Structure and Competition in the U.S. Home Video Game Industry

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Introduction

The U.S. home video game industry has developed tremendously over the past ten years to become a media force rivaling motion picture distribution. In 1999, video games equaled motion pictures with domestic revenues of $7.4 billion and the game industry continues to grow (PC Data 2000; Graser 2000), with an estimate of $13 billion in 2002 (Gaudiosi 2001). From 1998 to 2001, the industry became the fastest growing segment of the entertainment industry with a growth rate of 15 to 25 per cent,[1] employing over 200,000 people (IDSA 1999, 2001). Worldwide, video games are expected to hit $30 billion by 2002 (Gaither 2001), with popular online games in South Korea enjoying a four million-strong subscription base (Levander 2001). Coupled with its role in the burgeoning online world, the industry has become a significant economic player in the American media environment as game use has skyrocketed among users of all ages. Time spent on games has risen steadily and is expected to climb at the expense of more traditional media. Communication scholars have noted that many younger users spend more time on video games than television (Bloom 1982; Funk & Buchman 1996). Nevertheless, at the same time, the business of producing and distributing video games has gone largely unexamined by scholars. A review of previous research yields a healthy body of work on effects, mostly focusing on children and violence and gender roles (Dill & Dill 1998; Anderson & Dill 2000; Griffiths 1999; Dietz 1998; Funk 1993; Schutte et al 1988; Cooper & Mackie; 1986), and growing interest in uses and gratifications (Sherry et al 2001), but almost nothing on the industry.[2]

This article is patterned after Chan-Olmstead's (1991) analysis of the syndicated television market: it examines the rise of the industry and lays out its current structure in depth, while also analyzing the resulting competition and the character of the industry as it moves to the mainstream. Drawing on Litman's (1979) work on the level of diversity in television programming, variations in content are predicted based on different market structures. The first underlying hypothesis is that a decentralized, competitive market structure will feature less mainstream content and less anticompetitive behavior than a maturing concentrated industry; as games have become a larger, more rationalized business, more mainstream content has begun to predominate. However, the network effects present in video game systems create competitive forces that lessen the anticompetitive problems traditionally associated with concentrated industries. The trends reported here support these hypotheses. Video games are seen as a maturing, competitive industry with practices and structure similar to other media.

This research paper is grounded in the industrial organization approach, a process derived from applied microeconomic theory that provides a framework for organizing the industry into a comprehensive whole while maintaining enough flexibility to examine its unique characteristics. The approach employs the strategy of analyzing the

Abstract

The video game industry has continued to grow dramatically over the past decade, cutting into mainstream media in participation and revenues as it becomes part of mainstream media culture. Following the industrial organization model, this paper conceptualizes and systematically analyzes five vertical stages and the key market segments of consoles, handheld and PC-based games. Genre-based measures of content show that the different game platforms have varying levels of product diversity, driven by differing levels of risk and rewards. Comparisons in production and distribution are made with other major media. The main conclusion is that the industry is reaching a mature phase with concentration and integration beginning to be found in its stages. A mainstreaming of content is partially countered by a vibrant community of developers, mostly for PC games. As a standard-based industry, non-interoperability and network effects continue to play a key role in preserving competition in a field with a shrinking number of firms.

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structural properties of the current system and the resulting conduct and performance of the firms, including issues of competition and product differentiation. The analysis is supplemented by interviews of game company executives, many of which were conducted at the industry's annual E3 trade show in Los Angeles. The industry's history is traced briefly, followed by a discussion of the important differences between the three major sub-industries: consoles, handheld systems and PC games. Next, the vertical stages of development, publishing, manufacturing, distribution and retail are systematically analyzed. Lastly, trends in product differentiation and 'convergence' are examined. Where possible and appropriate, the industry is compared to other media.

Video games are a mass medium with properties similar to several other well-studied media, yet are unique in the mix of these properties (Vogel 1998). Unlike many other media, video games are not yet driven by a 'dual product' model (Picard 1989); for most of the industry, revenues are not generated by delivering audiences to advertisers.[3] Secondly, unlike other media, video games mostly run on proprietary hardware, creating important competitive pressures on firms; non-interoperability is a crucial competitive factor. Lastly, the industry's development cycle is similar to that of motion pictures, and its publishing and distribution stages have elements found in both the prerecorded videocassette (see Komiya & Litman 1990) and book publishing industries (see Greco 2000). Much like many media, this industry has come to rely on large-scale successes and is a 'hits' business (see Neuman 1991) – the only difference being that instead of calling the title a 'box office smash,' hit games are 'killer aps' (short for killer applications) or 'AAA games.' These are titles so desirable that they induce consumers to spend several hundred dollars on the proprietary machines and accessories necessary to play them. The study's main conclusion is that the direct result of this structure and history is the steady growth, maturation and competitive nature of the industry, and, with the exception of a vibrant and creative development fringe, the general mainstreaming of its game product. This pattern of growth and diffusion is seen as similar to many other media where large firms have taken advantage of relaxed ownership restrictions. In the video game industry, non-interoperability has kept competition alive.

A Brief History of Home Video Games

The history of home video games is a history of constant change and innovation, battles over standards, booms and busts. The industry has progressed through a development stage characterized by small-scale inventors, and an expansion and legitimization phase based on popular acceptance and the promise of profitability. It is currently in a maturation and diversification stage based on the wide variety of genres and the multiple capabilities promised by the newest generation of machines. This last stage is made possible when large-scale sales prove that profitable submarkets can be served with distribution patterns to suit the emerging genres (O'Donnell 1985); sustainable profitability became apparent in the late 1980s and increasingly so in the late 1990s.

