THE HISTORICAL EVOLUTION OF THE U.S. VIDEO GAME INDUSTRY: APPLYING THE INDUSTRIAL ORGANIZATION MODEL

by

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(Under the direction of Dr. Andy Kavoori)

ABSTRACT

The historical evolution of the U.S. video game industry was examined. The industrial organization model and historical method employed in this study identify the historical changes of the market structure and the market conduct in the U.S. video game industry.

INDEX WORDS: Video game industry, Historical evolution, Industrial organization model, Graduate School, Sangho Seo, M.A., The University of Georgia

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CHAPTER 1

INTRODUCTION

"The time has come to take games seriously as an important new popular art shaping the aesthetic sensibility of the 21st century."

-Henry Jenkins, Director of the Center for Comparative Media Studies, MIT-

Justification and Background of the Study

The current interests in video games can be traced back to the early 1970s. First video games were introduced in 1972 as Pong. Within a year, over 6,000 of the games were sold nationwide at a cost of more than $1,000 each. In the same year, Magnavox introduced Activision, a video game system that could be played on home television sets (Provenzo, 1991). Developments giving impetus to the rise in consumer interests in video games were the initial sales of programmable home video games in 1977, the major technical improvements in coin-operated video games[1] in 1979, the widespread licensing

[1] Coin-operated video games, also called arcade video games. Coin-operated video game machines are usually in the form of arcade-style uprights. Although some gambling machines have similar features, they are not considered as video games (U.S. ITC, 1984).

of popular arcade video games for use in programmable home video games in 1980, and the evolution of video games into home computers during 1982 and 1983 (U.S. ITC, 1984).

Today, video games appear to have come of age as a cultural icon and commodity in its own merit. In addition to the omnipresent video arcade and its on-line versions, video games now influence popular culture across the board. One notable example recently is the success of the film `Tomb Raider' starring Laura Croft which began its life as a video game. Video games also offer experiences that traditional media cannot compete with. For players, young and old, they offer a rich interactive entertainment experience, which many find more compelling than passive media forms like movies and television.

While video games are quintessential entertainment products (Vogel, 1994), they are also big business. The video game industry in the United States annually generates over $13 billion in sales (at wholesale) and about $18 billion (at retail) as of the mid-1990s. Globally, the amounts are probably two to three times as great, with numerous companies involved in the manufacture and distribution of game products of all types. A recent study ("Gaming industry good for the economy," 2001) on the video game industry entitled "Economic Impacts of the Demand for Computer and Video Games" claims that the industry created 220,000 jobs and close to nine billion dollars in salaries. In addition, the study found that the sales of games led to another $ 10.5 billion in economic activity. "This new study clearly dramatizes the growing importance of the

video game industry in America's high-tech sector," says Doug Lowenstein, president of the Interactive Digital Software Association. "With the introduction of new advanced game machines, surging demand for video game software, and an expanding base of dedicated and casual game players, it is clear that the industry will be a major force in the American economy for years to come" ("Gaming industry good for the economy," 2001). According to Interactive Digital Software Association (2001), video game software sales alone will soon surpass $ 10 billion, and the next generation of video game consoles may achieve household penetration rates approaching 70 percent, making them nearly as commonplace in American homes as videocassette recorders.

That is an astonishing development for an industry once viewed as a niche business for teenage boys. Particularly, what is attractive is the coming of age of video games as a technological force that may shape how we think about the future of entertainment. Recently, big four video game makers such as Sony, Nintendo, Sega, and Microsoft are venturing into previously untapped customers like females and adults, and offering non-gaming features like DVD and Internet access. Video game consoles[2] are evolving into low-end computers or entertainment gateways capable of audio, video, and high-speed Internet functionality and some may be able to support PC printers and other

[2] Video consoles, also called home video games, usually consist of a game console and game controllers. The console, also referred to as a game player or master unit, is the central unit to which the game controllers are attached. Game controllers can be an integral part of the console (hard wired) or they can be connected by cables. Typical types of controllers are push buttons, joy sticks, X-Y controllers, roller controllers, steering wheels, touch pads, and paddle controllers (U.S. ITC, 1984).

peripherals in the future. This technological convergence will make video game consoles possible to integrate satellite TV with high-speed Internet access, digital storage, interactive services, video on demand, and the ability to connect extra devices. Thus, it is expected that video games will become an entertainment hub and the heart of the digital life in a future as they penetrate a mass market.

The study on video game industry is important for mass communication research because the video game industry is a major source of entertainment, leisure, and major economic commodity. It certainly has been seen a tremendous increase of leisure over the past few decades. Most leisure time is spent with entertainment, both with the media and without them. Although television is still the most important source of entertainment, other forms are also readily accessible. Newspapers and magazines, radio programs, movies, computer and video games, and more recently, the Internet, provide entertainments the most people are looking for.

