regard, but some do their own ticketing in the end, like Cape Air, Great Lakes, ExpressJet. It is own branded flying but it [the regional carrier] still flies a*

significant amount for Continental and other carriers. It's [purely own branded flying-no affiliation] been tried before. Independence Air was formerly Atlantic Coast and they are no longer in existence. The jury is out on the viability of it [purely own branded flying-no affiliation], but there is no magic way it can't work. Yeah, that [purely own branded flying-no affiliation] we haven't seen yet. Two new regional carriers came on board recently in 2007. Lynx and Compass but both are owned and offshoots of existing carriers."

The CEO of the interviewed regional carrier acknowledged the regional business model and its future affiliation with larger carriers is not limited to the *local* FSC; regional carriers will be creative in creating future partnerships:

> *"New opportunities are opening up in the future related to regional carriers with Open-Skies and providing feed for various network carriers…I envision regional carriers providing capacity for LCCs in the future, certainly those that have a 'network' carrier model. We will cooperate with anyone who wants to work with us. However, most of their IT platforms do not enable interlining today"* (Regional A1, 2008).

Operationally, there is a strong to moderate focus on fleet non-standardization among many possible future business model changes. These findings are often combined with a carrier focusing solely on pure capacity production. This may indicate that scope clauses among contracting carriers affect fleet standardization indexes among regional carriers (Airline Business, 2002). However, there is an indication that regional carriers are maintaining a watchful eye on the possibility of transitioning to larger aircraft. For capacity providers this may be an indication that regional carriers are prepared to upscale their fleet as scope clause restrictions at contracting carriers are relaxed (Abbey, 2008), while for regionals with own-branded operations it is a signal that as market power expands in the future carriers may be prepared to expand to larger equipment. Chuck Evans, of Bombardier Aerospace, stressed that yields, cost, and load factors are driving regionals to acquire larger aircraft (Abbey, 2008). This move is reflected in orders by US regionals, SkyWest and Republic, for next generation regional jets with capacity for up to nearly 90 passengers (Low-Fare and Regional Airlines, 2008c; Low-Fare and Regional Airlines, 2008d). As the Regional Airline Association representative and the CEO of a regional carrier declared:

> *"The aircraft are getting larger, and larger regional jets and larger turbo jets are replacing smaller regional jets and smaller turbo props. Increasing stage lengths, which have doubled in the span of about 5 years"* (R. Cohen, 2008).

> *"We would like to, and anticipate, migrating to a larger aircraft when the market is prepared for it. We like to operate with adequate frequencies where ever possible [read: high]"* (Regional A1, 2008).

Table 9.9: Regional deep themes

		Strong	Moderate	Weak
Innovation	**Pure Regional**	Absence of through-fares	No reoccurring elements	No reoccurring elements
	Non-pure Regional	Capacity lift provider	Dual cabin configuration Fleet non-standardization	Presence of ticket restrictions Presence of through-fares
External imitation	**Regional-LCC**	Fleet non-standardization Absence of ticket restrictions	No reoccurring elements	No reoccurring elements
	Regional-FSC	Dual cabin configuration Fleet non-standardization	Single cabin configuration Capacity lift provider Absence of an FFP GDS absence No lounge access	Triple cabin configuration Capacity lift provider with own-brand flying Fleet standardization Relative high percentage of ASKs to secondary airports Presence of through-fares Absence of through-fares
	Regional-FSC-LCC	Absence of ticket restrictions	Dual cabin configuration Presence of an FFP Fleet non-standardization	Single cabin configuration Capacity lift provider No lounge access Absence of through-fares
Internal imitation	**Regional**	No reoccurring elements[1]		

Source: Author's own creation
[1]: No reoccurring elements signifies that there are no repeating elements present in the particular analysis, however there are individual elements; the researcher omitted these as they were regarded as non-parsimonious

The final validating link presented, are the survey results for the regional respondents from the distributed survey (see Chapter 7). These results indicate that there is a strong focus among regional carriers on Internet distribution, which is a business model element inquired about in the survey but not incorporated in the two analyses[72] due to lack of data. The second greatest focus on recent business model changes was

[72] Chapters 6 and 8

in fleet purity, which is a weak[73], broad focus within the entire regional group. The survey indicates that regional carriers had implemented the least amount of change in cabin configuration, which is contradictory to the MVQCA findings. These results indicate that the strongest focus in the future will be on a single cabin configuration. This variation may be attributed to survey respondents. Ticket restrictions as an element is ranked fourth in the survey and the Boolean findings show that there will be a weak, broad focus on this particular business model element, which can be interpreted to be comparable with the Boolean findings.

Table 9.10: Recent regional business model changes – survey results

	GDS	Internet	Online	Interline	Through-fare	Restrictions	In-flight service	In-flight classes	Ancillary	Lounge	FFP	Assigned seating	Primary airport	Secondary airport	Pure fleet	Charter	Alliance
Regional[1]	3.10	4.30	3.80	3.10	2.60	3.10	2.70	1.67	2.60	2.50	2.80	2.40	2.10	2.20	4.00	2.60	2.10

[1]: 5-point Likert scale
Source: Author’s own creation

The following quotes are extracted from the regional carrier survey respondents from the 2007 distributed survey.

> *“Paradigm shift; unifying the thought.”*
>
> *“High flexibility demands to apply an aggressive ‘low-cost’ model on one route (with high competition) and a classical high-fare on monopoly routes. Lack of revenue management systems. Lack of specialists with profound knowledge of low-cost model. Adaptation to market differences, for example high Internet sales in Western Europe and practically no Internet sales in C.I.S./Middle East markets.”*
>
> *“Training requirements to meet changes. Motivation to change. If correctly used in an open and people-oriented management style implementation of change is successful.”*
>
> *“Employee resistance.”*

These statements mirror those by the two other strategic groups found in the industry. Business model change within regional carriers is challenged by stakeholder resistance, both internally and externally. However, one carrier did indicate that the lack of proper technological solutions challenged change, although the majority of carriers indicate stakeholder resistance was the primary challenge whether or not built on technological advances. In addition, the same regional carrier stated that a lack of

[73] Four out of six analyses

skilled personnel was a challenge, which is a growing threat within the industry (Arnoult, 2007b; Karlsson, 2007).

9.4 Conclusion

This chapter nearly completes the cycle presented in figure 2.2 by integrating primary and secondary data in an attempt to validate the Boolean findings in Chapter 8. The remaining step is to complete the rotation by questioning the underling philosophy of science, which will be done in the following chapter. Although it is not feasible to prove or disprove future events before they happen the researcher has questioned members of various strategic groups and trade organizations about their own interpretations of the findings and future. Many statements suggest that the Boolean findings contain a level of validity and credibility. This is supported by the statements of airline executives and examples from various events throughout the industry. This supports the researcher in concluding that the Boolean findings are valid and applicable when investigating future developments in the industry.

10. Conclusion

- The busiest route in the world measured in operations is Barcelona to Madrid with 971 per week; nearly six flights per hour, 24 hours a day -

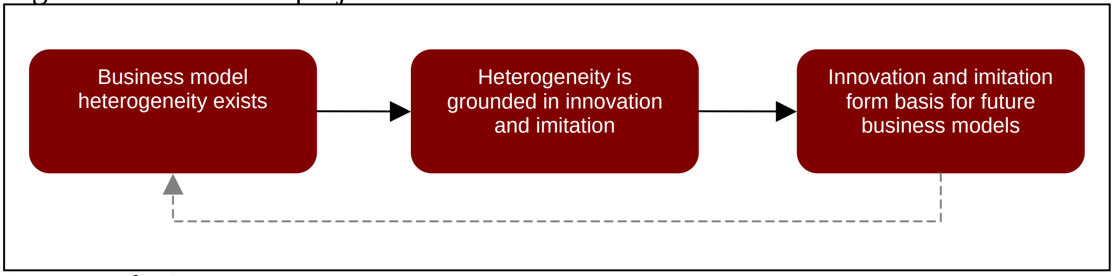
Industry change may be grounded in various phenomena. Studies suggest that technological advancements may form the basis of industry evolution (Christensen et al., 2004) while others indicate that change may be based on industry asset and activity developments (McGahan, 2004a). However, researchers are focusing increasingly on advancements in business model change as a basis for industry change (H. W. Chesbrough, 2006; Markides, 2006). One explanation for this increased focus may be that business model change is applicable to all firms and industries, manufacturing and service alike. This contrasts with research in industrial change in manufacturing industries which is often grounded in technological evolution (Christensen et al., 2004), with results that are often extrapolated to other industries. Business model research is more advantageous because of its wide applicability across both service and manufacturing industries.

The airline industry exemplifies business model evolution, which, although heavily dependent on technology, is often unable to patent or protect intellectual property. Airlines offer a service which is often regarded as highly commoditized which exposes management to demanding challenges (O'Conner, 2001). In an industry where technology plays a secondary role and business practices may be unique for only brief moments the business model is often the airline managers' only opportunity to achieve differentiation. However short-lived that may be. This creates intense focus on an airline's business model and management is often challenged to constantly implement business model changes, which in turn leads to an evolutionary process in the industry. This dissertation investigated the type of business model change present in the industry and incorporated this knowledge in developing scenarios for future business models. In other words, it projects industry evolution based on firm behavior. The research questions that are addressed are:

1. How does the variation of airline business models affect profit?
2. Why is there variation in airline business models?
3. What future airline business models can be proposed?

The research stream was segmented into three themes. The first theme investigated industry heterogeneity in the industry and its impact on airline performance, with the goal of confirming the presence of business model variation. The second theme researched the explanation for such variation by questioning airline executives about their business model changes, which were grounded in innovation and imitation. The final theme utilized the principles of innovation and imitation to propose future airline business models using Boolean algebra. The findings from the final theme support the continuing existence of firm heterogeneity in the industry. As airlines are prone to imitate competitors the Boolean results suggest business models that are comprised of successful combinations of elements from two or more strategic group business models; in other words, winning hybrids. These concepts and their relationships are shown in figure 10.1.

Figure 10.1: Research project stream



Source: Author's own creation

The first theme researches the existence of the lack of homogeneity among airlines in the industry and how this impacts operating margins, which was investigated at both the strategic group and industry levels. The results show that business model variation is evident and that there is a positive correlation between the two factors at both levels of measurement. Although, the analysis of the full-service carrier group showed a weak, negative relationship between business model variation and airline performance; the researcher is hesitant to advocate such findings, and rather suggests that additional research be conducted on this particular group. This wavering is based on the results from the two other groups, and the industry-level analysis, which indicate otherwise. The measured spread among carriers in the three strategic groups varied. Full-service and regional carriers showed limited heterogeneity compared to the low-cost carrier group. The full-service carrier's limited spread is most likely a reflection of the group's historical role as an infrastructure provider regulated at the international level, and the subsequent struggle by some carriers to transition to a viable commercial entity. On the other hand, the small variation seen among regional carriers is most likely a result of the group's limited scope in the industry. This group has historically often been mandated to operate as a capacity production platform for full-service carriers and this constrains the ability for carriers in this group to bring variation into the business model as it must often complement a larger partner's business model. The low-cost group, on the other hand, displayed a large business model spread, which may be a testament to the lack of historical constraints in this group and the freedom this brings.