Like many media industries, the home video game industry began with hobbyists and enthusiasts. Curiously, the first video game was developed in 1958 in a lab by a government nuclear research scientist named Wally Higginbotham who, tired of seeing bored visitors at his lab's open house, decided to create a game of tennis on an oscilloscope screen (Herman 1997). Higginbotham never patented the game, and this kept the U.S. government from owning the initial patent for the industry – yet another instance of the difference between the U.S.' preference for private ownership versus the state-owned PTT media systems typical elsewhere.[4] In 1962 MIT engineering graduate student Steve Russell programmed Spacewar on the school's PDP-1 computer and the game spread quickly to other universities where students adapted the programming language and began to grasp the entertainment and commercial possibilities behind electronic gaming (Poole 2000).[5] As the early developers sought capital and support for their tinkerings, a series of negotiations between Ralph Baer, consumer products manager for the military electronics firm Sanders Associates, and giant RCA began (including an initial attempt to use cable systems to operate the games), but ended when RCA demanded full ownership of the idea. One of the RCA negotiators left the firm and joined Magnavox who, in 1972 produced the Odyssey, the first mass marketed home game machine. The Odyssey also introduced the concept of removable media components – games in the form of preprogrammed instruction sets could be inserted into a larger base machine, and so could play multiple games on one box. In that same year Nolan Bushnell, one of the graduate student enthusiasts of Spacewar, founded Atari and had the first coin-operated success with Pong, an advanced version of Higginbotham's original tennis concept (Cohen 1984).

From this early stage of development, the industry stumbled with poorly-performing home products but began to innovate steadily. It wasn't until the Atari Pong home game was released in 1974 through Sears that the industry began to generate real profits. The popular Atari VCS (Video Computer System) was released in 1977 and initiated the crucial idea that other companies – later called 'third parties' – could create games for a proprietary system. Over the next seven years Atari remained dominant, but sales suffered through mismanagement, and a sequence of

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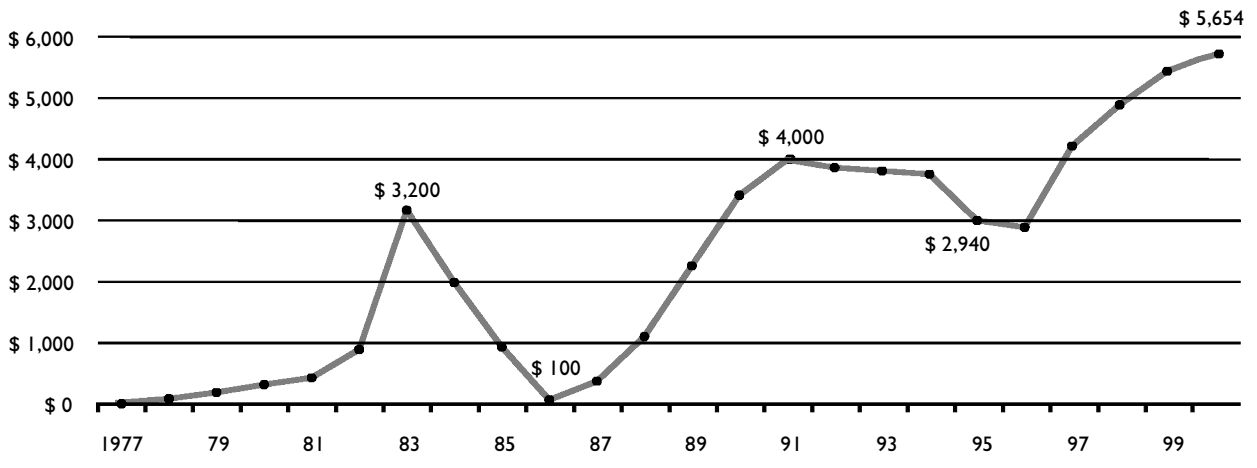
highly advertised, but poorly designed games (notably 'E.T.' and 'Pac-Man') (Kent 2000). Figure A visually demonstrates the rise, fall and rebirth of the industry.

Atari's spectacular failure appeared to be the death knell of the entire industry until the upstart Nintendo company revived it by gambling on home systems again in the mid 1980s (Kent). A host of newer, more advanced and attractive machines flooded the marketplace over the ensuing ten years and new entrants Sega and Sony propelled the home console industry to large sales growths in the 1990s. Sega briefly grabbed the industry share lead in 1995 (Chronis 1996), but quickly lost it back to Nintendo, which lost it to the current console industry leader, Sony. This pattern of market dominance and failure has been a familiar one in this volatile industry. This is partially due to the structure that evolved and partly due to management behavior. As each firm became dominant, it acquired and then abused its market power. For Atari, it was an issue of hype, poor quality and unreasonable growth expectations. For Nintendo, it was first a lack of innovation in the late 1980s and then an abuse of its relationships with developers in the mid 1990s. Each firm lost its leadership.

The structure that creates the underlying volatility in console video games is a direct result of technological and business choices made early on by the firms. In seeking to create dominant positions for themselves, each firm released a system incompatible with the others. This non-interoperability created a standard-based industry in which there is only room for a small number of firms. As a result, games have always been an oligopolistic market at the hardware level. Market share itself becomes a crucial resource for firms that try to seek the greatest installed base possible, often by price-undercutting or by preempting the announcements made by rival firms (Farrell & Saloner 1986). Meanwhile, the consumer was (and still is) forced into an all-or-nothing decision when purchasing a home machine: buying a Fairchild, Magnavox or Atari machine meant only being able to play that firm's games and being excluded from others'. Twenty-five years later, the names of the systems have changed to Microsoft, Nintendo and Sony, but the dynamics remain the same. The network effects are the same as those faced by the early Bell telephone system and its competitors (see Brock 1982): bigger networks have advantages, but in this case there was no regulated standard and no natural monopoly. Instead, competition has flourished as each firm sought (and seeks) the greatest network externalities arising from the largest user base. Without interoperability, it is difficult for firms to see each other as anything besides a threat to their user base, and a spirit of cooperation between the larger players remains unlikely. Another important implication of this dynamic is that there is only room for a handful of viable console systems. Despite over 30 console launches between 1972 and 2001 (NextGeneration 2000), the market has consistently had room for only two or three successful systems at any one time.