Especially, video games are able to deliver this type of entertainment to users through the convergence of today's new technologies. "Video games provide simulations of a series of aspects of reality, or simulations of complex social developments, from urban development to the evolution of civilization. The hallmark of most video games is that they transform the traditional forms of entertainment into an interactive form that enables the player actively to participate in shaping the games. A key to explaining why video games have become very popular forms of entertainment is to explore those gratifications that are linked to the interactive form." (Grodal, 2000, p. 197)

Table 1.1 Media usage and consumer spending: 1992 to 2002

Item	92	93	94	95	96	97	98 Proj.	99 Proj.	00 Proj.	01 Proj.	02 Proj.
					Hours per person per year						
TV	1510	1535	1550	1575	1557	1551	1560	1555	1571	1577	1575
Radio	1150	1082	1102	1091	1091	1082	1075	1055	1056	1047	1040
Record	233	248	294	289	289	265	260	261	269	278	289
News-papers	172	170	169	165	161	159	157	156	154	153	152
Books	100	99	102	99	99	92	95	95	95	97	97
Maga-zines	85	85	84	84	83	82	82	81	80	80	79
Home video	42	43	45	45	49	50	52	53	55	56	58
Movies	11	12	12	12	12	13	13	13	13	13	13
Video games	19	19	22	24	26	36	39	42	43	44	46
Internet access	2	2	3	7	15	28	35	39	43	46	49

(Source: Veronis, Suhler & Associates Inc., New York, NY, Communications Industry Report)

In summary, video games have become a richer and richer medium, they have been more enthusiastic, and they have continued to attract more players. The demographic for video gaming has been broadened dramatically beyond the traditional teenage-boy audiences and, in these days, video games have been played by all ages and tastes of people. For these reasons, the study on the video game industry has importance in the field of entertainment and mass communication research.

Table 1.2 Adult participation in video games as a leisure activity in 1998

[In thousands (24,227 represents 24,227,000), except percentages]

Activity	Participated in the last 12 months		Frequency of participation							
			Two or more times a week		Once a week		Two to three times a month		Once a month or less	
	No.	%	No.	%	No.	%	No.	%	No.	%
Video games	24,227	12.4	8,630	4.4	2,510	1.3	2,799	1.4	5,730	2.9

(Source: Mediamark Research, Inc., New York, NY, Top-line Reports)

Research Question

The overall aim of this study is to trace the historical evolution of U.S. video game industry. During the last three decades, the market structure of the U.S. video game industry has been altered considerably. Video game industry was just started by some scientists in 1970s, but the industry has experienced huge developments through all domains of the industry for thirty years. In addition to the considerable changes in the market structure of the U.S. video game industry, the market conduct in the industry, for example, the practice of advertising or innovation, has also been changed.

In light of that, a research question for this study was established as following: How did the market structure of the U.S. video game industry change historically? In addition, how did the market conduct of the U.S. video game industry change historically? To examine the historical changes of the market structure and the market

conduct of the U.S. video game industry, this study has chosen the three factors—the number of company, the sales, and the degree of market concentration for analyzing the changes of the market structure in the U.S. video game industry. Moreover, to examine the historical changes of the market conduct of the U.S. video game industry, two market conduct variables—the practice of advertising and innovation--have also been chosen for this study.

To achieve this goal, a specific analytical model called industrial organization model (IO) has been chosen. "The industrial organization model argues that the structure of economic markets affects the conduct of participants in those markets." (Busterna, 1988, p. 35) This model can provide information about the market. In addition, this model can provide answers to a number of questions concerning the present situation in the market. Especially, if historic data are used, the model can also give a picture of how the market looked at a given time, and give guidelines for how we can expect the market to develop in the future.

Outline of the Study

The first chapter is about the introduction of this study. This chapter contains the justification and background of the study. This contains the reason why this study is important for mass communication research. This chapter also includes a research question for the study.

The second chapter contains the theoretical framework, literature reviews, and the methods for the study. This chapter's aim is to provide the theoretical framework and to lay down some basic concepts and definitions that will be used in later chapters. This chapter also includes the reviews of previous studies related to the theoretical framework of the study.

The third chapter is about the historical changes of the market structure and the market conduct in the U.S. video game industry. This chapter will illustrate the historical changes of the market structure and the market conduct in the U.S. video game industry since the early eras to the recent ones.

The fourth chapter is about the conclusions and discussions of this study. The conclusions summarized in this chapter take into account the historical changes of both the market structure and the conduct in the U.S. video game from the early eras to the present ones through the entire history.

CHAPTER 2

THEORETICAL FRAMEWORK AND METHODOLOGY

Theoretical Framework

The aim of this part is to provide a summary of theoretical framework for this study. Since the aim of this study is to trace historically changes of the market structure and the market conduct in the U.S. video game industry, the next theoretical approach will allow the attainment of the objective.

1. Industrial Organization (IO) model

The industrial organization model is used to understand the relationships among market structure, conduct, and performance. This model of structure, conduct, and performance provides a powerful and useful analytical framework for economic analysis. According to Scherer (1980), the industrial organization model offers a systematic approach to analyze the many abstract concepts encountered in studying a market. Busterna (1988) adds that the model helps in understanding the interaction of market forces and their impact on market activities. Further, the industrial organization model explains why market performance is linked to market structure and conduct.

Over the years, researchers of media economics were using industrial organization model to examine a variety of issues. These include issues such as: “the

extent to which various media industries are highly concentrated, what should be done to increase television program diversity, the presence of and impact of vertical integration in media markets, and the impact of various market structure variables on the pricing of advertising time and space." (Wirth & Bloch, 1995, p. 15) Recently there has been calls for more extended use of industrial organization model in media economic research and analysis. The one reason is that "industrial organization model can move the field of media economics beyond mere ownership analysis, and thereby produce a basis for better informed choice of appropriate government action, and evaluation of such." (Ramstad, 1997, p. 45) In addition, another reason is that "through proper use of the theories developed in the new industrial organization model there is a possibility for better explanations of the strategic behavior of media companies." (Ramstad, 1997, p. 45)