Industry heterogeneity is grounded in both innovation and imitation of business models. A survey distributed to airline executives worldwide and analyzed using statistical methods confirm the presence of these two phenomena. However, it is not all carriers that utilize these methods equally. Results show that carriers that deviate from their strategic group's traditional business model are more imitative of other groups than those that follow the model closely, and that this behavior is only intensified by rivalry, both among peers within the same strategic group and between other strategic groups. Findings also show that carriers that adhere to the traditional business model tend to be more imitative of their peers within their own strategic group. In addition, if there is a perception of high external rivalry among strategic groups, carriers that closely follow their group's traditional business model are more likely to imitate internally. However, it is not possible to distinguish whether this imitation is of other peers that adhere to the traditional model, or peers in the same strategic group though with a low level of adherence to the traditional model. Such a distinction may imply that heterogeneity is strengthened or weakened; further research may therefore be beneficial. Innovation, on the other hand, has been shown to be present among all carriers, both those that follow their group's business model closely and those that deviate from tradition.

The findings indicate that airlines rely on both innovation and imitation when attempting to change their business models, which form the basis for the third analysis. Through application of the multi-value qualitative comparative approach it is possible to indicate which combination of business model elements are present in successful carriers, which specify where innovative attention should be focused in the future. However, firm advantages from innovation may be short-lived due to the mimetic behavior that airlines display. The same approach allowed the researcher to study and propose scenarios for future business models based on imitative traits. Although the results are too abundant to list all in this chapter some highlights are presented in table 10.1. Please refer to Chapter 8 for detailed results.

Table 10.1: Excerpts of future business models

Full-service	**Low-cost**	**Regional**
No alliance membership and use of regional partners	GDS presence through a 3rd party and online transfers	Absence of through-fares and online transfers
Presence of through-fares and removal of ticket restrictions	No GDS presence and a non-standard fleet and no frequent flyer program	Capacity lift provider with own branded flying
Focus on secondary airports and alliance membership	Lounge access for payment and no interline transfers	Single cabin configuration and a standardized fleet

*: Only highlights from results; see Chapter 8 for detailed findings
Source: Author's own creation

This behavior implies that the strategic distance between strategic groups in the industry is diminishing and that the industry may soon experience a *winning hybrid* based on the successful characteristics copied from competing strategic groups. Biologist Edward Wilson discusses the implication of imitative behavior on the human race and concludes that in the future humans will all be of the same racial mix, however the variety of human beings will increase (Harford, 2006). This implies that future airlines and their business models may all be cut from the same cloth due to imitation, however the industry will continue to display variation. Said another way, some future carriers may strive to be low-cost but differentiation will continue to flourish. This is a reinforcement of industry heterogeneity, implied by the return arrow from the final analyses and its link to the first, as shown in figure 10.1. The following section will address the chosen methodology and theories.

10.1 Methodological and theoretical reflections

This research project is grounded in the researcher's interpretive paradigm and the perspective of the research problem as a closed system. This perspective allowed the researcher to interpret the research problem and its complementing elements by incorporating the relationships between business model elements. This paradigm complemented the action research method utilized by the researcher. The caveat of this approach is the involvement of the study group, which is allowed to aid in guiding the research, much like a consultant-client relationship. It allowed the researcher to work in collaboration with the users of the knowledge, namely SAS

Danmark. The systems approach complemented the theoretical foundation by regarding the research problem in a similar, entwined perspective. This approach recognizes that a system, or business model, is comprised of various elements whose combinations may have a positive, negative, or neutral impact. The researcher may have been able to incorporate one of the other two approaches (Arbnor & Bjerke, 1996), however the research stream would have been conducted in a different manner. An analytical approach would have failed to capture the relations between the business model elements, and their respective contributions would not have incorporated the impact on each other. Rather, the approach would have investigated each individual element's impact on carrier performance. An actors approach may have been appropriate, especially with the project's grounding in the interpretive paradigm, however such an approach may not have been able to capture the intricate combinations present in business models. It is the relations between business model elements that are stressed in the literature and the chosen approach was the one that best captured these relationships. This approach may have been more appropriate with a method other than the multi-value qualitative comparative approach.

The theories incorporated in this research include business models, strategic groups, imitation, and innovation. The business model framework leans heavily against strategy, however it differentiates itself by focusing on value-creating activities, while strategy is primarily concerned with positioning (Magretta, 2002). The research could potentially be carried out using strategic theory, although results may have been diluted due to strategy's broad-reaching grasp. An example of such a theory may have included the resource based view (Wernerfelt, 1984; Wernerfelt, 1995; Wernerfelt, 1997). The theory of strategic groups was incorporated to integrate structure into the research. Groups were populated according to carriers with similar business models. One critique of the project may include the researcher's failure to create groups using industry data and the creation of taxonomy; rather, literature was used to construct the project's strategic groups. However, the research merely utilizes strategic groups as a tool and it is not a primary aim of the research to investigate such a framework. This research postulates that airline industry change is primarily grounded in business model imitation and innovation rather than technological advances. The researcher recognizes that advancements in technology[74] do, and will continue to do so in the future, advance airline industry change, however the time frame for appearance is stretched and the impact less pronounced than business model initiatives[75]. Historical, radical technological advances in the industry had a greater impact on the industry than today's incremental achievements.

Measurement of imitation of business models is challenged due to variation of perceptions and metrics. While product imitation may be easier to distinguish it is important to attempt to capture business model imitation. The same holds true for innovation. Measurement of this feature is difficult as some may interpret innovation as an imitation, and vice versa. This research project proposes new business models based on innovation already present within business models. This limitation of the application of the theory is presented and may be an issue for future research. For example, innovation grounded in other industries or creative solutions is not captured

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[74] The author may include such technological advances as the introduction of regional jets or continuing research on alternative fuels.

[75] Regulatory changes may have the greatest impact on industry change in the future, however changes in regulations often precede and contribute to business model change.

in this research. Complementing theories that may have contributed to the research include activity sets (McGahan, 2004a) which studies industry change based on the activities present, similar to a business model, but at a macro, industry perspective. This theory may have been utilized instead of a business model framework, however the analyses at the firm level (Chapters 7 and 8) may not have been possible.

The methods utilized in this report include the standard statistical tools of correlation, regression, and ANOVA, as well as, an application of a relatively new method, multi-value qualitative comparative approach (MVQCA), in the realm of strategic management. MVQCA allowed the researcher to investigate the combinations of business model elements that will appear at some point in the future in the airline industry grounded in innovation and imitation. Alternative methods could have been utilized, such as scenario planning, a Delphi study, which would have complemented the actor's approach, or backcasting; however the researcher wished to incorporate a quantitative rigor in the study, while attempting to maintain a qualitative interpretation, as well as, match the business model framework. Application of MVQCA in the realm of business model studies and future studies has not been attempted in previous research, and it has shown potential in proposing alternative future scenarios. The researcher's primary critique is the method's failure to incorporate many, if not all, of the business model elements. Many MVQCA results produce parsimonious findings with one or two business model elements, which is interpreted to indicate that such a parsimonious business model ensures success. For example, many results do not indicate a fleet standardization index, implying that aircraft are not necessary in an airline business model. An incorporation of more thresholds in the MVQCA analyses may have enabled for the inclusion of more business model elements, however these results may not have been parsimonious and rather superficial. This is a contradicting dilemma present in the method. The use of meta-variables may also be a solution, however the challenge of reverse-engineering such results may prove challenging. The method was applied to the strategic groups grounded in the theories of innovation and imitation. Its application in an innovative theme may not have been possible if it had been shown that, for example, pure carriers imitate other pure carriers in their own group. This would have conflicted with the method in which the researcher applied MVQCA to propose innovation solutions. Therefore, additional investigations into the application of the method and these theories would be beneficial. Overall, the MVQCA method is an initial first step in proposing the shape of the future airline industry, and the researcher is comfortable recommending continued research with the method in this realm.

A researcher and his or her paradigm are at risk at being thrown into disarray at the conclusion of a research project. Findings may be so profound that a paradigm shift occurs. This research project, however, has failed to produce such esoteric results that have shifted the researcher's core interpretation of the subject. Rather, the outcome of this research has provided evidence for what the researcher, and many in the industry, intuitively understand to be taking place in the airline industry. One may say that the results strengthen the chosen paradigm and present empirical evidence which supports this notion, however no shift has taken place.

10.2 Limitations

This research project investigates the scheduled passenger airline industry within a closed systems model perspective, and attempts to propose future business models. It fails though in incorporating external environmental events. These events are not incorporated due to their uncertainty and challenge in integrating such externalities in the applied methods, which would be better addressed using other methods, such as scenario planning or Delphi study methods. Examples of these include regulatory changes, such as the recent Open Sky agreement (ATW, 2008a), the environmental impact of aviation and possible constraints (ATW, 2007a; ATW, 2008b), or the impact of oil prices.

10.3 Managerial implications

Although the researcher strives to adhere to academic rigor this project was constructed with airline practitioners in mind. These results show the industry is dynamic and managers rarely have an opportunity to relax. Findings from each of the three themes have implications for management.

Differentiation of a carrier and its position as a secondary firm in the strategic group shows that this has a negative affect on operating margins. In other words, carriers that strive for differentiation incur a cost penalty which is not entirely compensated through higher revenues. This is not to imply that carriers attempting differentiation will post negative margins, merely that managers can expect their margins to be lower than their peers that are leading firms in the strategic group. However, a transgression to a non-pure carrier may be appropriate if carrier survival is endangered at the present position.

The analyses of executive responses show that innovation and imitation is present in the industry, and this challenges managers to maintain a competitive lead as any good idea is eventually mimicked. This behavior implies that constant evolution of a carrier's business model is necessary, and that once an innovation is implemented managers should be preparing their next business model change. An innovation, especially a good one, is not free from the peering eyes of competitors. Such behavior may lead non-threatening, distant competitors to minimize the competitive distance, and become potential rivals. However, one source of competitive advantage may be the entanglement of business model elements and the impact that an innovation or imitation may have throughout. If management is able to entwine an innovation throughout the entire business model it may protect the carrier from imitative advances.

The overall results from this research aid management by proposing which business model elements are deserving of innovative or imitative attention. The results provide a potential map that inspires management's future direction. However, some airlines may opt to maintain their current business model, and this project aids these carriers as well by providing a glimpse into the possible future industry construct of their partners and competitors. In other words, a proposal for the future industry makeup is presented which aids in management's overall understanding of the industry.

10.4 Areas for future research

The researcher hopes that this research has extended the boundary of understanding within the field of business models, industry change, and the airline industry. Some areas that may benefit from additional research include increased analyses of business models using Boolean methods, longitudinal studies, and weighting of business model elements. One example includes the incorporation of more variables or creation of meta-variables that integrate a number of variables. The challenge is the deciphering of Boolean results using such techniques. This research has investigated possible future business models grounded on business models that create the greatest operating margins. However, alternative analyses may include investigating those business model combinations that result in the lowest cost per available seat kilometer, the highest passenger satisfaction, or expanding the theoretical framework to include strategic and financial elements to measure net profit. In addition, the researcher would like to expand this research to investigate geographical or operational differences. For example, results may show that North American low-cost carriers are successful with an entirely different business model combination than their European counterparts. In addition, an expansion of the industry may be beneficial. The charter industry was not integrated in this research, which is an option in future analyses. Operational analyses may include investigating how a long-haul business model has characteristics that distinguish it from short-haul, which may aid in research understanding of the combination of low-cost and long-haul operations. The enticing aspect of the MVQCA method is its applicability to a range of topics.