At the same time that the console systems developed into market maturity, the home computer market was growing, allowing consumers to play more complex games on home PCs. The first popular home PCs that took advantage of the early gaming possibilities were Apple Computer's 1977 Apple II and Commodore's 1982 Commodore 64. As the 1980s wore on, the IBM-clone PCs began to dominate the home market. With only two major operating systems

Figure 1: U.S. Home Game Sales, 1977 - 2000 (in millions $)



Data Source: Amusement & Music Operators Assoc., Nintendo, PC Data, NPD, Veronis Suhler

Table 1: Market Share by Console Manufactures, 1995 - 1999 (32-bit and faster machines)

Firm	1995	1996	1997	1998	1999	2000
Nintendo	0 %	31,9 %	42,5 %	61,5 %	28,4 %	26 %
Sega	34,7 %	19,1 %	0,5 %	–	28,6 %	18 %
Sony	65,2 %	48,9 %	57 %	38,5 %	43 %	55 % **
H-H Index*	0.546	0.377	0.506	0.526	0.347	0.403

Source: PC Data and NPD Group

** The Herfindahl-Hirschman Index is the sum of the squared market shares for each firm. Numbers over .18 are typically considered indicative of a highly concentrated market, .10 to .18 is considered moderately concentrated and < .10 is considered unconcentrated (Litman 1998).*

*** Includes both PlayStation (41%) and PlayStation2 (14%).*

in place by the late 1980s (Microsoft's DOS and Windows OS, and Apple's Macintosh OS), game developers were releasing a large array of titles.

Economics of the Industry's Segments

Home video games fall into three separate but related market segments. Although each follows the same vertical stages (see below), each has unique characteristics that set it apart from the others and should be considered individually. Not separating these three segments would give a distorted view of the industry in terms of market share, competition and product.

Consoles

Consoles, with their higher profit margins and less diverse game types, represent the mainstream of the video game industry and are marked by oligopolistic control at the hardware level and software level, and by tremendous competition. Three major manufacturers, Nintendo, Microsoft and Sony, currently control the industry, with Sega having recently withdrawn. Each of the boxes operates a proprietary system, running only software designed specifically for that box. 1999 saw the end of the previous generation of hardware's lifecycle as the generation of 32- and 64-bit machines began to be replaced by the next generation of more powerful, capable ones able to render extremely realistic and lifelike graphics with many times more polygons drawn per screen. 2001 saw the rollout of these boxes and the start of a heated battle for market share. The big three are expected to spend almost $1 billion promoting their boxes in 2001 and 2002.

Each firm's core strategy is based on the same basic business principle: the money is in the software because development and manufacturing costs keep the consoles' break-even sale price from most consumers' price points. Sony's PlayStation2 ($299 at launch) and Sega's Dreamcast (free after rebate) were the first next-generation consoles, and each was sold as a loss leader (Herald News Service 30 Mar. 2000, p. 56). The incentive to sell units below cost is created by the need for a large installed user base; since the systems are proprietary, competition for the hearts and minds of consumers is fierce. In order to generate the profits required to compensate for the losses from the console sales, manufacturers must have a critical mass of possible users to take advantage of significant network effects. This obstacle is doubly important because it also applies to attracting a network of developers, none of whom want to publish for a system that has few users or is likely to perish.

Concentration indices show that the U.S. market benefits when there are more viable firms in the market (see Table 1). The end of one product's lifecycle means an increase in industry concentration to extremely high levels until a new product is introduced to take its place. Before Microsoft's entry, Sega's viability had been the key factor in keeping the industry at lower concentration levels. However, the proprietary nature of the systems lessens the chance for any kind of spirit of cooperation to develop between the oligopolistic firms. Video games are a standard-based industry, with the expected importance of first-mover advantage, mass acceptance of the product, and technical innovation (Gallagher & Park, 2002). The only common interest that manufacturers have is in the health of the industry, not in each other. Console makers have a disincentive to work together because they are all fighting over the same potential user base. One firm's gain in network effects is likely another firm's loss, so the drive to acquire those consumers first is all-consuming. It follows that this structural antipathy should and has stymied cartel-like behavior. This competitive structure also means that the high H-H figures shown above are less worrisome than in other industries.

Profits are made on the software side through licensing agreements with developers and publishers, and through contractual obligations to manufacture the software using the main firm's plant. Outside game developers who create games for Sega, Nintendo and Sony (and presumably Microsoft) pay a per-copy licensing fee that ranges from $5-$8 a unit. For each of these three, publishers are also required to manufacture their products (discs or cartridges for Nintendo) at the manufacturer's plant, adding further costs – $1-$3 for CDs and up to $20 for Nintendo cartridges.[6] Nintendo was able to leverage developers into such

Table 2: Market Share by Manufacturer in the Handheld Video Game Industry (Calculated from Annual $ Sales of Hardware)

Firm	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000 *
Nintendo	100 %	100 %	77 %	58 %	48 %	53 %	60 %	91 %	100 %	100 %	99 %
Sega	–	–	23 %	42 %	52 %	47 %	40 %	9 %	–	0 %	0 %
NeoGeo	–	–	–	–	–	–	–	–	–	–	1 %
H-H Index**	1	1	0.646	0.501	0.501	0.510	0.52	0.836	1	1	0.99

Source: Gerard Klauer Mattison & Company

* Projection. ** CR_2's for all years equal 100 %.

comparably unfavorable arrangements by wielding considerable market power in the early 1990s; their subsequent loss in market share to Sony may be explained by Sony's ability to grow a significantly larger title library through more attractive deals with developers. Indeed, it has been a common pattern for the largest and most successful firms to either abuse their market power in negotiating with developers, or to ignore quality standards internally. It was Nintendo's conditions for developers that allowed Sega to pass it in the early 1990s, and Sony to do the same in the mid 1990s. For Atari in the early 1980s, it was a reliance on market power, rather than quality control that ultimately caused its demise. Had either firm both maintained quality standards and not abused its power in dealing with developers, either could arguably have maintained its leadership position.

The four majors are further distinguished by their approaches. Sega bet entirely on its ability to secure a large user base in the new generation of consoles and on online gaming. By early 2001, Sega had been unable to generate a critical mass of users and retreated entirely from hardware, restructuring itself to become a development unit for its rivals (Strom 2001). Nintendo and Sony are betting on their popular brands and their ability to generate a large quantity of titles through strong networks of licensees. Microsoft is betting on its large financial war chest of funds, brand recognition, a faster chipset and market power (Chronis 2000b). However, success in consoles has historically been the result of establishing a large title base for a system's launch through an established network of developers, brand recognition and a 'killer app.' These are all barriers to entry that the other three major players have surmounted, and that will remain difficult for any new entry, regardless of its size. In short, Microsoft has the clout, but possibly not the expertise to compete in this segment (Schwartz 2000).