Industrial organization model provides some important benefits. "First, the model provides a systematic means of dissecting the various components of a market under study. Second, the model gives us a framework for studying how various market forces interact to affect activities in a market. Third, the model can give us some understanding of why market processes may break down. Finally, the model gives us a tool to make market performance more nearly achieve the ideal through means other than direct governmental control of market performance." (Busterna, 1988, p. 35) In sum, "industrial organization model provides the context to understand the relationship between media firms and their industry environment and it also offers a systematic approach of examining the conduct of media firms and its consequences." (Albarran & Chan-Olmsted,

1998, p. 10) Specifically, this model focuses on three concepts: “industry structure, which refers to the relatively stable features of the industry environment such as seller concentration, product differentiation, barriers to entry, buyer concentration, and barriers to exit; industry conduct, which refers to the patterns of behavior that firms follow in adapting to the market in which they participate; and industry performance, which refers to the evaluation of the composite performance of firms competing in an industry.” (Albarran & Chan-Olmsted, 1998, p. 11)

Table 2.1 Industrial organization model

Market Structure	Conduct	Performance
Sellers & buyers concentration	Pricing behavior	Technical & allocative efficiency
Product differentiation	Product strategy	Progress
Barriers to entry	Advertising	Full employment
Vertical integration	Innovation	Equity
Cost structures		

(Source: John C. Busterna, Concentration and the Industrial Organization Model, 1988, p.38; F. M. Scherer, Industrial Market Structure and Economic Performance, 2nded, 1980)

(1) Market Structure

Market structure refers to how a given market is organized. A market can be defined as “a closely interrelated group of buyers and sellers.” (Busterna, 1988, p. 35) According to Busterna (1988), “Markets have two components which together suggest how the

buyers and sellers are to be interrelated: the product market and the geographic market. A common product market consists of sellers providing the same product, or close substitute products, to a common group of buyers." (Busterna, 1988, p. 36) "The structural analysis of the media market is important because it provides the analyst with information about the market, and the different structures within it." (Gomery, 1989, p. 45)

The structure of a market is dependent on several factors, but several important variables clarify the type of market structure. According to Wirth and Bloch (1995), a number of different variables are typically considered important with respect to defining the structure of a market. These variables include: the number of sellers and buyers in a market; the degree of product differentiation present in market; the extent to which firms wishing to enter an industry face barriers to entry and the level of barriers to exit if a firm should decided to leave an industry; the extent to which market firms are vertically integrated.

The degree of seller concentration refers to "the number and relative size of sellers in a given market." (Busterna, 1988, p. 37) The degree of buyer concentration refers to "the number and relative size of buyers in a market." (Busterna, 1988, p. 37) The number of producers or sellers in a given market explains a great deal about concentration in a given market. According to Albarran (1996), a market is concentrated if it is dominated by a limited number of large companies.

Product differentiation refers to “the extent to which buyers perceive real or imagined differences among the products of the various sellers.” (Busterna, 1988, p. 37) According to Albarran (1996), the product differentiation is the subtle differences (either real or imagined) perceived by buyers to exist among products produced by sellers. Scherer (1970) stated that product differentiation includes service, physical differences in the products supplied, and the subjective images they impress on the consumer’s mind. Pindyck and Rubinfeld (1989) noted, “Product differentiation can exist even for a seemingly homogeneous product.” (p. 433) In this case, differentiation will be based on such things as location and services.

The barriers to entry refer to “the ease or difficulty that exists for potential new sellers who may wish to enter the market.” (Busterna, 1988, p. 38) According to Albarran (1996), the barriers to entry are the obstacles that new sellers must overcome before entering a particular market. This may be limited to capital (money) or other factors.

Cost structure refers to “the relationship between fixed production costs and total production costs in a market.” (Busterna, 1988, p. 38) According to Albarran (1996), the cost structure is the cost for production in a particular market. Total cost consist of both fixed costs-the cost need to produce one unit of a product—and variable costs—the costs that are variable in nature depending on the quantity produced (e.g., labor and raw materials).

Vertical integration refers to “the degree that producers have ownership control of the various markets which comprise the production and distribution stages from raw

materials procurement to the final retail sale." (Busterna, 1988, p. 39) According to Albarran (1996), vertical integration occurs when a firm controls different aspects of production, distribution and exhibition of its products.

(2) Market Conduct

The industrial organization model posits that certain structures act in certain systematic ways. That is, the analyst examines the behavioral consequences of a particular market structure. That is referred to as the study of market conduct. Market conduct refers to "the behavior of the firms in a market with respect to pricing, product and advertising strategies, and research and innovation." (Wirth & Bloch, 1995, p. 17) "The importance of market structure lies in the way it induces firms to behave: changing prices and outputs, setting the characteristics of services and products, and factoring in efforts of research and innovation. Market conducts directs attention to a firm's external behavior, both toward the market in general and toward specific rivals in particular." (Gomery, 1989, p. 49)

Pricing behavior refers to "the procedures used by sellers (or buyers) to determine price levels, such as price fixing, price leadership, price discrimination, and discounts." (Busterna, 1988, p. 39) Picard (1989) explains that pricing behavior involve a series of decisions regarding how products are packaged, discounted and set. Picard identifies four common price orientations: (a) demand-oriented pricing, where prices are set via market forces; (b) target return pricing, which is based on a desired amount of profit; (c)

competition oriented pricing, in which prices are based on those offered by competitors; and (d) industry norm pricing, which is based on the industry at large, rather than market forces.

Product strategy refers to "the decisions made about the design and quality of the product." (Busterna, 1988, p. 39) According to Albarran (1996), product strategy refers to decisions based on the actual products offered by a firm, including how a product is packaged or designed.