This study used one year, 2006, as a base year, which influences the research and findings by relying on a snapshot of the industry. The research would be strengthened by incorporating longitudinal analyses, as the industry is highly cyclical. However, the challenge may be to incorporate such a study with the theoretical underpinnings of innovation and imitation and Boolean methods. It may be appropriate to conduct time series analyses on each strategic group to identify which combination of business model elements over several years has lead to financial success. One alternative may be to conduct an annual Boolean analyses across a number of years on each strategic group, and then combining these annual results into one Boolean analysis for each groups. In effect, a meta-minimization analysis of a number of years.

The correlation analyses were controlled for size, however if greater market analyses were possible more controls could be introduced. A control for market location would benefit the analyses by investigating the effects of market growth in various regions that may influence the results. A measure of competitiveness may be possible, such as an average Herfindahl-Hirschman Index comprised of the routes flown by each carrier. Passanger data may provide the necessary, and can possibly be obtainabled from APG (Seabury Airline Planning Group, 2008). Control of operational aspects may have provided added understanding, such as fuel exposure. However, data collection may be hampered by the lack of airline reporting.

The results discovered during the course of this research were an inspiration for potential additional theoretical studies. While findings indicate that imitation is prolific in the industry the survey failed to delve deeper in this phenomenon to discover the justification for such behavior. The researcher would like to investigate whether imitation in the airline industry is an attempt to reduce rivalry, a result of information gaps, or a combination of both, and whether some strategic groups or group members imitate for differing reasons. In addition, internal imitation by pure carriers was indiscernible whether it was of other pure carriers or non-pure carriers. This knowledge may have implications for future industry composition. The researcher also suggests additional research in mobility barriers and their prevalence in the industry. Discussions with airline managers hint to the existence of asymmetrical mobility barriers, with some industry participants stating low-cost carriers may face lower mobility barriers than full-service carriers. Such a declaration is grounded in the belief that low-cost mobility often entails an increase in product offerings and the accompanying expenses, while full-service mobility is frequently associated with a simplification of product offering and cost reduction. This implies that low-cost carriers wish to improve customer experience with added expense, while full-service carriers may degrade customer experience while striving for efficiency, which may lead to asymmetrical mobility barriers; it may be easier to spend money than to save money.

These topics include an expansion beyond the airline industry. The airline industry has witnessed an influx of low cost and differentiated firms, which is similar in a number of industries. This analytical method can be extended to such industries as retail, banking, or computer software. These industries are all witnessing new, price-leading business models enter the industries, expand the markets, and post impressive results. Eventually, imitation proliferates and hybrid business models appear. MVQCA allows one to research the developments that may take place and propose potentially new constructs in the industries.

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Appendix I: Freedom rights

The airline industry is supported by the fundamental, underlying agreements that allow airlines to carry passengers between countries. Below you will find an explanation of the industry's nine freedom rights. This information is adopted from the website http://ostpxweb.dot.gov/aviation/Data/freedoms.htm.

- First freedom: The right to fly across the territory of a foreign country. without landing (e.g. United Airlines flies from the United States over Ireland en route to Germany).
- Second freedom: The right to land in a foreign country for technical or non-traffic purposes, such as for re-fueling or maintenance. (e.g. American Airlines flies from the United States and lands to refuel in Ireland enroute to Germany).
- Third freedom: The right to deplane traffic in a foreign country that was enplaned in the home country of the carrier. (e.g. United Airlines carries passengers from the United States to France).
- Fourth freedom: The right to enplane traffic in the foreign country that is bound for the home country of the carrier. (e.g. American Airlines carries passengers from the United Kingdom to the United States).
- Fifth freedom: The right to enplane traffic at one foreign point and deplane it in another foreign point as part of continuous operation also serving the airline's homeland (e.g. Northwest Airlines has "fifth freedom" rights to carry traffic between Tokyo and Hong Kong, on services which stop at Tokyo en route between Los Angeles and Hong Kong).
- Sixth freedom: This term is applied to Fifth Freedom traffic carried from a point of origin in one foreign country to a point of destination in another foreign country via the home country of the airline. (e.g. KLM, carries sixth-freedom traffic between New York and Cairo, carrying passengers traveling from New York to Amsterdam and on to Cairo).
- Seventh freedom: This term is applied to an airline's operating turn around service and carrying traffic between points in two foreign countries without serving its home country (e.g., Lufthansa operates between New York and Mexico City without serving Germany).
- Eight freedom: This term is used to refer to "consecutive or fill-up" cabotage in which an airline picks up traffic at one point in a foreign country and deplanes it at another point in that same foreign country as part of a service from the home country of the airline (e.g., Singapore Airlines enplanes traffic at Wellington and deplanes it in Aukland as part of its service between New Zealand and Singapore).
- Ninth freedom: This term is used to refer to "pure" cabotage in which an airline of one country operates flights and carries traffic solely between two points in a foreign country (e.g., Air France operates flights between Berlin and Frankfurt).

Appendix II: Glossary

ANOVA	Analysis of variance; method to measure for significant differences between groups
ASM; ASK	Available seat mile/kilometer; total number of seats available on scheduled flights multiplied by the number of kilometers (or miles) seats were flown
ATA	Air Transport Association; trade organization of North American airlines; performs lobbying on behalf of member to US legislative authorities
Average daily utilization	Average number of block hours an aircraft flies per day; used to determine average asset utilization
Block hour	Time aircraft moves under own power to parking brake is set; used to calculate asset utilization
CASM; CASK	Cost per available seat mile/kilometer; the cost of moving one seat, one kilometer (or mile); measurement of unit cost in the airline industry
CLP	Capacity lift provider; a regional carrier whose primary function is to produce capacity for a partner, often an FSC
CLT	Capacity lift taker; often an FSC, sometimes an LCC, that uses a regional carrier to produce capacity on designated routes; the regional carrier is a CLP for the CLT
Codeshare	Agreement between two or more airlines that allow each other to use their own flight codes or share a common code on flights
Competitive cusp	The balance between differentiation and legitimacy; firms can differentiate themselves too much that they are not deemed legitimate
Condition	The independent variable that is used to study a phenomenon using Boolean methods
Conditions	Independent variables used in QCA, MVQCA, or fs/QCA analyses
Conjunction	Used in QCA, fs/QCA, and MVQCA to describe two or more conditions that combine to produced a designated outcome; referred to as logical AND; designated by a multiplication symbol (x or *) in notation, which is often implied and not written
Control variable	Used to extract the variance it explains from each of the two initial variables which are correlated
Dependent variable	Output of a function; the observed to change in response to the independent variables
Disjunction	Used in QCA, fs/QCA, and MVQCA to describe two or more conditions that do not combine to produced a designated outcome; referred to as logical OR; designated by an addition symbol (+) in notation, which is always written
ELFAA	European Low Fares Airline Association; trade organization of European low-cost carriers; identifies policy areas affecting the low-fares industry group, lobbies on behalf of regulatory issues, promotes the common interest of its members
Feed (passenger)	Passengers that are often flown to an airport to transfer onto another flight by the same airline or a partner airline; may be flown by a regional partner or alliance partner
FFP	Frequent flyer program; program used by airlines to reward loyal passengers
fs/QCA	Fuzzy set qualitative comparative approach; a development of QCA that allows for more refined

	measurement of conditions
FSC	Full-service carrier; sometimes referred to as network carrier, legacy carrier, flag carrier, hub-and-spoke carrier; a carrier that often relies upon a complex business model to offer high levels of service to customers
FSI	Fleet standardization index; a measurement of the level of fleet purity in an airline's fleet
GDS	Global distribution system; computerized databases of travel-related inventory such as airline seats, hotels, cruise ship tickets, car rentals, etc. often used by travel agencies; airlines use these systems to sell their inventory
IATA	International Air Transport Association; international industry trade group of airlines with the main objective of assisting airlines in achieving lawful competition and uniformity in prices
ICAO	International Civil Aviation Organization; agency of the United Nations tasked with adopting standards and recommended practices in air navigation and cross-border procedures.
ICT	Information and communication technology
Independent variables	The input of a function; the manipulated variables that invoke a change in the dependent variable
Interline; interline passengers	Agreement between two or more airlines that allow passengers to continue a journey on one set of travel documents
Isomorphism	The process of one unit in a population mimicing other units that face identical environmental conditions
KPI	Key performance indicator
LCC	Low-cost carrier; a carrier that often relies upon business model simplicity to keep costs low
Literal	Presentation of a condition in MVQCA and its outcome; often written *Condition Name* and *{outcome}*
Load factor or cabin factor	Efficiency of filling the aircraft cabin with passengers; a high load factor does not necessarily equate to high earnings
MVQCA	Multi-value qualitative comparative approach; a development of QCA that allows for refined measurement of conditions
Online; online passengers	Ability to transfer from one flight to another on the same airline
Operating income	The income that an airline earns purely from airline operations
Operating margin	The percentage of revenue that can be categorized as income
Outcome	Dependent variable used in QCA, MVQCA, or fs/QCA analyses
Outcome	The dependent variable that is solved for using Boolean methods
Primary airport	A main airport that serves a nearby city; often serviced by FSCs
QCA	Qualitative comparative approach; method used to measure combinations of conditions
RAA	Regional Airline Association; trade organization of North American regional carriers; its goal is provide technical, government relations, and public relations services for regional airlines
Restrictions (ticket)	Ticket rules that place restrictions on how a ticket may be used or when it may be purchased; also referred to as fences; used to force customers to pay higher fares during peak times, or ensuring that low-paying passengers are

	forced to purchase tickets during off-peak times
Revenue passenger mile/kilometer (RPM; RPK)	Number of paying passengers carried on scheduled flights multiplied by the number of kilometers seats flown
Seat pitch	The distance between one seat and the same point on another seat directly in front or behind
Secondary airport	An airport that is often smaller and more distant than a primary airport, however it may be located nearer a city center in some areas; often have lower costs and less congestion than primary airports and used by LCCs
Stage length	Flight distance flown by an airline; often measured as an average
Through-fare	A discount in ticket fare offered to passengers when they fly two or more legs on a journey; a through-fare from point A to point C, via point B is less than the individual fares from A to B, plus B to C
TOSMANA	Tool for small-N analysis; computer program used for QCA or MVQCA analyses
Transfer; transfer passenger	Necessity to change planes en route to reach final destination
Turbofan engine	Today’s common jet engine that is comprised of a low pressure fan blade in front of the engine, which produces the majority of the thrust of a jet engine
Yield	Average revenue collected per passenger kilometer; measurement of the average fare paid

Appendix III: Representative airline data

This section presents the reader with appropriate financial and operational metrics regarding the researcher-chosen study group. The table below lists the carriers in the groups and their respective IATA codes. It should be used as a reference to the metric table.