Handhelds

Handheld video game systems are marketed exclusively to pre-teens, and feature simpler games than console or PC systems. In contrast to the fierce competition of the console industry, the handheld segment is a near-perfect monopoly dominated by Nintendo (see Table 2). The Game Boy, and more recently the Game Boy Color, have maintained Nintendo's dominance in the handheld segment through an impressive array of barriers to entry and astute and fortunate product differentiation. The result is long-term near-perfect market share and annual sales that topped $1.2 billion in 1999 (Hutsko 2000).

The barriers to entry are high. Despite efforts from Sega in 1992-1996 and a recent effort from NeoGeo, the Game Boy platform has been able to beat back rivals with lower costs, an impregnable lineup of developers and distributors and a series of successful games that have become franchises on their own, Mario and Pokémon. The latter is a 'killer app' so killer that it accounted for four of the top five best-selling games in 1999, regardless of platform. It is unlikely that Nintendo's hold on the industry will abate anytime soon, although the large excess profits remain tempting. Nintendo's new handheld system Game Boy Advance features e-mail and Web browsing capabilities, making it a potential competitor for Palm Pilot-type systems, although the reverse is also potentially true.

PC Games

While consoles represent the mainstream of gaming, the smaller PC market represents the vanguard of imaginative programming, risk taking and fringe products. The market is growing steadily, but is currently only half as large as the combined console software market (PC Data 2000). Mid-20 per cent growth rates in the late 1990s were fueled by the expanding penetration of home PCs and the development of innovative and popular software such as Broderbund's Myst and Maxis' SimCity series. Industry growth cooled off to its current level of 12 per cent, and estimates differ on whether the market may be slowing down and stagnating (Campbell 2000) or will eventually pass console games (Kalorama 2000).

The PC game market is populated by many of the same players as the console and handheld segments and operates similarly, but has different underlying economics and a much different product. Unlike console games, PC games are

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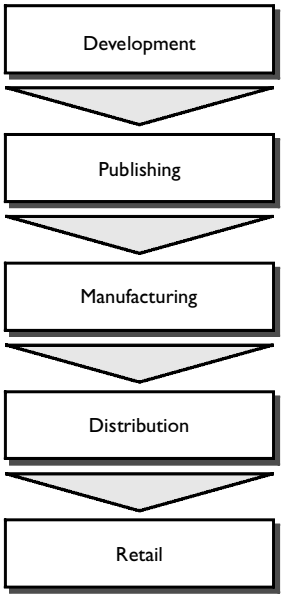
largely free of the proprietary restrictions that accompany consoles, and they are also free from the manufacturers' licensing fees; since the architecture for home PCs is open and available to scores of manufacturers, no one company has been able to integrate their firm in both hardware and software to leverage competitors. With the exception of the small, if vibrant, Macintosh, Unix and Linux communities, PCs operate on software produced by the Microsoft Corporation. This is especially true for gamers, who predominately use Microsoft OS-based computers. The user base of PC gamers is 70 per cent of home computer owners and estimates place penetration of home PCs at over 40 per cent of the population, comparable to console penetration (Forrester 1998).

The economic structure of the PC game industry differs from that of consoles, and so yields different conduct and performance. There are no licensing fees demanded by manufacturers, and development costs are typically lower. Average costs for PC development and marketing are $3 – 10 million for high-end titles, with most of that cost spent on labor. Manufacturing fees are significantly lower versus console games since PC games need only CD duplications, a jewel box, instructions and a box, typically $2-3 total per unit. Break-even units for high-end PC games are roughly 90,000 versus 500,000 for license-laden Nintendo games (Forrester). The barriers to entry are also significantly lower for developers. Unlike console development which requires a 'development kit,' typically costing $10 to $20 thousand, PC games need only a capable desktop computer and manpower. This low entry cost has spawned countless small operations of varying levels of competence, and an overwhelming number of titles: In 1998 there were 4,704 available PC titles versus 44 for the Nintendo 64 and 399 for the PlayStation (NPD Group data). A large portion of PC titles have little marketing or packaging and are sold for under $20 as budget games.

Figure 2: Five Vertical Stages of the Video Game Industry



However, the PC market has also been hampered by new, non-standardized advances in home computers, most notably third-party video cards which must be programmed for and tested individually for each game.[7] Many developers prefer the stability of the console platform and its well-defined parameters. PC games frequently release with software bugs while console games almost never do. The reason is that PC games can be fixed retroactively with software 'patches' while console games must be perfect or will be returned. More importantly, the margins for console games are steady and well-known, and so the associated risks for console game development (see 'Development' below) are much lower.

Vertical Stages of the Industry[8]

The vertical stages of the video game industry have aspects similar to that of both the pre-recorded video cassette industry and the book publishing industry. Overall, there is integration by firms in some adjoining stages while others remain competitive (see Figure 2).

Development

Production of the games takes place at the development stage in which games are conceived, created and programmed. This stage – the content – remains the industry's main strength, although the economics for PC development are increasingly out of synch with console development. Games designed for one platform are often recoded at lower costs for another, a process know as 'porting.' Development teams used to be mainly independent operations, but have increasingly been purchased by publishers and distributors seeking to vertically integrate the development function in-house. However, one of the key facets of the U.S. development industry is the creative process, especially in PC games. The 'small is beautiful' approach remains the most fruitful, and the most successful game designers tend to work and produce better without interference from a larger corporate structure. Some of the savvier publishers purchase the developers but leave them largely untouched operationally. One of the largest and most successful publishers, Electronic Arts, has built its success on this formula by acquiring well-known developers Maxis, Square, Origin and Westwood Studios. This small-shop trend is responsible for the large number of titles available on all systems and is partly responsible for the U.S.'s dominance over Japan in game software. Japanese developers usually create games under the auspices of large corporations (Bossong-Martines 1999).