Advertising refers to "the whole gamut of promotional activities in which firms may engage." (Busterna, 1988, p. 39) According to Albarran (1996), advertising is a range of activities designed to create awareness of media products and services.

Research and innovation refers to "the efforts made to change the product or differentiate it from competitors' products over time." (Busterna, 1988, p. 39) According to Albarran (1996), research and innovation as the effort of firms to differentiate or improve their products over time.

Scherer and Ross (1990, p.4) identified two additional conduct variables: "investment in production facilities (i.e., how firms decide on this budget and the actual level of expenditures here) and legal tactics (i.e., the extent to which the legal system is used to enforce firm market positions)."

(3) Market Performance

Market performance variables include: “firm profitability (i.e., the extent to which market firms earn normal returns in the long run); production and allocative efficiency (i.e., the extent to which firms are not wasting scarce resources and the extent to which firms are producing the “right” quantity, quality, and mix of goods to maximize consumer welfare); and the extent to which market firms contribute to stable full employment and to an equitable distribution of income.” (Wirth & Bloch, 1995, p. 17)

Technical efficiency refers to “producing a given level of output with the least amount of productive input.” (Busterna, 1988, p. 40) Allocative efficiency refers to “whether a particular market earns normal or excessive economic profit.” (Busterna, 1988, p. 40) Progress refers to “the extent that the firms in a market increase output per unit of input over time.” (Busterna, 1988, p. 40) Full employment refers to “the ability of a market to maintain stable full employment of resources.” (Busterna, 1988, p. 40) Equity refers that “producers do not get excessive rewards for their efforts and that there is relative price stability.” (Busterna, 1988, p. 40)

2. Competition

The term competition is generally employed to describe a situation in which individuals or organizations are engaged in a process of active struggle to secure a share of a finite resource which may be either material (e.g. wealth) and/or symbolic (e.g. status) in nature. Although the concept of competition in the field of mass communication

has almost been central to the area of media economics, it has taken some different meanings and interpretations.

Stigler (1987) described competition as a rivalry that arises whenever two or more firms strive for something that all cannot obtain. Picard (2002) also defined competition in media industry as "the rivalry of media firms to provide products and services." (p. 139) These definitions seem to be general. But, at the same time, this definition could be a comprehensive one, because the 'rivalry' in this definition contains all sorts of forms of rivalry (e.g. market trading), instruments of rivalry (e.g. prices or advertising), and objects of rivalry (e.g. profits or market shares).

Alexander, Owers, and Carveth (1993) defined competition as "a market structure in which many sellers of the product compete." (p. 371) Litman (1988) specified competition in media industry into four kinds of market structure--perfect, monopolistic, oligopoly, and monopoly. In this case, the number of media firms in a specific market in which media firms compete is a key point to decide the market structure.

Competition can be viewed from the buyer's perspective, which involves making substitution decisions. In this case, competition is defined as "a choice for the consumer." Lacy and Vermeer (1995) mentioned that "at the most basic level, competition exists when one or more potential buyers consider two or more products to be acceptable substitutes for each other. If such substitution is not acceptable to buyers, competition for their money or attention does not occur." (p. 50)

In structure-conduct-performance (SCP) framework from the industrial organization model (Litman & Bridges, 1986; Powers, 1993; Shrikhande, 2001), competition is considered as an activity to succeed. In this model, media economists view competition as a factor that brings new products, innovations, or other changes in media products and services.

Some media economists applied ecological approach to analysis of media competition (Albarran & Dimmick, 1993; Dimmick, Patterson & Albarran, 1992; Hellman & Soramaki, 1994; Li, 2001). In this approach, competition in media industries can be defined as resource utilization. According to Li (2001), "Organizational ecologists define market competition by the use of resources, so when two organizations are utilizing the same resources, they are competing against each other." (p. 260)

3. Theory of the firm

Analyzing the number of sellers and buyers in a market, the difference between products, barriers to entry, cost structures and vertical integration gives insight into the structure of a market. The four types of market structure are recognized popularly in much of the literature as the "theory of the firm." The foundation of any applied economic analysis of any media industry lies with the basic principles of theory of the firm. The starting point for any economic primer is the four standard theoretical models of market organization including perfect competition, monopoly, monopolistic competition, and oligopoly. "These four market structures can best be viewed as a

continuum with perfect competition and monopoly at the extremes and monopolistic competition and oligopoly at interior positions." (Litman, 1988, p. 3) According to Litman (1988), Monopoly is a type of structure whereby a single seller of a product exists and thus dominates the market. An oligopoly differs from a monopoly in that an oligopolistic structure features more than one seller of a product. Monopolistic competition exists when there are many sellers offering products that are similar, but not perfect, substitutes for one another. In perfect competition, many sellers in which the product is homogeneous and no single firm or group of firms dominates the market characterize the market structure.

Literature Review

Industrial organization model increasingly provides the explicit or implicit framework for numerous studies across the variety of media industries. Many studies have dealt with linking structure with either conduct or performance. Despite the importance of video game industry as an entertainment and high-tech business, the literature applying industrial organization model to video game industry is quite limited. This limitation depends on the relative newness of the video game industry as a specialized one.