Appendix IV: Researcher-chosen study group

Full-service carriers (IATA code)			
Air Canada (AC)	British Airways (BA)	Emirates (EK)	Qantas (QF)
Air China (CA)	Cathay Pacific (CX)	Iberia (IB)	SAS (SK)
Air France-KLM (AF)	China Eastern Airlines (MU)	Japan Airlines (JP)	Singapore Airlines (SQ)
Alitalia (AZ)	China Southern Airlines (CZ)	Korean Air (KE)	Thai Airways (TG)
American Airlines (AA)	Continental Airlines (CO)	Lufthansa (LH)	United Airlines (UA)
ANA (NH)	Delta Air Line (DL)	Northwest Airlines (NW)	US Airways (US)
			Virgin Atlantic (VS)

Low-cost carriers (IATA code)			
Aer Lingus (EI)	EasyJet (U2)	Midwest Airlines (YX)	Sterling (NB)
Air Asia (AK)	Flybe (BE)	Norwegian (DY)	Virgin Blue (DJ)
Air Berlin (AB)	Frontier Airlines (F9)	Ryanair (FR)	Vueling (VY)
AirTran Airways (FL)	Gol Transportes Aereos (G3)	Southwest Airlines (WN)	WestJet Airlines (WS)
ATA Airlines (TZ)	JetBlue Airways (B6)	Spirit (NK)	

Regional carriers (IATA code)			
Aegean (A3)	Air Wisconsin (ZW)	ExpressJet (XE)	Régional (YS)
Air Canada Jazz (QK)	American Eagle (MQ)	Horizon Air (QX)	Skywest (OO)
Air Macau (NX)	Brit Air (DB)	Lufthansa Cityline (CL)	TSA (AX)
Air Nostrum (YW)	Comair (MN)	Mesa (YV)	
Air One (AP)	Eurowings (EW)	Pinnacle (9E)	

The table below shows various metrics for the chosen carriers. The carriers' IATA codes are listed. One may refer to the above table for the carrier name.

Appendix IV: Researcher-chosen study group statistics

Airline (IATA code)	**Operating Revenue (US $ millions)**	**Operating Profit (US $ millions)**	**Operating margin**	**Net profit (US $ millions)**	**Passengers (thousands)**	**ASK (millions)**	**RPK (millions)**	**Load factor**	**Fleet**
FSC									
AC	8,690,993	97,738	1.1%	-63,444	23,124	89,610	72,584	81%	192
CA	5,748,207	322,060	5.6%	422,782	31,504	79,476	60,322	75.9%	193
AF	30,765,100	1,653,390	5.4%	1,092,040	72,732	NA	197,482	NA	364
AZ	6,232,840	-614,046	-9.9%	-825,394	24,157	52,211	38,427	73.6%	148
AA	22,563,000	1,060,000	4.7%	231,000	98,200	280,252	224,482	80.1%	674
NH	12,635,000	781,000	6.2%	273,900	50,644	87,926	60,229	68.5%	142
BA	16,662,900	1,181,240	7.1%	859,439	36,072	150,710	114,841	76.2%	235
CX	7,792,700	669,000	8.6%	547,700	16,728	89,076	71,172	79.9%	101
MU	4,760,673	1,800	0.0%	-360,300	35,016	70,467	50,243	71.3%	195
CZ	6,078,811	40,310	0.7%	26,087	49,202	97,036	69,575	71.7%	233
CO	13,128,000	468,000	3.6%	343,000	48,782	157,182	127,475	81.1%	358
DL	17,171,000	58,000	0.3%	-2,001,000	73,655	201,798	159,219	78.9%	439
EK	8,475,150	988,270	11.7%	941,800	16,748	97,886	73,904	75.5%	104
IB	7,050,900	157,500	2.2%	73,500	27,799	65,781	52,493	79.8%	151
JP	19,503,730	194,189	1.0%	-135,100	56,869	137,817	95,783	69.5%	199
KE	8,598,000	529,000	6.2%	366,900	11,607	71,871	52,178	72.6%	122
LH	25,447,400	1,665,400	6.5%	1,029,500	53,432	146,715	110,330	75.2%	244
NW	12,568,000	740,000	5.9%	-2,800,000	54,888	137,987	117,013	84.8%	377
QF	9,961,100	529,800	5.3%	350,400	24,574	103,865	82,261	79.2%	125
SK	8,867,752	187,739	2.1%	691,596	25,099	36,970	27,506	74.4%	171
SQ	9,548,725	863,270	9.0%	1,403,642	17,975	112,099	87,325	77.9%	94
TG	4,848,722	452,576	9.3%	239,138	18,775	NA	55,505	76,9%	84
UA	19,340,000	447,000	2.3%	-219,000	69,284	230,326	189,098	82.1%	404
US	11,557,000	558,000	4.8%	-217,000	36,083	76,326	59,763	78.3%	224
VS	3,327,500	72,500	2.2%	NA	4,907	48,261	35,279	73.1%	37

LCC

EI	1,430,500	40,900	2.9%	-89,600	8,631	17,220	13,363	77.6%	35
AK	233,800	29,600	12.7%	34,700	NA	NA	NA	NA	34
AB	2,065,800	84,300	4.1%	65,900	15,228	27,301	21,704	79.5%	68
FL	1,893,400	42,100	2.2%	15,500	20,051	30,595	22,273	72.8%	132
TZ	752,113	-30,905	-4.1%	1,321,747	2,969	13,138	9,039	68.8%	29
U2	3,073,400	223,500	7.3%	178,600	33,676	33,875	27,608	81.5%	120
BE	541[1]	-6[1]	-1.1%	-22[1]	4,537	3,989	2,525	63.3%	80
F9	994,300	-7,900	-0.8%	-14,000	8,898	17,587	13,401	76.2%	58
G3	1,777,890	328,014	18.4%	266,138	17,447	20,272	14,819	73.1%	69
B6	2,363,000	127,000	5.4%	-0.800	18,565	46,004	37,539	81.6%	123
YX	664,500	0.600	0.0%	5,400	3,894	8,115	6,232	76.8%	36
DY	452,500	-5,000	-1.1%	-2,000	5,105	5,346	4,223	79%	22
FR	2,986,771	628,155	21.0%	580,820	40,532	NA	NA	83%	135
WN	9,086,300	934,300	10.3%	499,100	96,349	149,265	109,113	73.1%	491
NK	540,426	-45,375	-8.4%	-57,046	4,965	9,324	7,329	78.6%	36
NB	699[1]	-34[1]	-4.9%	-25[1]	4,000	NA	NA	82%	24
DJ	1,043,800	92,100	8.8%	63,300	14,643	21,406	16,932	79.1%	49
VY	300[1]	-67[1]	-22.4%	-85[1]	NA	NA	NA	NA	20
WS	1,516,000	170,500	11.2%	98,000	10.169	20,157	15,763	78.2%	65

Regional

A3	506[1]	51[1]	10.1%	32[1]	4,448	4,022	2,932	72.9%	24
QK	1,184,010	123,459	10.4%	120,029	8,700	8,515	6,148	72.2%	135
NX	366[1]	-15[1]	-4.1%	-8[1]	2,410	4,052	3,039	75%	16
YW	796[1]	36[1]	4.5%	28[1]	5,269	4,523	2,836	62.7%	66
AP	789,032	33,548	4.3%	8,100	6,300	5,902	3,382	57.3%	49
ZW	568,345	55,137	9.7%	28,443	5,790	5,087	3,607	70.9%	70
MQ	1,911,027	185,903	9.7%	5,524	18,766	18,197	13,557	74.5%	262
DB	346.06[2]	15.23[2]	4.4%	2.88[2]	3,963	3,505	2,240	63.9%	45
MN	1,201,937	46,230	3.8%	-292,063	10,596	11,462	8,516	74.3%	140
EW	1,000	23	2.3%	13	2,497	2,143	1,305	60.9%	32
XE	1,679,600	141,100	8.4%	92,600	18,331	21,335	16,620	77.9%	271
QX	644,022	8,953	1.4%	8,191	6,860	5,849	4,334	74.1%	75
CL	1,164[2]	61[2]	5.3%	33[2]	6,229	6,346	4,036	63.6%	77
YV	1,337,200	100,800	7.5%	34,000	15,358	14,736	11,096	75.3%	138

9E	824,623	127,548	15.5%	77,799	8.988	9,084	6,904	76%	126
YS	736[2]	6[2]	0.8%	5[2]	3,884	3,841	2,385	62.1%	62
OO	3,114,700	339,200	10.9%	145,800	19,496	19,254	15,288	79.4%	264
AX	371,367	19,674	5.3%	12,905	3,705	3,608	2,558	70.9%	48

Source: Financial data from ATW (2007d) unless otherwise indicated; [1]: Airline Business (2007c); [2]: Amadeus financial database; traffic data from ATW (2007f) unless otherwise indicated
NA: Not available

Appendix IV: QCA

There are ten basic features of Boolean algebra and its use within QCA; the examples that follow are reproduced from Ragin (1987 pgs. 86 – 101) for clarity purposes.

1. Notation
   Within QCA there are two states: true (present) or false (absent). These two states are represented in base 2: 1 indicates presence; 0 indicates absence. This binary representation requires that all variables, both independent and dependent, must be nominal-scale measures. This does result in minimal data loss, however it is usually arbitrary to the outcome, and many topics of interest for comparatists are usually already in nominal-scale measurements. The application of interval- or ordinal-scale measurements was developed following Ragin's QCA method, which will be presented and described after the basics of QCA and Boolean algebra. Independent variables are commonly referred to as conditions and dependent variables as outcomes.

2. Data representation
   Once data has been coded into binary notation it is necessary to sort the cases and their various configurational data into a matrix table; known as a truth table. Each logical combination of conditions and outcome is represented as one row in the table. When using binary notation the number of logically possible combinations in the truth table is two to the power of number of conditions (2^x); with three independent variables there are 8 possible combinations (2^3). Table IV is a truth table example using 3 independent variables.

Appendix IV: Truth table example

Conditions			Outcome	Frequency
A	**B**	**C**	**O**	**F**
0	0	0	0	9
1	0	0	1	2
0	1	0	1	3
0	0	1	1	1
1	1	0	1	2
1	0	1	1	1
0	1	1	1	1
1	1	1	1	3

Source: Author's own creation

The frequency is shown in the table, although it has no bearing on the analysis. It is merely included to remind the viewer that each row is a specific combination of independent variables that is present a number of times in reality.

Conditions and outcomes are commonly denoted with a letter, as in the truth table example above. Both when writing a specific combination of variables or analyzing QCA results these letters are used in place of variable expressions. To express the dichotomous representation of presence and absence one uses upper- and lowercase letters. For example, an uppercase *A* indicates the presence of variable *A* (depicted with a 1 in the truth table), or a lowercase *c* indicates the absence of variable *C* (depicted with a 0 in the truth table).

3. Boolean addition
   Boolean addition requires that the researcher think in *logical* rather than *arithmetical* terms. For example, if:

   A + B = Z

   and A = 1 and B = 1, then Z = 1

   in other words, 1 + 1 = 1

   In Boolean algebra addition is equivalent to logical *OR*. Therefore, the example above can be restated to read: if A equals 1 *OR* B equals 1, then Z equals 1.