Development occurs in three ways. 'First party' developers are those internal to a publishing organization; this is basic upstream vertical integration. For example, Nintendo has its own internal development teams. However, the major manufacturer/publishers cannot supply enough titles for console games on their own. 'Second party' developers are those who contract for a publisher to create games for the publisher's label; this is effectively vertical integra-

Table 3: Game Title Economics by Platform, 1997

Platform Title Economics	PC	Nintendo 64	PlayStation
# of Titles	4,704	44	399
Total Sales ($ millions)	$ 1,225	$ 1,014	$ 949
$ per title (thousands)	$ 260	$ 15,844	$ 2,378
Units per title (thousands)	9,6	256	61
High-end Title Economics			
Aggregate development and marketing cost (millions)	$ 2+*	$ 5	$ 5
Units necessary to break even	90,000	500,000	250,000
Units penetration of installed base required to break even	0,02 %	8 %	3,5 %

Data: Forrester Research, Inc. and The NPD Group

The numbers here illustrate the diversity of the PC platform and the profitability of the console market.
The 1997 data show a flush Nintendo as the industry leader before Sony assumed the console lead.

*** High-end PC games are now costing over $3 million to develop (IDSA, 1998)***

tion by contract. Lastly, 'third party' developers are unaffiliated outside firms that create games for a platform;[9] this involves the often costly licensing step discussed above. In terms of integration, industry sources and online databases (http://www. gamasutra.com) place about one-half to two-thirds of development as occurring under the ownership of a publisher.

The standard revenues for developers are royalties from publishers. Much like the book publishing industry, the creator of the product typically works on advances against future royalties, which are paid out based on pre-established progress milestones. Developers share few of the risks for the title's success, although many publishers reserve some payments in case of later product returns and to guarantee against price protection policies enforced by retailers (see below). Typically, the publisher then acquires the intellectual property rights for the game and advantageous terms for possible sequels or spin-offs.[10]

The reason for these risk-sharing arrangements is the volatile costs associated with game creation. While there are known costs such as development kits for console game creation ($20,000) and labor (averaging about $60,000/year per designer), cost overruns follow a pattern similar to that found in motion picture development: the time and budget goals are often not met. Development time can range from the flukish (the surprise hit Deer Hunter took less than a half-year) to the unforeseeable (the flop Stonekeep took over three years). Technological expectations and advances can make the goals a moving target, frustrating even the best-organized developers. This year's technological breakthrough may be next year's hackneyed plaything, and if the game is delayed the consequences can be disastrous.[11] Once released, product lifecycles remain highly variable, and the unpredictability of consumer tastes ads a further risk factor. Importantly, the rise in game popularity and their acceptance by major retailers has added to the 'killer app' hits-business product cycle. High-turnover shelf-space at K-Mart means that a smaller number of titles with higher chances of success have begun to predominate the market. Much to the chagrin of the hard-core PC game designer and player, mainstream titles like Frogger and Who Wants to Be a Millionaire frequently top the sales charts. Despite these obstacles, PC development still attracts risk-takers and visionaries who continue to balance the creative need to produce unique products with the real-world demands to turn out a profitable hit.

Publishing

Publishers are the rights-holders for the games. Once the game is delivered by a developer (internal or external), the publisher is responsible for marketing the product's launch and the manufacturing process. As noted above, the manufacturing process is part of the licensing deal when making console games, and the major three manufacturers maintain strict control through a small number of duplication facilities. PC software duplication is totally unconcentrated because it means dealing with CD replicators and commercial printers, of which there are hundreds.

Sometimes publishers manage the risk of this stage by half-publishing with an 'affiliated label.' This is the practice of

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taking advantage of another publisher or distributor's sales or marketing expertise, and it demonstrates the permeability found between the publishing and distribution stages. For example, a smaller publisher like Interplay might contract with the larger Activision label. Interplay would retain the rights, but would split the profits and Activision would promote the game through its better integrated distribution system and sales staff. The distributor might even handle the duplication process.

Publishing can be a very high margin business, although there are several back-end costs demanded by retailers. The keys for publishers are strong marketing and distribution networks, but most importantly a salable product. The holy grail for publishers is a hit title that can be sequelled or spun off into related hits. For these hit products, margins can be very high on both the PC and console sides. EIDOS' bottom line margin after development, duplication, licensing and distribution can run as high as 25 per cent for a successful title like Tomb Raider, now in its fifth iteration. Publishers who have integrated development units or who have integrated via contract also bear many of the costs in that segment: development kits, advances against royalties, licensing fees, etc. Professional sports and movie licensing fees can be a significant expense separate from the licensing fee demanded by the console manufacturers.[12]

Concentration is rising in the publishing stage (see Table 4). By 1998, the combined H-H index for PC and console publishing had risen from near zero to 10.549. Still, vertical integration remains a stronger anti-competitive threat (see 'Distribution,' below). In consoles, Sony and Nintendo maintain dominant market positions, but do not participate in PC publishing. In PC software publishers are being merged at a fast rate, driven by the rising costs of marketing and development (IDSA 1998) and by the scale economies and market strengths made possible by larger operations.

Distribution

Distributors are responsible for the physical storage and delivery of the product, and usually for the sales effort. The storage and shipping function is a very low-margin business. The distribution stage is notable for its role in the maturation process of the game industry. In its early years, distribution was handled by small firms and frequently by the publishers themselves in a patchwork structure that allowed for few simple economies. As the industry became more profitable and increasingly attractive to mass merchandise stores in the early 1990s (who were themselves becoming more concentrated and mainstream), the need for coordinated national distribution arose. Industry leaders emerged and smaller fish were snapped up as the economies began to take shape; the movement to consolidation here parallels that of the prerecorded music distribution business. In fact, in many cases the distributors who emerged built their successes on infrastructures already established for distributing prerecorded music and videocassettes. Distributors began to establish exclusive contracts with the major retail chains to be their game supplier in the early and mid-1990s.