The following are, in particular, the examples of studies on media industries using industrial organization model. An early example of the application of industrial organization model to analyzing the relation between market structure and conduct or

performance in media industries concerns the effect of market structure on conduct or performance in newspaper or television stations. Especially, the structure-conduct-performance (SCP) framework has been used in a number of studies about media industries that examine the impact of increased competition on the conduct and performance of newspaper and television station. Many previous research findings (Albarran, Pilcher, Steele & Weis, 1991; Chan-Olmsted, 1996; Lacy, Atwater, & Qin, 1989; Litman & Bridges, 1986; Powers, 1993; Powers, 2001) showed that market competition has a positive impact on market conduct or performance. But some studies discovered the opposite (Hellman & Soramaki, 1985; Lin 1995).

Litman and Bridges (1986) theorized that competition among newspapers would lead to better quality newspapers. They found that competitive newspapers make a greater financial commitment. Albarran et al. (1991) found competition had a positive impact on program type diversity. The authors suggested the introduction of a new broadcast network catalyzed the increasing program diversity. Powers (1993) found that competition intensity was related to hours of local news per day. The author suggested when news programs are running neck-and-neck with their competitors in shares, they are more likely to differentiate their products by adding more news time per day, in order to effectively compete. Powers (2001) also found that if the number of television new competitors has increased, the stability of market shares has decreased and product differentiation has increased. Lacy et al. (1989) studied the effect of competition on news budgets by taking into account levels of intensity of competition between stations. The

results indicated that as competition intensified for local newscasts, newsroom budgets increased. Chan-Olmsted (1996) examined the degree of competition among the programming distributors for commercial children's television and found that the children's cable channels had greatly increased the degree of competition in commercial children's television in the United States. This, in turn, led to a greater number of choices available for young American audiences.

However, other studies show the opposite relation. Hellman and Soramaki (1985) compared market concentration of the videocassette industry in the United States and Britain and discovered that a more concentrated market was associated with a better quality of videos. This finding suggests that market competition had a negative effect on product content. And Lin's study (1995) on TV programming has shown a negative relation between market competition and product diversity. Lin analyzed a 10-year period of prime time programs from 1980 to 1990. Compared to the 1970s, the 1980s presented competition for the three TV networks because cable TV and VCRs were available. This study showed a decrease in programming diversity in the 1980s.

Method

Historical method employed in this study can give us an opportunity to trace the historical evolution of the market structure and the market conduct in the U.S. video game industry as it emerges in real time. The essence of history lies in present thought about particular things in the past. It is a form of inquiry into the past that asks questions

about the things people have done and elicits answers based on evidence. “The purpose of history involves the significance and particularity of the object studied. Its significance lies in the historian’s conviction that something selected from the past for study has an ongoing importance. Its particularity stems from the idea that it investigates things in context, things about particular problems, people, places, and times.” (Startt & Sloan, 1989, p. 14) Historical method contains at least three elements: (a) “evidence,” (b) “interpretation,” and (c) “narrative.” (Startt & Sloan, 1989, p. 2) According to Chandy and Tellis (2000), the historical method has some advantages. First, people can study events from the past, many from the distant past. Second, the easier alternative approach of surveying can suffer from severe memory or self-biases. Third, the historical approach enables us to study the effects of time. They also maintained that an understanding of temporal changes requires attention to the time order of events that is best obtained by the historical approach. Historical approach is tedious and time consuming, but well worth the efforts because of the insight and novelty of findings it provides.

The historical method relies on both original source data and secondary materials for its historical analysis. All data the historical method uses are all publicly available and published sources of information. These include government census, industry data, industry articles and books, newspaper articles, scholarly books, journal articles. According to Chandy & Tellis (2000), there are five criteria to include data for historical study. First, at least two published sources cite the same tact (confirmation). Second, the sources have no overt interest to bias their reports (neutrality). Third, the sources are

based on independent observation (independence). Fourth, the sources are well respected or have a history of good reporting (reliability). Five, the sources report as close to the time of the event as possible (contemporaneity).

1. Variables and data

In this study, to examine the historical changes of the market structure of the U.S. video game industry, the three variables—the number of company, sales, and the degree of market concentration—were chosen. First, the number of company in the U.S. video game industry was operationalized as the total number of company in the industry and the number of home video game company with shipment of $100,000 and more. Some previous studies used the counting of number of sellers in a market to examine the market structure in a media market (Cho & Lacy, 2002; Lacy & Dravis, 1991; Lacy, Coulson & Cho, 2002; Powers, 2001; Shaver & Lacy, 1999; Shrikhande, 2001; Wirth & Wollert, 1984). The measurement of counting a number of sellers in a market has an advantage of simplicity. It can be computed and interpreted easily. To measure the total number of company in the U.S. video game industry, the data of 1972, 1977, 1982, 1987, 1992, and 1997 Census of Manufacturers of the U.S. Department of Commerce[3] were used. Also, to measure the number of home video game company with shipments of 100,000 and more

[3] According to U.S. Standard Industry Classifications, video game industry belongs to SIC code 3944. This entry's industry consists of establishments primarily engaged in manufacturing game sets for adults and children (including electronic), toys, and children's vehicles (except bicycles and metal tricycles).