4. Boolean multiplication
   Boolean multiplication, like Boolean addition, is not arithmetic. Boolean algebra is concerned with simplifying expressions, referred to as *sums of products*, a product being a specific combination of causal conditions. Using the example truth table above, one can write the unique combinations using Boolean techniques as follows (note that the multiplication symbol, *, is not actually written but implied):

   $O = Abc + aBc + abC + ABc + AbC + aBC + ABC$

   The term *Abc* does not signify mathematically *A* (1) multiplied by *b* (0) multiplied by *c* (0), but merely that the presence of *A* is combined with an absence of *b* and with an absence of *c*. In Boolean algebra multiplication is equivalent to logical *AND*. Note that there are only seven causal expressions in the example above, as the first row in table IV indicates an outcome absence. The unique combination for an absence of the outcome is: $O = abc$.

5. Combinatorial logic
   A Boolean analysis incorporates combinatorial design. From the example in table IV, if one only had the first four rows of data, one would state that the mere presence of any single condition would result in the outcome. This oversimplification of the analysis is not correct, and in a Boolean analysis an absence of a condition has the same importance and status as a presence of a condition. If one reviews row two, *Abc* causes *O*, independently it might be concluded that the presence of *A* alone is enough to cause *O*, regardless of the absence or presence of other conditions in future predictions. However, using Boolean techniques it is possible to determine whether outcome *O* will occur

in the presence of condition *A* and the presence of either conditions *B* or *C*. Combinatorial logic supports the notion that cases and their variables should be viewed holistically rather than independent parts; causes are viewed as combinations of conditions rather than isolated incidents.

6. Boolean minimization

The fundamental rule of Boolean minimization is as follows:

"If two Boolean expressions differ in only one causal condition yet produce the same outcome, then the causal condition that distinguishes the two expressions can be considered irrelevant and can be removed to create a simpler, combined expression" (Ragin, 1987).

This is to say that a researcher can take two Boolean expressions that only differ in one condition and compose a more parsimonious result. For example, the expressions *Abc* and *ABc* that both produce the outcome *O* only differ in condition *B*. It can be stated that outcome *O* will be present regardless of condition *B* in those two expressions. Therefore, condition *B* can be omitted from the expressions, which can be minimized to the parsimonious statement, *Ac*. This minimization is a step-wise process as the Boolean expressions are funneled into parsimonious explanations. Using our example from table IV we can reduce the following primitive explanations:

Abc + aBc + abC + ABc + AbC + aBC + ABC = F

Abc combines with *ABc* to produce *Ac*
Abc combines with *AbC* to produce *Ab*
aBc combines with *ABc* to produce *Bc*
aBc combines with *aBC* to produce *aB*
abC combines with *AbC* to produce *bC*
abC combines with *aBC* to produce *aC*

The expressions with two conditions present and one absent can be reduced to the following:

ABc combines with *ABC* to produce *AB*
AbC combines with *ABC* to produce *AC*
aBC combines with *ABC* to produce *BC*

This step-wise reduction to parsimony can be further minimized:

Ab combines with *AB* to produce *A*
Ac combines with *AC* to produce *A*
aB combines with *AB* to produce *B*
Bc combines with *BC* to produce *C*
aC combines with *AC* to produce *C*
bC combines with *BC* to produce *C*

This minimization results in the following parsimonious expression explaining the outcome *O*:

$O = A + B + C$

7. Prime implicants
Implication is a concept within Boolean analysis. It is possible for a Boolean expression to imply another expression if the membership of the second term is a subset of the first expression. In the parsimonious explanation from above, *Abc* is included as a subset of *A*. Table IV is a reproduction of a prime implicant chart from Ragin (1987 page 97).

Appendix IV: Prime implicant chart

		Primitive expressions			
		ABC	AbC	ABc	aBc
	AC	✓	✓		
Prime implicants	AB	✓		✓	
	Bc			✓	✓

Source: Ragin (1987)

A longhand minimization prior to using a prime implicant chart would provide three causal combinations, *AC*, *AB* and *Bc*. However, using the prime implicant chart the researcher can see that the prime implicant *AB* overlaps with the primate expressions found in prime implicants *AC* and *Bc*. Therefore, the most parsimonious minimization would be to state the both *AC* and *Bc* are the causal expressions, and combination *AB* is superfluous. Such minimization is possible using longhand techniques, however for more complex solutions computer algorithms are necessary, which various QCA software provide.

8. De Morgan's law
The majority of analyses utilizing Boolean algebraic techniques are researcher the combinations that results in the presence of a particular outcome. However, if a researcher is interested in also researching which combinations lead to the opposite, or an absence of the dependent variable, it is possible to do without reconstructing a new truth table and analyzing the entire data matrix again. De Morgan's Law, formulated by Augustus De Morgan, related to logical processes simply requires that a Boolean minimized resulted be recoded with opposite notation; a present condition becomes an absent condition, logical *OR* becomes logical *AND*, and vice versa. Using our example from the prime implicant chart, $O = AC + Bc$, and applying De Morgan's Law results in the following:

$$O = AC + Bc \quad \Rightarrow$$
$$o = (a + c)(b + C) \quad \Rightarrow$$
$$o = ab + aC + cb + cC \quad \Rightarrow$$
$$o = ab + aC + cb$$

One can state that outcome, *O*, is present when either condition *A* is present *AND* condition *C* is present, *OR* condition *B* is present *AND* condition *c* is absent. Likewise, it can be stated that outcome, *O*, is absent when either condition *a* is absent *AND* condition *b* is absent, *OR* condition *a* is absent *AND* condition *C* is present, *OR* condition *c* is absent *AND* condition *b* is absent.

9. Necessary and sufficient causes
The concepts of necessity and sufficiency are present in Boolean analyses and parallel common research language, an advantage of the method over others. A condition is deemed necessary if it must be present for an outcome to occur. Likewise, a condition is deemed sufficient if it can produce an outcome by itself. Below are four examples of necessity and sufficiency:

$S = AC + Bc$ (No cause is either necessary or sufficient)
$S = AC + BC$ (*C* is necessary but not sufficient)
$S = AC$ (Both *A* and *C* are necessary but not sufficient)
$S = A + Bc$ (*A* is sufficient but not necessary)
$S = B$ (*B* is both necessary and sufficient)

10. Factoring Boolean expressions
Algebraic factoring of Boolean expressions is possible, which can be helpful in determining which conditions are causally are necessary or equivalent. Factoring is useful to help clarify minimized expressions and aid the researcher in getting a clearer picture of the results. An example of factoring is:

$S = abc + AbC + abd + E \quad \Rightarrow$
$S = a(bc + bd + E) + A(bC + E)$

This example shows those conditions combined with an absence of *a OR* a presence of *A* that are necessary to produce outcome *S.*

Appendix V: Questionnaire

The global airline industry operates within a challenging business environment and airlines are being forced to review their strategies, business models, and operations. In order to facilitate and improve understanding of this phenomenon Copenhagen Business School, in cooperation with University of California at Berkeley, instigated in 2005 a doctorate study of the trend of business model innovation within the airline industry.

The doctoral student, in cooperation with the Association of European Airlines, has created and mailed this survey to airlines throughout the world in order to obtain the most relevant results for industry practitioners, academics, and industry observers.

All responses will remain anonymous at all times.

In appreciation of your participation the summarized research results will be made available to you at the conclusion of the survey period.

The survey consists of 11 questions and takes approximately 10 minutes to complete. For your convience an identical online version is available at **www.surveymonkey.com/airlinesurvey** if you prefer.

Please postmark your responses by March 2, 2007

For any questions or comments please do not hesitate to contact the doctoral candidate, Kristian Hvass, at kah.tcm@cbs.dk

1. How would you classify your airline?	
Network carrier	
Low-cost carrier	
Regional carrier	
Charter carrier	
Other (please describe)	

2. How would you describe your airline's business model?

3. A value proposition can be described as the tangible benefits customers obtain from using your product; it should answer the question, “Why should I buy this product?” How would you describe your airline’s value proposition?

4. Please rank the competitiveness of the following groups of airlines (1 being not a competitor, 5 being a direct competitor):

	Not a competitor	Indirect competitor	Somewhat a competitor	A near competitor	Direct competitor	N/A
	1	**2**	**3**	**4**	**5**	
Network carriers						
Low-cost carriers						
Regional carriers						
Charter carriers						
Other (please describe)						

5. Please rank the market segments that your airline targets (1 being primary, 2 being secondary, etc.):

	Primary	Secondary	Tertiary	Quaternary	Quinary	N/A
	1	**2**	**3**	**4**	**5**	
Corporations						
Small/medium businesses						
Leisure						
Inclusive tour packages						
Ad-hoc charter (e.g. sport teams)						
Other						

6. Please rank your airline’s integration in the travel cycle (1 being no integration, 5 being highly integrated). One example of integration is whether your airline cross-sells travel solutions, such as car rental or insurance, to customers?

	No integration	Very little integration	Some integration	Medium integration	High integration

	1	**2**	**3**	**4**	**5**
Travel cycle integration					

7. Has your airline recently changed a business model activity? If yes, how would you rate this change? (1 being no change, 5 being greatest change):

	No change	Very little change	Some change	Medium change	Greatest change	N/A
	1	**2**	**3**	**4**	**5**	
GDS distribution activities						
Internet distribution activities						
Online connections						
Interline connections						
Thru-fares (i.e. lower fares for connections)						
Ticket restrictions (i.e. Saturday night stay)						
In-flight service level						
In-flight classes (i.e. first/business class)						
Ancillary revenue						
Ground services						
Lounges						
Frequent flyer program						
Seating assignments						
Service to primary airports						
Service to secondary airports						
Fleet composition						
Charter operations						
Alliance membership						
Other (please describe)						
Other						
Other						

8. What affect did the following variables have on prompting business model activity changes (1 being no affect, 5 being greatest)?

	No affect	Little affect	Some affect	Medium affect	Greatest affect	
	1	**2**	**3**	**4**	**5**	**N/A**
Current market segment						
Capture new market segment						

Competition						
Internal planned growth						
Political/regulatory						
Macro-economic						
Social trend						
Technical						
Internal process improvement						
Other (please describe)						

9. When undergoing business model activity changes please indicate and rank the sources of inspiration (1 being no affect, 5 being greatest).