The case of GT Interactive is illustrative of the industry's development, concentration and deconcentration. GT began operations as Good Times Home Video, a videotape distributor that existed primarily as a contractor for the large Wal-Mart chain. When GT expanded into the fledgling software business as a publisher in the early 1990s they were fortunate to sign then-unknown developer id Software. Two million $40 copies of the runaway hit Doom later, GT found itself approached by Wal-Mart in 1993. Wal-Mart recognized the industry's potential but had no coordinated supply system or expertise to deal with the thousand-or-so publishers in operation. For the years 1995-1997, GT was the only major distributor for Wal-Mart and Target and amassed market power and excess profits.[13] As a result, competitors arose and retailers also began to look for alternatives. This spurred the publishers to take on distribution roles more often, and was made possible by the consolidation taking place in publishing. Firms like Activision found that they could take on the distribution role to reduce costs, but could not always generate desirable economies of scale with only their own titles, and so took on the distribution function for rivals in the publishing stage. As a direct result, many distributors became integrated in publishing and vice-versa, while independents at both stages are now forced to rely on competitors for vital functions. Distribution squeezes remain a problem for the non-integrated publishers, although this is often counterbalanced by pressure from retailers who (with varying levels of ex-

Table 4: HH Table for PC Publishing, 1995 - 1999

Year	H-H	CR_4*
1995	.0752	44 %
1996	.0802	49 %
1997	.0912	52 %
1998	.0912	52 %
1999	.0852	52 %

Data Source: PC Data

Notes:
H-H Indicies calculated from dollar market share.

**** The four-firm concentration ratio (CR_4) is the combined market share of the top four firms.***

Table 5: Retail Market Share by Platform, 1999

Console Software		PC Software	
Wal-Mart	19 %	Best-Buy	15 %
Toys 'R Us	15 %	CompUSA	14 %
Best Buy	13 %	Wal-Mart	13 %
Electronics Boutique	11 %	Electronics Boutique	12 %
Babbages	8 %	Babbages	9 %
Target	8 %	Sam's Club	4 %
KB Toys	5 %	Toys 'R Us	3 %
Funcoland*	4 %	Costco	2 %
K-Mart	4 %	Musicland	2 %
CompUSA	2 %	All Else	26 %
All Else	11 %		
CR_4	**58 %**	**$CR_{.5}$**	**54 %**
H-H Index**	**.1072**	**H-H Index*****	**.0871**

* Merging with Electronics Boutique.
** Moderately concentrated.

*** Unconcentrated.

Source: Int. Development Group

pertise) can demand hit titles from the distributors. For example, the successful developer/publisher EIDOS publishes the hit series Tomb Raider but must rely on GT Interactive – a direct publishing competitor – to distribute its titles to Wal-Mart and other large retailers. This imbalance in integration can create squeezes and anti-competitive behavior.

Retail

The retail stage is notable for the increase in concentration due to the rise of 'super stores,' for the demands placed on publishers and for a windowing process similar to that in motion picture distribution. The U.S. retail stage is marked by a lack of independent software outlets in stark contrast to many European countries, which frequently have a majority of independents. Due to the mass merchandising style of the oligopolistic retailers, shelf space is at a premium and so retailers wield considerable leverage over distributors and publishers. In 2002, publishers began to release PC games in smaller boxes to enable more product on store shelves and so to reduce this leverage. Retailers charge publishers significant MDF ('market development funds') for posters, end-of-aisle space, and a host of other devices.[14] Similarly, publishers are forced to bear the risk of the product's success through a practice known as 'price protection.' If a game sells poorly and copies remain on the shelf, the retailer forces the publisher to bear some of the discounting cost (publishers sometimes share this cost with contracted developers as well). Publishers are forced to comply with these costs and risks because of the need to maintain a long-term relationship with the retailer.

There is no integration by any of the distributors into the retail stage as yet. Such integration would represent a substantial cost savings and a powerful tool to use against competitors.

A natural practice similar to the windowing found in motion picture distribution (Litman 1998) occurs in retail, most notably in PC software. Higher-end titles run first at higher prices in software-dedicated chains like Electronics Boutique before being discounted and sold to a more mass-merchandise market in the larger superstores. Because the retailers are not visibly coordinated, this cannot be considered second-degree price discrimination.

There are alternative distribution paths on the horizon. One way to circumvent the entire distribution and the 'brick and mortar' retail stage is to sell directly to consumers online through e-commerce. This remains a distant, but intriguing possibility for this and other industries. Most estimates put online sales potential at no higher than 10 per cent by 2002 (IDSA 1998), but this will be an important outlet to watch, especially for online games. Online shopping has the benefit of no shelf space restrictions and wider selection. Another possibility is delivery of the games on a pay-per-play basis through cable systems, an idea first attempted by Ralph Baer of Sanders Associates in 1968 (Herman, p. 8). MediaStation's 'SelectPlay' service charges a $9.95 monthly fee for access to a game library supplied by Sierra, Interplay, Disney and GT Interactive, bypassing the retailer and the physical media itself entirely (Chronis 2000c).

Games and Consumers

As noted earlier, console games represent the mainstream of the industry. Within consoles, the diversity of titles remains woefully thin. Hotelling's (1929) classic theory of centrality and homogenization in markets is appropriate here: as hit titles generate interest in a new game format, competitors copy the format, predictably more eager to split the profits for a sure thing than to risk the failure of a more innovative format that might only appeal to some smaller group. If an H-H index is applied as a measure of title diversity (see Litman 1979 for a similar applica-

www.mediajournal.org

tion of the measure in television programming) by genre with six standard categories, consoles are a much more predictable platform: consoles measure .449 while PCs measure .170 (based on chart below, data from The NPD Group).

Product diversity is driven largely by demand, and this points out the significant difference between the console and PC platforms. As Forrester Research put it 'PC and console gamers don't see eye to eye' (Forrester 1998). Console owners are younger on average and prefer action games while PC users have much broader demographics and tastes. The diversity in PC titles is also made possible by the large number of firms and low concentration at the development stage.

The consumer base for home video games is not the young male one typically portrayed by the mass media. 54 per cent of console game players and 69 per cent of PC game players are over 18 (IDSA 1999), and the average PC game purchaser is now 34 years old, while the average primary user is 25 (Kalorama 2000). As industry surveys become more systematic, developers have begun to notice an important, but ignored consumer group: women. Sales among women increased 38 per cent in 1999, double the industry's already healthy rate (Saltzman 2000). An astounding 60 per cent of Americans now say they routinely play computer or video games, and 43 per cent of this group are women (IDSA 2000). Women's game use comprises an important part of the growing online gaming market, where they actually outnumber their male counterparts 53 to 47 per cent by more actively participating in traditional team-based card games on the large Internet portal sites (Saltzman).[15] It may be that women are systematically drawn to different types of games than their male counterparts (Laber 2001). Also important is the trend in the maturity of gaming content. As players raised on gaming systems grow older, they expect the content to do so as well, resulting in conflicts over the level of sex and violence, social norms and marketing (Russo 2001; Ritchell 2000).