in the U.S. video game industry, the data of 1982, 1987, and 1992 Census of Manufacturers of the U.S. Department of Commerce. Second, to measure the sales in the U.S. video game industry, the data of 1981, 1982, 1985, and 2000 Electronic Market Data Book were used. Third, to measure the degree of market concentration of the U.S. video game industry, the CR3 ratio and Herfindahl-Hirschman index were calculated. The Herfindahl-Hirschman Index (HHI), which incorporates information about the market share among market participants (Picard, 1989), was used for measuring the degree of market concentration in many previous studies. Some previous studies used this HHI Index for measuring competition in a media market (Hellman & Soramaki, 1994; Litman, 1979; Wurff & Cuilenburg, 2001). HHI is an interval measure and relatively clear and readily calculated. HHI reflects both the distribution of the market shares of the top firms and the composition of the market outside the top firms. Higher concentration ratios tell us that more economic activity is centralized under the control of only a small handful of firms. In addition, some previous studies (Chan-Olmsted, 1996; Hellman & Soramaki, 1994; Powers, 2001) used CR4 or CR8 index to measure the degree of market concentration in a media market. This measurement uses the percentage of total market shares accounted by the top four (CR4) or top eight firms (CR8). “A four-firm concentration ratio of 80 percent implies more monopoly power than a four-firm concentration ratio of 40 percent.” (Chan-Olmsted, 1996, p. 33) In this study, to calculate the CR3 and H-H index, the data of 1993, 1995, 1996, 1997, 1998, 1999, 2000, 2001 and 2002 U.S. Market Share Reporter were used.

Moreover, to examine the historical changes of the market conduct of the U.S. video game industry, two variables—the practice of innovation and advertising--were selected. The practice of innovation in the U.S. video game industry was operationalized as the total expenditures for research and development in the industry. In addition, the practice of advertising in the U.S. video game industry was operationalized as the total expenditures for advertising in the industry. To measure the expenditures for R&D, the data from 1984 U.S. International Trade Commission Report were used. In addition, to measure the expenditures for advertising in the industry, the data from American Toy Manufacturers Association (TMA) were used.

2. Data analysis

The study used quantification (known as quanto-history) from traditional historical methods as an approach to the data. There are a number of places in communication history where one can use quantitative techniques to advance and sharpen understanding of subject. Quantification has the potential to expand and sharpen historical knowledge. Aaker and Day (1986) found that the technique of historians would provide useful insights and generalizations in analyzing market growth. In this study, the percentage changes of each variable in according to the changes of time were used to explain the real-time changes in the market structure and the market conduct of the U.S. video game industry.

CHAPTER 3

FINDINGS

To examine the historical evolution of the U.S. video game industry, three market structure variables--the total number of company and the number of home video game company with shipments of $100,000 and more, the sales of video games, and the degree of the market concentration—were selected. Moreover, the expenditures for R&D and the expenditures for advertising in the industry were presented from the early eras to the recent eras to examine the historical changes of the market conduct in the U.S. video game industry.

This study has tested the correlations between the variables in the market structure and the market conduct in the U.S. video game industry. The result shows that there was a strong positive correlation between year and the sales of video games ($r = .974$, $p < .01$). The result also shows that there was a strong positive correlation between year and the degree of market concentration in the U.S. video game industry ($r = .894$, $p < .05$). However, there were no significant correlations among other variables.

Table 3.1 The historical evolution of the market structure and the market conduct in the U.S. video game industry

Year	1978	1982	1983	1992	1996	1997	2001
Number of Company	-	732	-	895	-	756	-
Number of home video game company	-	11	-	1	-	-	-
Sales (in thousands)	89,000	1,300,000	700, 000	3,975,000	4,600,000	5,550,000	-
CR3	67%	-	56%	80.7 %	92%	-	96.4%
H-H Index	-	0.17	0.11	-	0.29	-	-
Expenditures for R&D (in thousands)	12,230	97,709	161,072	-	-	-	-
Expenditures for Advertisement (in thousands)	-	-	-	-	950,178	874,172	-

Table 3.2 The correlations among the variables in the U.S. video game industry

Variables		Year	Sales	Concentration (CR3)
Year	Pearson's r	1	.974**	.894*
	Sig.	-	.001	.041
Sales	Pearson's r	.974**	1	.943
	Sig.	.001	-	.057
Concentration (CR3)	Pearson's r	.894*	.943	1
	Sig.	.041	.057	-

**. Correlation is significant at the 0.01 level

*. Correlation is significant at the 0.05 level

1. The number of company

Table 3.3 The historical changes of the number of company and the number of home video company with shipments of $100,000 or more in the U.S. video game industry

Year	1972	1977	1982	1987	1992	1997
Number of company	619	754	732	698	895	756
Percent changes	-	+22%	-3%	-4.6%	+28%	+16%
Number of home video game company	-	-	11	5	1	-
Percent changes	-	-	-	-55%	-80%	-

According to the data in the U.S. Census of Manufacturers, the number of company in the U.S. video game industry was 619 in 1972, 754 in 1977, 732 in 1982, 698 in 1987, 895 in 1992, and 756 in 1997. There was 22% increase in the number of company in the U.S. video game industry during the period from 1972 to 1997. The number of home video game company with shipments of $100,000 or more in the U.S. video game industry was 11 in 1982, 5 in 1987, and 1 in 1992. Totally, there was 90% decrease in the number of home video game company with shipments of $100,000 or more in the U.S. video game industry during the period from 1982 to 1992.