	No affect	Little affect	Some affect	Medium affect	Greatest affect	
	1	**2**	**3**	**4**	**5**	**N/A**
Board of Directors						
CEO						
Employees						
Partners						
Customers						
Consultants						
Competitors						
Academia						
Other industries (which ones)						
Other (please describe)						

10. Please describe any challenges experienced with implementing these changes.

11. In your opinion what are the greatest challenges your airline’s business model will face in the future?

Thank you very much for taking the time to complete this survey. Your answers will remain anonymous. Please provide your contact details where the summarized research results may be sent:	
Name:	
Email:	
Address:	

If the research group would like amplification on some of the answers may they contact you for further discussion?	
Yes	
No	

Appendix VI: QCA truth tables

Appendix IV: Researcher-chosen study group

Full-service carriers (IATA code)			
Air Canada (AC)	British Airways (BA)	Emirates (EK)	Qantas (QF)
Air China (CA)	Cathay Pacific (CX)	Iberia (IB)	SAS (SK)
Air France-KLM (AF)	China Eastern Airlines (MU)	Japan Airlines (JP)	Singapore Airlines (SQ)
Alitalia (AZ)	China Southern Airlines (CZ)	Korean Air (KE)	Thai Airways (TG)
American Airlines (AA)	Continental Airlines (CO)	Lufthansa (LH)	United Airlines (UA)
ANA (NH)	Delta Air Line (DL)	Northwest Airlines (NW)	US Airways (US)
			Virgin Atlantic (VS)
Low-cost carriers (IATA code)			
Aer Lingus (EI)	EasyJet (U2)	Midwest Airlines (YX)	Sterling (NB)
Air Asia (AK)	Flybe (BE)	Norwegian (DY)	Virgin Blue (DJ)
Air Berlin (AB)	Frontier Airlines (F9)	Ryanair (FR)	Vueling (VY)
AirTran Airways (FL)	Gol Transportes Aereos (G3)	Southwest Airlines (WN)	WestJet Airlines (WS)
ATA Airlines (TZ)	JetBlue Airways (B6)	Spirit (NK)	
Regional carriers (IATA code)			
Aegean (A3)	Air Wisconsin (ZW)	ExpressJet (XE)	Régional (YS)
Air Canada Jazz (QK)	American Eagle (MQ)	Horizon Air (QX)	Skywest (OO)
Air Macau (NX)	Brit Air (DB)	Lufthansa Cityline (CL)	TSA (AX)
Air Nostrum (YW)	Comair (MN)	Mesa (YV)	
Air One (AP)	Eurowings (EW)	Pinnacle (9E)	

Raw MVQCA data

Appendix VI: FSC raw data

Airline ID	Op. Margin	On-line	Inter-line	Thru-fare	Restric-tions	GDS	FFP	Lounges	In-flight classes	Alliance	Code-share	CLP	CLT	Primary a/p share	Feed share	Fleet	stage length
AA	0.05	1	1	1	1	1	1	1	3	1	1	0	1	0.95	0.07	0.19	1099
AC	0.04	1	1	0	0	1	1	1	2	1	1	0	1	0.99	0.09	0.06	1078
AF	0.05	1	1	1	1	1	1	1	3	1	1	0	1	0.99	0.07	0.04	993
AZ	-0.1	1	1	1	1	1	1	1	2	1	1	0	1	0.97	0.03	0.15	708
BA	0.07	1	1	1	1	1	1	1	3	1	1	0	1	0.93	0.09	0.09	1027
CA	0.06	1	1	1	1	1	1	1	3	0	1	0	1	1	0	0.05	901
CO	0.04	1	1	1	1	1	1	1	2	1	1	0	1	0.95	0.04	0.09	778
CX	0.09	1	1	1	1	1	1	1	3	1	1	0	0	1	0	0.11	1698
CZ	0.01	1	1	1	1	1	1	1	3	0	1	0	0	1	0	0.04	647
DL	0	1	1	1	1	1	1	1	2	1	1	0	1	0.95	0.15	0.12	1019
EK	0.12	1	1	1	1	1	1	1	3	0	1	0	0	1	0	0.09	1796
IB	0.02	1	1	1	1	1	1	1	2	1	1	0	1	0.98	0.11	0.13	842
JL	0.01	1	1	1	1	1	1	1	3	0	1	0	0	0.86	0.07	0.08	728
KE	0.06	1	1	1	1	1	1	1	3	1	1	0	0	1	0	0.05	1068
LH	0.04	1	1	1	1	1	1	1	3	1	1	0	1	0.98	0.07	0.07	597
MU	0.07	1	1	1	1	1	1	1	3	0	1	0	0	1	0	0.05	605
NH	0.06	1	1	1	1	1	1	1	3	1	1	0	0	0.81	0	0.1	490
NW	0.06	1	1	1	1	1	1	1	2	1	1	0	1	0.97	0.09	0.15	795
QF	0.14	1	1	0	0	1	1	1	3	1	1	0	1	1	0	0.11	848
SK	0.02	1	1	1	0	1	1	1	3	1	1	0	1	0.99	0.01	0.06	451
SQ	0.09	1	1	1	1	1	1	1	3	1	1	0	0	1	0	0.14	2435
TG	0.05	1	1	1	1	1	1	1	3	1	1	0	0	1	0	0.06	1302
UA	0.02	1	1	1	1	1	1	1	3	1	1	0	1	0.96	0.07	0.13	1071
US	0.05	1	1	1	1	1	1	1	2	1	1	0	1	0.92	0.18	0.08	683

VS	0.02	1	1	1	1	1	1	1	3	0	1	0	0	0.88	0	0.34	3872

Appendix VI: LCC raw data

Airline ID	Op. Margin	On-line	Inter-line	Thru-fare	Restric-tions	GDS	FFP	Lounges	In-flight classes	Alliance	Code-share	CLP	CLT	Primary a/p share	Feed share	Fleet	stage length
AB	0.04	1	1	1	0	1	1	0	1	0	1	0	0	0.96	0	0.14	929
AK	0.13	0	0	0	0	0	0	0	1	0	0	0	0	0.95	0	0.5	602
B6	0.05	1	0	1	0	0	1	0	1	0	1	0	0	0.82	0	0.5	1043
BE	-0.01	0	1	0	1	1	0	1	1	0	1	0	0	0.86	0	0.19	285
DJ	0.1	1	1	1	0	0.5	1	0.5	1	0	1	0	0	1	0	0.5	649
DY	-0.01	0	0	0	0	0	0	0	1	0	1	0	0	0.9	0	1	482
EI	0.04	1	1	1	1	1	1	1	2	1	1	0	0	1	0	0.25	701
F9	-0.01	1	1	1	1	1	1	0	1	0	1	0	0	0.92	0.08	0.33	818
FL	0.02	1	0	1	1	1	1	0	2	0	0	0	0	0.87	0	0.5	570
FR	0.21	0	0	0	0	0	0	0	1	0	0	0	0	0.41	0	1	499
G3	0.18	1	1	1	0	0	0	0	1	0	1	0	0	0.77	0	0.33	417
NB	-0.05	1	1	1	1	1	0	0	1	0	1	0	0	0.96	0	0.25	929
NK	-0.08	1	0	1	1	1	0	0	2	0	0	0	0	0.96	0	0.5	782
TZ	-0.04	1	1	0	1	0	1	0	2	0	1	0	0	0.72	0	0.07	1221
U2	0.07	0	0	0	0	0.5	0	0.5	1	0	0	0	0	0.68	0	0.5	534
VY	-0.22	0	0	0	0	0	0	0	1	0	0	0	0	1	0	1	491
WN	0.1	1	1	1	1	0.5	1	0	1	0	1	0	0	0.68	0	0.33	522
WS	0.11	1	0	1	0	0.5	1	0	1	0	0	0	0	1	0	0.33	617
YX	0	1	1	1	1	1	1	1	1	0	1	0	1	0.96	0.06	0.5	459

Appendix VI: Regional raw data

Airline ID	Op. Margin	On-line	Inter-line	Thru-fare	Restric-tions	GDS	FFP	Lounges	In-flight classes	Alliance	Code-share	CLP	CLT	Primary a/p share	Feed share	Fleet	stage length
9E	0.16	1	1	1	1	0	0	0	1	0	1	1	0	0.98	0	1	411
A3	0.1	1	1	0	1	1	1	0	2	0	1	0	0	1	0	0.23	292
AP	0.03	0	1	0	0	1	0	1	2	0	1	0	0	0.87	0	0.15	298
AX	0.05	1	1	1	1	0	0	0	2	0	1	1	0	0.97	0	1	202
CL	0.05	1	1	1	1	0	0	0	2	0	1	1	0	0.99	0	0.24	354
DB	0.04	1	1	1	1	0	0	0	1	0	1	1	0	0.96	0	0.33	318
EW	0.02	1	1	1	1	0	0	0	2	0	1	1	0	1	0	0.5	241
MN	0.04	1	1	1	1	0	0	0	1	0	1	1	0	1	0	0.5	535
MQ	0.10	1	1	1	1	0	0	0	1	0	1	1	0	0.94	0	0.33	343
NX	-0.04	1	1	1	0	1	1	1	2	0	1	0	0	1	0	0.13	518
OO	0.11	1	1	1	1	0	0	0	2	0	1	1	0	0.95	0	0.24	343
QK	0.1	1	1	0	0	0	0	0	2	0	1	1	0	1	0	0.33	308
QX	0.01	1	1	1	1	0	0	0	1	0	1	1	0	0.92	0	0.33	246
XE	0.08	1	1	1	1	0	0	0	1	0	1	0.5	0	0.97	0	1	295
YS	0.01	1	1	1	1	0	0	0	2	0	1	1	0	0.99	0	0.18	306
YV	0.08	1	1	1	1	0	0	0	2	0	1	0.5	0	0.96	0	0.1	237
YW	0.05	1	1	1	1	0	0	0	1	0	1	1	0	0.94	0	0.19	288
ZW	0.1	1	1	1	1	0	0	0	1	0	1	1	0	0.9	0	1	309

Innovation MVQCA tables

Appendix VI: FSC innovation truth table - contradictions included

v1:	Online	v2:	Interline
v3:	Thru-fare	v4:	Restrictions
v5:	GDS	v6:	FFP
v7:	Lounges	v8:	In-flight classes
v9:	Alliance	v10:	Codeshare
v11:	CLP	v12:	CLT
v13:	Primary a/p share	v14:	Feed share
v15:	Fleet	v16:	stage length
O:	Op. Margin	id:	Airline ID

v1	v2	v3	v4	v5	v6	v7	v8	v9	v10	v11	v12	v13	v14	v15	v16	O	id
1	1	1	1	1	1	1	1	1	1	0	1	1	0	0	0	C	AA,AF,BA,LH,UA
1	1	0	0	1	1	1	0	1	1	0	1	1	0	0	0	2	AC
1	1	1	1	1	1	1	0	1	1	0	1	1	0	0	0	C	AZ,CO,NW
1	1	1	1	1	1	1	1	0	1	0	0	1	0	0	0	C	CA,CZ,MU
1	1	1	1	1	1	1	1	1	1	0	0	1	0	0	1	2	CX,SQ,TG
1	1	1	1	1	1	1	0	1	1	0	1	1	1	0	0	C	DL,IB,US
1	1	1	1	1	1	1	1	0	1	0	0	1	0	0	1	2	EK
1	1	1	1	1	1	1	1	0	1	0	0	0	0	0	0	1	JL
1	1	1	1	1	1	1	1	1	1	0	0	1	0	0	0	2	KE
1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	2	NH
1	1	0	0	1	1	1	1	1	1	0	0	1	0	0	0	2	QF
1	1	1	0	1	1	1	1	1	1	0	1	1	0	0	0	1	SK
1	1	1	1	1	1	1	1	0	1	0	0	0	0	1	1	1	VS