Product development will also continue to be driven by two separate types of gamers, the so-called 'hard core' or 'avid gamer' and the more casual user. Hard-core gamers expect superior performance and have generally higher standards, and often function as opinion leaders for the marketplace. This influence may decrease over the next few years as the industry becomes more profitable and more mainstream (Wade 2000). Indeed, over the next three years casual gamers will likely double while avid gamers hold constant (Forrester).

Convergence

The new features offered by the newest generation of gaming consoles is leading to talk of 'convergence,' indicating that several previously separate functions will be incorporated into one device. Game machines are one candidate to be that box. The new consoles feature internet ports, e-mail capability and the ability to play both audio CDs and DVD movies.[16] Cable hookups are

Figure 3: PC Title Diversity

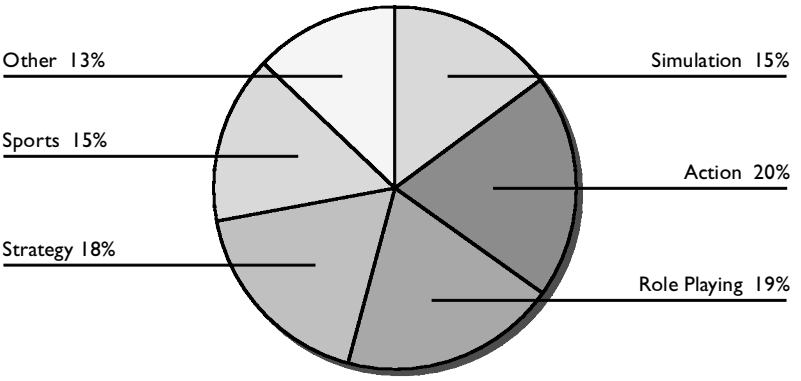
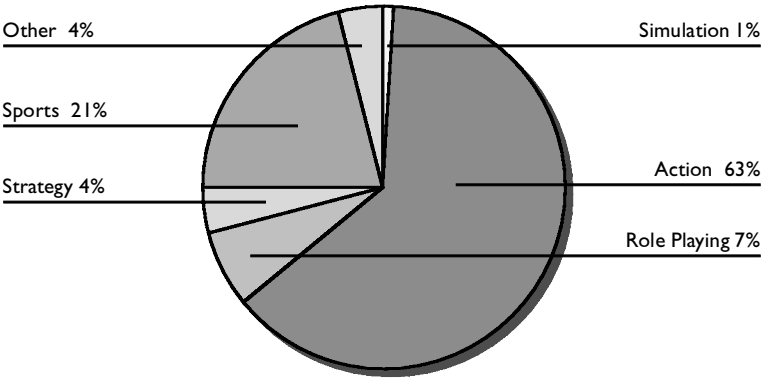


Figure 4: Console Title Diversity



also possible as gamers seek to take advantage of the superior bandwidth in their online gaming. The term for the new consoles is often 'e-boxes' (Chronis 2000), or 'Trojan horse' because they might be a means to replace non-game boxes in the future. The attraction of the devices is that they will cost less than the multiple products they replace. However, there are significant product differentiation problems with DVDs and video games. Manufacturers are confronted with the public image of game machines as toys, while the market for DVD players is considered older. Mixing the two images risks confusing buyers or diluting the image of the boxes. This is an issue of branding and marketing rather than functionality.

With broadband ports in the back of game machines, consoles become a potential convergence box and also open up a realm of gaming previously restrained to network-enabled computer gamers. Online gaming options will likely increase as ISP penetration increases and as broadband subscriptions continue to grow, and it represents an interesting form of mass media previously unseen (Chick 2000). While traditional media have taken the form of one point to many or point-to-point communication, online virtual communities represent an entirely new and unstudied paradigm. The past four years have seen the emergence of a new kind of mass medium, known as 'massively multiplayer games.' Literally hundreds of thousands of players can play in a virtual gaming world with each other in increasingly interactive fashion. Korean players number literally in the millions for the most popular MMP's there (Levander 2001). The better known U.S. titles of this innovative format are Everquest, Asheron's Call and Ultima Online, and titles based on the Star Wars franchise, and warring nation-states (Sovereign) are in development. The small, but growing success of these multiplayer-oriented titles suggests that the new broadband-enabled consoles might become more socially oriented as they become more networked.[17]

Discussion

The video game industry is marked by massive growth, volatility and opportunity. Although the market has clearly evolved from its pioneer days into a mature, structured industry, the underlying dynamic created by non-interoperability continues to influence the behavior of firms. Viewing the industry by segment and by vertical stage is important to understanding leadership, change and competition. Whereas some areas are vibrant and competitive – as exemplified by PC development and publishing – others are more concentrated, as with handhelds. Network effects play the most crucial role of all in video games, creating competitive pressures, but also in creating a smaller, more oligopolistic market. Because there is only room for a few systems, firms have been forced to push for the largest installed base possible, hoping to reach the 'tipping point' at which their system dominates the market and the others are forced out. These pressures have a dual effect. First, they encourage new firms, firms starting a new product lifecycle, or firms locked in a standards battle to innovate. Second, the entry barrier created by an existing dominant network has inevitably caused the leading firm to abuse its market power with consumers downstream and developers upstream. This has typically manifested itself in poor quality products, or with unreasonable contract offers for developers – a group traditionally too unconcentrated to wield any counteringvailing market power. However, such behavior has also inevitably lead to either new entry into the market, or to the demise of the firm due to its own incompetence. The former happened to Nintendo in the late 1980s with Sega and again in the mid 1990s with Sony. The latter happened to Atari in the early 1980s. The only exception to this pattern thus far has been Sony, which established itself as an industry leader in the late 1990s, but continued to innovate and offered reasonable deals to developers. The reason for this difference in behavior is unclear. It might be a difference in corporate culture or the particularities of a management team, as suggested by Asakura (2000). It might also be a need to head off future possible Schumpeterian 'gales of creative destruction,' or simply a recognition that excess profits attract new competitors. Further study is necessary to test these explanations.