2. Sales

Table 3.4 The historical changes of the sales of video games in the U.S. video game industry

[In thousands (89,000 represents 89,000,000), except percentages]

Year	1978	1979	1980	1981	1982	1983
Sales	89,000	175,000	525,000	1,000,000	1,300,000	700,000
Percent changes	-	+96%	+200%	+90%	+30%	-46%
Year	1991	1992	1996	1997	1998	1999
Sales	3,600,000	3,975,000	4,600,000	5,550,000	6,460,000	7,350,000
Percent changes	+414%	+10%	+16%	+21%	+16%	+13%

The table 3.4 shows the historical changes of the sales of video games in the U.S. video game industry. The sales of video games in 1978 were $89 million, $175 million in 1979, $525 million in 1980, $1 billion in 1980, $1.3 billion in 1982, and $700 million in 1983. Moreover, the sales of video games in 1991 were $3.6 billion, $3.975 billion in 1992, $4.6 billion in 1996, $5.55 billion in 1997, $6.46 billion in 1998, and $7.35 billion in 1999. Totally, there was 6100% increase in the sales of video games during the period form 1978 to 1999 in the U.S. video game industry.

3. Market concentration

The market concentration ratio (CR3) in the U.S. video game industry was 67% in 1982, 56% in 1983, 50% in 1984, 92% in 1996, 100% in 1999, and 96.4% in 2001. There was decrease from 1982 to 1984. However, the market concentration was highly increased fro the mid-1990s and the table shows that the U.S. video game industry was severely concentrated in recent years. Totally, there was 29.4% increase in the market concentration ratio (CR3) in the U.S. video game industry during the period from 1982 to 2001.

Table 3.5 The historical changes of the degree of market concentration (CR3) in the U.S. video game industry

Year	1982	1983	1984
CR3	67% Bally-Midway: 33% Atari: 23% Williams: 11%	56% Bally-Midway: 25% Atari: 19% Williams: 12%	50% Bally-Midway: 21% Atari: 19% Nintendo: 10%
Percent changes	-	-11%	-6%
Year	1996	1999	2001
CR3	92% Sega: 38% Nintendo: 30% Sony: 24%	100% Nintendo: 47% Sony: 44% Sega: 9%	96.4% Sony: 58.1% Nintendo: 23.6% Sega: 14.7%
Percent changes	+42	+8%	-3.6%

In addition to the CR3 ratio, the Herfindahl-Hirschman index also tells us the degree of market concentration of the U.S. video game industry. Typically, numbers over .18 are considered indicative of a highly concentrated market, .10 to .18 is considered moderately concentrated, and less .10 is considered no concentration (Litman, 1998).

Table 3.6 The historical changes of the H-H Index in the U.S. video game industry

Year	1982	1983	1984
H-H Index	0.17	0.11	0.09
Percent changes	-	-35%	-18%
Year	1996	1999	2001
H-H Index	0.29	0.42	0.41
Percent changes	+222%	+45%	-2%

The H-H index of the U.S. video game industry in 1982 was 0.17, 0.11 in 1983, 0.09 in 1984, 0.29 in 1996, 0.42 in 1999 and 0.41 in 2001.There was 141% increase in the H-H index in the U.S. video game industry during the period from 1982 to 2001. The changes of the Herfindahl-Hirschman index in the U.S. video game industry also tell us that the U.S. video game industry was moderately concentrated in early periods. However, the degree of market concentration was being continuously intensified, and, finally, the industry has highly been concentrated recently.

4. Innovation

The expenditures for R&D in the U.S. video game industry were $12.23 million in 1978, $17.38 million in 1979, $29 million in 1980, $43.54 million in 1981, $97.71 million in 1982, and $161 million in 1983. Totally, there was 1,220% increase in the expenditures for research and development in the U.S. video game industry during the period from 1978 to 1983.

Table 3.7 The historical changes of the R&D expenditures in the U.S. video game industry

[In thousands (12,230 represents 12,230,000), except percentages]

Year	1978	1979	1980	1981	1982	1983
R&D expenditures	12,230	17,375	29,001	43,547	97,709	161,072 (Proj.)
Percent changes	-	+0.42	+66%	+50%	+124%	+65%

5. Advertising

Table 3.8 The historical changes of the expenditures for advertising in the U.S. video game industry

[In thousands (950,178 represents 950,178,000), except percentages]

Year	1996	1997	1998	1999	2000
Advertising expenditures	950,178	874,172	976,720	842,173	837,103
Percent increases	-	-8%	+12%	-14%	-0.6%

The table 3.8 shows that the expenditures for advertising in the U.S. video game industry were $950.18 million in 1996, $874.17 million in 1997, $976.72 million in 1998, $842.17 million in 1999, and $837.1 million in 2000. Totally, there was 12% decrease in the expenditures for advertising in the U.S. video game industry during the period from 1996 to 2000.

CHAPTER 4

CONCLUSIONS AND DISCUSSIONS

The U.S. video game industry has undergone the drastic changes for the entire thirty-year-old history. The dramatically greater changes have been a driving force to move the video game business for just preteen boys into the big entertainment business. Furthermore, video game industry is now a rival of any other form of mass entertainment. Who would have thought thirty years ago the video games were going to so dramatically be a popular culture and entertainment art form around the world? It is amazing that in such a brief time the video game industry has truly been evolved.

The purpose of this study was to gain an understanding of the historical evolution of the U.S. video game industry by looking at the historical changes of the market structure and the market conduct in the U.S. video game industry. To achieve this goal, this study has chosen the industrial organization model as a theoretical framework. The industrial organization model is used to understand the relationships among market structure, conduct, and performance. This model of structure, conduct, and performance provides a powerful and useful analytical framework for economic analysis. Using the industrial organization model, this study has tried to give a picture of how the video game industry looked at past and a guideline for how we can expect the development of the video game industry in the future.