Appendix VI: LCC innovation truth table - contradictions included

v1:	Online	v2:	Interline
v3:	Thru-fare	v4:	Restrictions
v5:	GDS	v6:	FFP
v7:	Lounges	v8:	In-flight classes
v9:	Alliance	v10:	Codeshare
v11:	CLP	v12:	CLT
v13:	Primary a/p share	v14:	Feed share
v15:	Fleet	v16:	stage length
O:	Op. Margin	id:	Airline ID

v1	v2	v3	v4	v5	v6	v7	v8	v9	v10	v11	v12	v13	v14	v15	v16	O	id
1	1	1	1	2	1	2	1	1	1	0	0	1	0	0	0	1	EI
0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	2	AK
1	1	1	0	2	1	0	0	0	1	0	0	1	0	0	1	1	AB
1	0	1	1	2	1	0	1	0	0	0	0	1	0	0	0	1	FL
1	1	0	1	0	1	0	1	0	1	0	0	1	0	0	1	0	TZ
0	0	0	0	1	0	1	0	0	0	0	0	1	0	0	0	1	U2
0	1	0	1	2	0	2	0	0	1	0	0	1	0	0	0	0	BE
1	1	1	1	2	1	0	0	0	1	0	0	1	1	0	1	0	F9
1	1	1	0	0	0	0	0	0	1	0	0	1	0	0	0	2	G3
1	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	1	B6
1	1	1	1	2	1	2	0	0	1	0	1	1	1	0	0	0	YX
0	0	0	0	0	0	0	0	0	1	0	0	1	0	1	0	0	DY
0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2	FR
1	1	1	1	1	1	0	0	0	1	0	0	1	0	0	0	2	WN
1	0	1	1	2	0	0	1	0	0	0	0	1	0	0	1	0	NK
1	1	1	1	2	0	0	0	0	1	0	0	1	0	0	1	0	NB

1	1	1	0	1	1	1	0	0	1	0	0	1	0	0	0	2	DJ
0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	VY
1	0	1	0	1	1	0	0	0	0	0	0	1	0	0	0	2	WS

Appendix VI: Regional innovation truth table - contradictions included

v1:	Online	v2:	Interline
v3:	Thru-fare	v4:	Restrictions
v5:	GDS	v6:	FFP
v7:	Lounges	v8:	In-flight classes
v9:	Alliance	v10:	Codeshare
v11:	CLP	v12:	CLT
v13:	Primary a/p share	v14:	Feed share
v15:	Fleet	v16:	stage length
O:	Op. Margin	id:	Airline ID

v1	**v2**	**v3**	**v4**	**v5**	**v6**	**v7**	**v8**	**v9**	**v10**	**v11**	**v12**	**v13**	**v14**	**v15**	**v16**	**O**	**id**
1	1	0	1	1	1	0	1	0	1	0	0	1	0	0	0	2	A3
1	1	0	0	0	0	0	1	0	1	2	0	1	0	0	0	2	QK
1	1	1	0	1	1	1	1	0	1	0	0	1	0	0	1	0	NX
1	1	1	1	0	0	0	0	0	1	2	0	1	0	0	0	C	YW,MQ,DB,QX
0	1	0	0	1	0	1	1	0	1	0	0	0	0	0	0	1	AP
1	1	1	1	0	0	0	0	0	1	2	0	1	0	1	0	2	ZW
1	1	1	1	0	0	0	0	0	1	2	0	1	0	0	1	1	MN
1	1	1	1	0	0	0	1	0	1	2	0	1	0	0	0	C	EW,CL,YS,OO
1	1	1	1	0	0	0	0	0	1	1	0	1	0	1	0	2	XE
1	1	1	1	0	0	0	1	0	1	1	0	1	0	0	0	2	YV
1	1	1	1	0	0	0	0	0	1	2	0	1	0	1	1	2	9E
1	1	1	1	0	0	0	1	0	1	2	0	1	0	1	0	1	AX

External imitation tables

Appendix VI: FSC-LCC imitation - contradictions included

v1:	Online	v2:	Interline
v3:	Thru-fare	v4:	Restrictions
v5:	GDS	v6:	FFP
v7:	Lounges	v8:	In-flight classes
v9:	Alliance	v10:	Codeshare
v11:	CLP	v12:	CLT
v13:	Primary a/p share	v14:	Feed share
v15:	Fleet	v16:	stage length
O:	Op. Margin	id:	Airline ID

v1	**v2**	**v3**	**v4**	**v5**	**v6**	**v7**	**v8**	**v9**	**v10**	**v11**	**v12**	**v13**	**v14**	**v15**	**v16**	**O**	**id**
1	1	1	1	2	1	2	2	1	1	0	1	1	0	1	0	1	AA
1	1	0	0	2	1	2	1	1	1	0	1	1	0	0	0	1	AC
1	1	1	1	2	1	2	2	1	1	0	1	1	0	0	0	1	AF,BA,LH,UA
1	1	1	1	2	1	2	1	1	1	0	1	1	0	0	0	C	AZ,CO,IB,NW
1	1	1	1	2	1	2	2	0	1	0	0	1	0	0	0	1	CA,CZ,JL,MU
1	1	1	1	2	1	2	2	1	1	0	0	1	0	0	1	1	CX,SQ
1	1	1	1	2	1	2	1	1	1	0	1	1	1	0	0	C	DL,US
1	1	1	1	2	1	2	2	0	1	0	0	1	0	0	1	1	EK
1	1	1	1	2	1	2	2	1	1	0	0	1	0	0	0	1	KE,TG
1	1	1	1	2	1	2	2	1	1	0	0	0	0	0	0	1	NH
1	1	0	0	2	1	2	2	1	1	0	0	1	0	0	0	1	QF
1	1	1	0	2	1	2	2	1	1	0	1	1	0	0	0	1	SK
1	1	1	1	2	1	2	2	0	1	0	0	1	0	1	1	1	VS
1	1	1	1	2	1	2	1	1	1	0	0	1	0	1	0	1	EI
0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	C	AK,VY

1	1	1	0	2	1	0	0	0	1	0	0	1	0	0	0	1	AB
1	0	1	1	2	1	0	1	0	0	0	0	1	0	1	0	1	FL
1	1	0	1	0	1	0	1	0	1	0	0	0	0	0	0	0	TZ
0	0	0	0	1	0	1	0	0	0	0	0	0	0	1	0	1	U2
0	1	0	1	2	0	2	0	0	1	0	0	1	0	1	0	0	BE
1	1	1	1	2	1	0	0	0	1	0	0	1	0	1	0	0	F9
1	1	1	0	0	0	0	0	0	1	0	0	0	0	1	0	0	G3
1	0	1	0	0	1	0	0	0	0	0	0	0	0	1	0	1	B6
1	1	1	1	2	1	2	0	0	1	0	1	1	0	1	0	0	YX
0	0	0	0	0	0	0	0	0	1	0	0	1	0	1	0	0	DY
0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	FR
1	1	1	1	1	1	0	0	0	1	0	0	0	0	1	0	1	WN
1	0	1	1	2	0	0	1	0	0	0	0	1	0	1	0	0	NK
1	1	1	1	2	0	0	0	0	1	0	0	1	0	1	0	0	NB
1	1	1	0	1	1	1	0	0	1	0	0	1	0	1	0	1	DJ
1	0	1	0	1	1	0	0	0	0	0	0	1	0	1	0	1	WS

Appendix VI: FSC-Regional imitation

v1:	Online	v2:	Interline
v3:	Thru-fare	v4:	Restrictions
v5:	GDS	v6:	FFP
v7:	Lounges	v8:	In-flight classes
v9:	Alliance	v10:	Codeshare
v11:	CLP	v12:	CLT
v13:	Primary a/p share	v14:	Feed share
v15:	Fleet	v16:	stage length
O:	Op. Margin	id:	Airline ID

v1	v2	v3	v4	v5	v6	v7	v8	v9	v10	v11	v12	v13	v14	v15	v16	O	id
1	1	0	1	1	1	0	1	0	1	0	0	1	0	0	0	1	A3
1	1	0	0	0	0	0	1	0	1	2	0	1	0	0	0	1	QK
1	1	1	0	1	1	1	1	0	1	0	0	1	0	0	0	0	NX
1	1	1	1	0	0	0	0	0	1	2	0	1	0	0	0	1	YW,MQ,DB,MN
0	1	0	0	1	0	1	1	0	1	0	0	0	0	0	0	1	AP
1	1	1	1	0	0	0	0	0	1	2	0	0	0	1	0	1	ZW
1	1	1	1	0	0	0	1	0	1	2	0	1	0	0	0	1	EW,CL,YS,OO
1	1	1	1	0	0	0	0	0	1	1	0	1	0	1	0	1	XE
1	1	1	1	0	0	0	0	0	1	2	0	0	0	0	0	1	QX
1	1	1	1	0	0	0	1	0	1	1	0	1	0	0	0	1	YV
1	1	1	1	0	0	0	0	0	1	2	0	1	0	1	0	0	9E
1	1	1	1	0	0	0	1	0	1	2	0	1	0	1	0	1	AX
1	1	1	1	1	1	1	2	1	1	0	1	1	0	0	0	1	AA,AF,BA,LH,UA
1	1	0	0	1	1	1	1	1	1	0	1	1	0	0	0	1	AC
1	1	1	1	1	1	1	1	1	1	0	1	1	0	0	0	C	AZ,CO,IB,NW
1	1	1	1	1	1	1	2	0	1	0	0	1	0	0	0	1	CA,CZ,EK,MU

1	1	1	1	1	1	1	2	1	1	0	0	1	0	0	0	1	CX,KE,SQ,TG
1	1	1	1	1	1	1	1	1	1	0	1	1	1	0	0	0	DL
1	1	1	1	1	1	1	2	0	1	0	0	0	0	0	0	1	JL
1	1	1	1	1	1	1	2	1	1	0	0	0	0	0	0	1	NH
1	1	0	0	1	1	1	2	1	1	0	0	1	0	0	0	0	QF
1	1	1	0	1	1	1	2	1	1	0	1	1	0	0	0	1	SK
1	1	1	1	1	1	1	1	1	1	0	1	0	1	0	0	1	US
1	1	1	1	1	1	1	2	0	1	0	0	0	0	0	1	1	VS

Appendix VI: LCC-Regional imitation

v1:	Online	v2:	Interline
v3:	Thru-fare	v4:	Restrictions
v5:	GDS	v6:	FFP
v7:	Lounges	v8:	In-flight classes
v9:	Alliance	v10:	Codeshare
v11:	CLP	v12:	CLT
v13:	Primary a/p share	v14:	Feed share
v15:	Fleet	v16:	stage length
O:	Op. Margin	id:	Airline ID

v1	**v2**	**v3**	**v4**	**v5**	**v6**	**v7**	**v8**	**v9**	**v10**	**v11**	**v12**	**v13**	**v14**	**v15**	**v16**	**O**	**id**
1	1	1	1	2	1	2	1	1	1	0	0	1	0	0	0	1	EI
0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	AK
1	1	1	0	2	1	0	0	0	1	0	0	1	0	0	1	1	AB
1	0	1	1	2	1	0	1	0	0	0	0	1	0	0	0	1	FL
1	1	0	1	0	1	0	1	0	1	0	0	1	0	0	1	0	TZ
0	0	0	0	1	0	1	0	0	0	0	0	1	0	0	0	1	U2
0	1	0	1	2	0	2	0	0	1	0	0	1	0	0	0	0	BE
1	1	1	1	2	1	0	0	0	1	0	0	1	1	0	1	0	F9
1	1	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	G3
1	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	1	B6
1	1	1	1	2	1	2	0	0	1	0	1	1	1	0	0	0	YX
0	0	0	0	0	0	0	0	0	1	0	0	1	0	1	0	0	DY
0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	FR
1	1	1	1	1	1	0	0	0	1	0	0	1	0	0	0	1	WN
1	0	1	1	2	0	0	1	0	0	0	0	1	0	0	1	0	NK
1	1	1	1	2	0	0	0	0	1	0	0	1	0	0	1	0	NB

1	1	1	0	1	1	1	0	0	1	0	0	1	0	0	0	1	DJ
0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	VY
1	0	1	0	1	1	0	0	0	0	0	0	1	0	0	0	1	WS
1	1	0	1	2	1	0	1	0	1	0	0	1	0	0	0	1	A3
1	1	0	0	0	0	0	1	0	1	2	0	1	0	0	0	1	QK
1	1	1	0	2	1	2	1	0	1	0	0	1	0	0	0	0	NX
1	1	1	1	0	0	0	0	0	1	2	0	1	0	0	0	1	YW,MQ,DB,MN,QX
0	1	0	0	2	0	2	1	0	1	0	0	1	0	0	0	1	AP
1	1	1	1	0	0	0	0	0	1	2	0	1	0	1	0	C	ZW,9E
1	1	1	1	0	0	0	1	0	1	2	0	1	0	0	0	1	EW,CL,YS,OO
1	1	1	1	0	0	0	0	0	1	1	0	1	0	1	0	1	XE
1	1	1	1	0	0	0	1	0	1	1	0	1	0	0	0	1	YV
1	1	1	1	0	0	0	1	0	1	2	0	1	0	1	0	1	AX

Appendix VI: FSC-LCC-Regional imitation

v1:	Online	v2:	Interline
v3:	Thru-fare	v4:	Restrictions
v5:	GDS	v6:	FFP
v7:	Lounges	v8:	In-flight classes
v9:	Alliance	v10:	Codeshare
v11:	CLP	v12:	CLT
v13:	Primary a/p share	v14:	Feed share
v15:	Fleet	v16:	stage length
O:	Op. Margin	id:	Airline ID

v1	v2	v3	v4	v5	v6	v7	v8	v9	v10	v11	v12	v13	v14	v15	v16	O	id
1	1	0	1	2	1	0	1	0	1	0	0	1	0	0	0	1	A3
1	1	0	0	0	0	0	1	0	1	2	0	1	0	0	0	1	QK
1	1	1	0	2	1	2	1	0	1	0	0	1	0	0	0	0	NX
1	1	1	1	0	0	0	0	0	1	2	0	1	0	0	0	1	YW,MQ,DB,MN,QX
0	1	0	0	2	0	2	1	0	1	0	0	1	0	0	0	1	AP
1	1	1	1	0	0	0	0	0	1	2	0	1	0	1	0	C	ZW,9E
1	1	1	1	0	0	0	1	0	1	2	0	1	0	0	0	1	EW,CL,YS,OO
1	1	1	1	0	0	0	0	0	1	1	0	1	0	1	0	1	XE
1	1	1	1	0	0	0	1	0	1	1	0	1	0	0	0	1	YV
1	1	1	1	0	0	0	1	0	1	2	0	1	0	1	0	1	AX
1	1	1	1	2	1	2	2	1	1	0	1	1	0	0	0	1	AA,AF,BA,LH,UA
1	1	0	0	2	1	2	1	1	1	0	1	1	0	0	0	1	AC
1	1	1	1	2	1	2	2	0	1	0	0	1	0	0	0	1	CA,CZ,EK,JL,MU
1	1	1	1	2	1	2	1	1	1	0	1	1	0	0	0	1	CO,IB,NW
1	1	1	1	2	1	2	2	1	1	0	0	1	0	0	0	1	CX,KE,NH,SQ,TG
1	1	1	1	2	1	2	1	1	1	0	1	1	1	0	0	C	DL,US

1	1	0	0	2	1	2	2	1	1	0	0	1	0	0	0	1	QF
1	1	1	0	2	1	2	2	1	1	0	1	1	0	0	0	1	SK
1	1	1	1	2	1	2	2	0	1	0	0	1	0	0	1	1	VS
1	1	1	1	2	1	2	1	1	1	0	0	1	0	0	0	1	EI
0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	AK
1	1	1	0	2	1	0	0	0	1	0	0	1	0	0	0	1	AB
1	0	1	1	2	1	0	1	0	0	0	0	1	0	0	0	1	FL
1	1	0	1	0	1	0	1	0	1	0	0	1	0	0	0	0	TZ
0	0	0	0	1	0	1	0	0	0	0	0	1	0	0	0	1	U2
0	1	0	1	2	0	2	0	0	1	0	0	1	0	0	0	0	BE
1	1	1	1	2	1	0	0	0	1	0	0	1	0	0	0	0	F9
1	1	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	G3
1	0	1	0	0	1	0	0	0	0	0	0	1	0	0	0	1	B6
1	1	1	1	2	1	2	0	0	1	0	1	1	0	0	0	0	YX
0	0	0	0	0	0	0	0	0	1	0	0	1	0	1	0	0	DY
0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	FR
1	1	1	1	1	1	0	0	0	1	0	0	1	0	0	0	1	WN
1	0	1	1	2	0	0	1	0	0	0	0	1	0	0	0	0	NK
1	1	1	1	2	0	0	0	0	1	0	0	1	0	0	0	0	NB
1	1	1	0	1	1	1	0	0	1	0	0	1	0	0	0	1	DJ
0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	VY
1	0	1	0	1	1	0	0	0	0	0	0	1	0	0	0	1	WS

Appendix VI: FSC imitation

v1:	Online	v2:	Interline
v3:	Thru-fare	v4:	Restrictions
v5:	GDS	v6:	FFP
v7:	Lounges	v8:	In-flight classes
v9:	Alliance	v10:	Codeshare
v11:	CLP	v12:	CLT
v13:	Primary a/p share	v14:	Feed share
v15:	Fleet	v16:	stage length
O:	Op. Margin	id:	Airline ID

v1	v2	v3	v4	v5	v6	v7	v8	v9	v10	v11	v12	v13	v14	v15	v16	O	id
1	1	1	1	1	1	1	1	1	1	0	1	1	0	0	0	1	AA,AF,BA,LH,UA
1	1	0	0	1	1	1	0	1	1	0	1	1	0	0	0	1	AC
1	1	1	1	1	1	1	0	1	1	0	1	1	0	0	0	C	AZ,CO,NW
1	1	1	1	1	1	1	1	0	1	0	0	1	0	0	0	1	CA,CZ,MU
1	1	1	1	1	1	1	1	1	1	0	0	1	0	0	1	1	CX,SQ,TG
1	1	1	1	1	1	1	0	1	1	0	1	1	1	0	0	C	DL,IB,US
1	1	1	1	1	1	1	1	0	1	0	0	1	0	0	1	1	EK
1	1	1	1	1	1	1	1	0	1	0	0	0	0	0	0	1	JL
1	1	1	1	1	1	1	1	1	1	0	0	1	0	0	0	1	KE
1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	1	NH
1	1	0	0	1	1	1	1	1	1	0	0	1	0	0	0	1	QF
1	1	1	0	1	1	1	1	1	1	0	1	1	0	0	0	1	SK
1	1	1	1	1	1	1	1	0	1	0	0	0	0	1	1	1	VS

Appendix VI: LCC imitation

v1:	Online	v2:	Interline
v3:	Thru-fare	v4:	Restrictions
v5:	GDS	v6:	FFP
v7:	Lounges	v8:	In-flight classes
v9:	Alliance	v10:	Codeshare
v11:	CLP	v12:	CLT
v13:	Primary a/p share	v14:	Feed share
v15:	Fleet	v16:	stage length
O:	Op. Margin	id:	Airline ID

v1	v2	v3	v4	v5	v6	v7	v8	v9	v10	v11	v12	v13	v14	v15	v16	O	id
1	1	1	1	2	1	2	1	1	1	0	0	1	0	0	0	1	EI
0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	AK
1	1	1	0	2	1	0	0	0	1	0	0	1	0	0	1	1	AB
1	0	1	1	2	1	0	1	0	0	0	0	1	0	0	0	1	FL
1	1	0	1	0	1	0	1	0	1	0	0	1	0	0	1	0	TZ
0	0	0	0	1	0	1	0	0	0	0	0	1	0	0	0	1	U2
0	1	0	1	2	0	2	0	0	1	0	0	1	0	0	0	0	BE
1	1	1	1	2	1	0	0	0	1	0	0	1	1	0	1	0	F9
1	1	1	0	0	0	0	0	0	1	0	0	1	0	0	0	1	G3
1	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	1	B6
1	1	1	1	2	1	2	0	0	1	0	1	1	1	0	0	0	YX
0	0	0	0	0	0	0	0	0	1	0	0	1	0	1	0	0	DY
0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	FR
1	1	1	1	1	1	0	0	0	1	0	0	1	0	0	0	1	WN
1	0	1	1	2	0	0	1	0	0	0	0	1	0	0	1	0	NK
1	1	1	1	2	0	0	0	0	1	0	0	1	0	0	1	0	NB

1	1	1	0	1	1	1	0	0	1	0	0	1	0	0	0	1	DJ
0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	VY
1	0	1	0	1	1	0	0	0	0	0	0	1	0	0	0	1	WS

Appendix VI: Regional imitation

v1:	Online	v2:	Interline
v3:	Thru-fare	v4:	Restrictions
v5:	GDS	v6:	FFP
v7:	Lounges	v8:	In-flight classes
v9:	Alliance	v10:	Codeshare
v11:	CLP	v12:	CLT
v13:	Primary a/p share	v14:	Feed share
v15:	Fleet	v16:	stage length
O:	Op. Margin	id:	Airline ID

v1	**v2**	**v3**	**v4**	**v5**	**v6**	**v7**	**v8**	**v9**	**v10**	**v11**	**v12**	**v13**	**v14**	**v15**	**v16**	**O**	**id**
1	1	0	1	1	1	0	1	0	1	0	0	1	0	0	0	1	A3
1	1	0	0	0	0	0	1	0	1	2	0	1	0	0	0	1	QK
1	1	1	0	1	1	1	1	0	1	0	0	1	0	0	1	0	NX
1	1	1	1	0	0	0	0	0	1	2	0	1	0	0	0	1	YW,MQ,DB
0	1	0	0	1	0	1	1	0	1	0	0	0	0	0	0	1	AP
1	1	1	1	0	0	0	0	0	1	2	0	0	0	1	0	1	ZW
1	1	1	1	0	0	0	0	0	1	2	0	1	0	0	1	1	MN
1	1	1	1	0	0	0	1	0	1	2	0	1	0	0	0	1	EW,CL,YS,OO
1	1	1	1	0	0	0	0	0	1	1	0	1	0	1	0	1	XE
1	1	1	1	0	0	0	0	0	1	2	0	0	0	0	0	1	QX
1	1	1	1	0	0	0	1	0	1	1	0	1	0	0	0	1	YV

1	1	1	1	0	0	0	0	0	1	2	0	1	0	1	1	1	9E
1	1	1	1	0	0	0	1	0	1	2	0	1	0	1	0	1	AX

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