In light of that, a research question of this study was established as following: how did the market structure of the U.S. video game industry change historically? Moreover, how did the market conduct of the U.S. video game industry change historically? In this study, the historical changes of the market structure in the U.S. video game industry were examined by the historical changes of the number of company and the number of home video game company with shipments of $100,000 and more, the sales of the video games, and the degree of market concentration using the CR3 ratio and H-H index. In addition, the historical changes of the market conduct in the U.S. video game industry were examined by the historical changes of the expenditures for R&D and the expenditures for advertising. These changes were presented from the early eras to the recent eras in this study.

Overall, this study found that the market structure as well as the market conduct in the U.S. video game industry was changed manifestly. The test result of the correlations among the variables for this study has shown that there was a strong positive correlation between the year and the sales of video games. There was 6100% increase in the sales of video games during the period from 1978 to 1999 in the U.S. video game industry. This means that video games are not just toys for children any more, but the video games are increasingly popularized and faced to the growing demand of U.S. customers. This fact tells us that video games become an important tool of mass entertainment.

And the result has shown that there was a strong positive correlation between the year and the degree of market concentration (CR3) in the U.S. video game industry. There were some decreases of CR3 ratios in early periods in the U.S. video game industry. However, the CR3 ratio was highly increasing from the mid-1990s and, finally, the CR3 ratio in the U.S. video game industry reached at almost the highest point in the recent years. Totally, there was 29.4% increase of the CR3 ratio in the U.S. video game industry during the period from 1982 to 2001. In addition to the CR3 ratio, the Herfindahl-Hirschman index also tells us the degree of market concentration of the U.S. video game industry. There was 141% increase of the H-H index in the U.S. video game industry during the period from 1982 to 2001. The changes of the Herfindahl-Hirschman index in the U.S. video game industry tell us that the U.S. video game industry was moderately concentrated in early periods. However, the degree of market concentration was being continuously intensified, and, finally, the industry has highly been concentrated recently. According to Albarran (1996), a fact that a market is concentrated means the market is dominated by a limited number of large companies. Thus, this study could found that the U.S. video game industry has been dominated by very little number of companies. A small number of relatively large size of manufacturers accounted for the bulk of the industry production. This phenomenon is caused by the domination of the U.S. video game market of a limited number of large video game companies such as Nintendo, Sega, Sony, and later Microsoft.

In addition, in the number of company, there was 22% increase in the industry during the period from 1972 to 1997. This means there exist a high growing in the U.S. video game industry. However, in the number of home video game company with shipments of $100,000 or more, there was 90% decrease in the U.S. video game industry during the period from 1982 to 1992. Those changes tell us that big companies are only a few in the industry, although the number of company in the video game industry grows year by year. As the historical changes of the market conduct in the U.S. video game industry, the expenditures for R&D in the U.S video game industry increased 1,220% during the period from 1978 to 1983. Moreover, in the expenditures for advertising in the U.S. video game industry, there was 12% decrease of the expenditures for advertising during the period from 1996 to 2000.

Conclusively, this study could found that the U.S. video game industry was concentrated increasingly as time is gone and the sales in the industry are increasing. However, although the total number of company in the industry is increasing, the number of company, which has relatively big sales, is decreasing. In addition, the expenditures for advertising have a tendency to be decreased and the expenditures for R&D have a tendency to be increased year by year. The expenditures for advertising almost decreased as the sales of video games increased and as the degree of the market concentration increased. Moreover, the expenditures for R&D increased as the sales of video games increased and as the degree of market concentration increased.

Thus, it would be concluded that as the U.S. video game market was concentrated more and more, the advertising expenditures of each video game company decreased and that as the degree of market concentration increased—in the contrary, the competition in the U.S. video game industry decreased, video game companies increased their commitment for the innovation and spent more expenditures for research and development. This finding is coincident with the findings of some previous studies (Hellman & Soramaki, 1985; Lin 1995). These two studies found that market competition had a negative relationship with innovation. Thus, this study's finding is not congruent with the findings of other previous studies (Albarran, Pilcher, Steele & Weis, 1991; Chan-Olmsted, 1996; Lacy, Atwater, & Qin, 1989; Litman & Bridges, 1986; Powers, 1993; Powers, 2001). The findings of these studies showed that market competition has a positive impact on market conduct or performance. Overall, this study could found the fact that the changes of the market structure in the U.S. video game industry have affected the changes of the market conduct in the industry. This fact coincide the theory of the industrial organization model. According to the industrial organization model, the structure of economic markets affects the conduct of participants in those markets (Busterna, 1988).

This study could serve as the basis for future research about the economic analysis of video game industry. The careful attention has been paid to describe exactly the complex changes of the market structure and the market conduct in the U.S. video game industry. However, this study did not test statistically the direct relationship

between the market structure and the market conduct in the U.S. video game industry, because the data on the video game industry is not enough to test the relationship between them historically. This could be a limitation of the study. As video game industry becomes more established and as the industry will be more interested by other researchers, it is obvious that more data will be available. As a result, it will be possible to test the relationship among the factors that are consisting the market structure, conduct, and performance in the U.S. video game industry.

Future research could consider other factors are consisted of the market structure and the market conduct in video game industry, besides the number of company, the degree of market concentration, the sales, the expenditure for R&D and the expenditures for advertising. In addition, future research could consider the performance of video game industry besides the market structure and the market conduct of video game industry. In this study, the historical changes of the market performance of the U.S. video game industry were not examined. It could be interesting to see the contents of the video game. Therefore, it would be interesting to see how video game makers such as Sony and Nintendo diversify the contents of their products. In addition, finally, there is need for research on the economic impact of video game industry on other information, technology and entertainment (ITE) industries.

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