Concentration in the various stages is not as much of an anti-competitive behavior threat as the indices might suggest, although retailers currently wield considerable leverage over publishers. However, vertical integration remains a barrier to new entry through the development, publishing and distribution stages, and is an obvious tool for anti-competitive practices. Further integration may still come from within the current industry or from outside.

After the initial crash of the video game market in the early 1980s, the large media conglomerates stayed away from the gaming industry (Kent 2000; Herman 1997), but this cannot last. Whereas Warner Communications suffered greatly when its Atari subsidiary failed, video games are now 15 years older and a much larger and more stable industry with a much broader user base. Corporate history aside, conglomerates like AOL/Time Warner or Disney would be able to gain considerable synergies through gaming acquisitions. Not only could these giants vertically integrate through every stage of the industry, there are clear cross-promotional gains to be made with their movie and television properties. Also, as the future of media moves into an online world, games represent one of the leading and most valuable types of content available: gaming sites have risen from 1 to 8 per cent of e-commerce referrals (Stellin 2000).

Without a dominant industry standard, change remains the rule, even as the market's total size continues to expand at dramatic rates. As the first generations raised on Atari and Magnavox systems enter their 30s and 40s and continue to play games, video games have begun to emerge from their adolescent stereotype and into the mainstream. Further research into all aspects of gaming are therefore called for. With the exception of a growing body of social science research chronicling the effects of game violence, academia has largely ignored this booming and vital new mass medium. And yet even this effects work is mostly uninformed with regards to content – video games are assumed violent to some degree without an understanding of the different types of content, or an agreed-upon typology for genre or playing style. The generalizability of the results is often misinterpreted to mean that the majority of gamers are playing first-person shooters (see Figures 2 and 3 above). One would scarcely imagine a study on the effects of television without a better understanding of what kinds of television there are or how popular each type is among which groups. Indeed, a basic typology of content and the development of content scales should be a research priority.

When previous media emerged, academics played an important role in making sense of the industry and informing policy, and also in providing an important gateway between the public and the industry (Preston 2000). We have a responsibility to do so again. The good news is that there is a dizzying set of opportunities for research, on both the economic and social fronts.

Note

The older SIC codes for software do not differentiate for video games. 7372 is the code for home-use software publishing and reproduction. The newer NAICS codes are more specific. Packaged software publishing is 511510, reproduction is 334611, software stores are 443120, software wholesalers are 421430, and game machine manufacturing (includes coin ops) is 339932.

Endnotes

[1] For reference, the annual growth from 1995-2000 for computer and video game software publishing was 17.4%. It was 9.2% for motion pictures, 8.5% for video tape rental, 10.9% for professional sports and 6.4% for consumer electronics (ISDA 2001).

[2] See Vogel (1998) and Gallagher & Park (2002) for exceptions.

[3] Online games operated by major internet portals like Yahoo! would be an exception in that the portals generate revenues from traffic and click-through referrals to e-commerce sites.

[4] This is a pattern similar to that of the telegraph, which inventor Samuel Morse pleaded the government to buy out, but which was rejected by skeptical senators as a psychic's device. See Czitrom (1982, p. 21-22) for a discussion.

[5] This game also represented the introduction of the idea of an open source code in gaming.

[6] Sony has one CD manufacturing plant that also makes Sony's music CDs, Nintendo has one plant and Sega operates a network of four plants.

[7] These cards add functionality to an existing computer and are usually installed by the user. A graphics card handles the complex rendering of polygons on the screen, enabling the CPU to devote its power to non-graphic functions. Faster cards mean both smoother game play and a sharper image with more detail. The recent merger of the top two graphics card firms, nVidia and 3dfx, might standardize this feature (PCGamer 2001).

[8] Information in this section is based on a series of interviews with game developers, publishing executives, retailers, and analysts.

[9] Following the Nintendo example, there are currently sixty-seven licensee companies producing games for the Nintendo 64 for the forthcoming Gamecube system (www.nintendo.com). 82 per cent of the PlayStation titles released in 1999 were published by Sony licensees (Toyama 2000).

[10] Two interesting risk-sharing variations on the standard royalty system are 'co-publishing' and bonding arrangements. Co-publishers involve a publisher paying for a project's development expenses upon completion of contracted terms and the intellectual property rights remain with the developer. Bonding arrangements are new to the industry. A publisher agrees to pay a developer upon completion but a third party bonding agent guarantees a bank loan to the developer. Again, because the publisher assumes less risk, intellectual property rights are more likely to remain with the developer.

[11] Developer Outrage Entertainment is representative of the increasing costs and expectations of development. While development of a similar game might have cost $100-200,000 about 10 years ago, the 1992 title Descent cost $250-300,000. 1995's Descent 2 cost $500,000, and 1999's Descent 3 cost a little over $2 million.

[12] Licensing fees paid to movie studios or sport leagues are a separate category and are present in all of the game publishing segments. Electronic Arts reportedly paid $100 million to FIFA for the international licensing rights to FIFA-endorsed soccer games.

[13] GT executives would not release this data, but confirmed the analysis.

[14] These devices include: 'Shelf talkers,' small cut-out signs on the shelf next to the games; 'endcaps,' the term for end-of-aisle space; banners, and counter-top boxes (Campbell 2000). Also, promotional demo videos shown on the retailer's floor, and even the cost of publishing the games in the retailer's flyers are expenses charged to the publisher.

[15] Although the preteen market for girls is predominated by Barbie titles, a growing segment of female gamers are using more male-gendered action titles (Saltzman, p. 32).

[16] Many games already incorporate video sequences that require MPEG-2 compression, the same standard used in DVD movies.

[17] Ultima Online and Everquest feature complex economies, occupations and guilds, clan warfare, Shakespearean plays and even weddings between players.

References

Alaimo, D. 2000, 'Game Sales Hit $7.4 Billion in 1999; PlayStation Top', Supermarket News, 13 Feb., p. 51.

Anderson, C. & Dill, K. 2000, 'Video games and aggressive thoughts, feelings, and behavior in the laboratory and in life', Journal of Personality and Social Psychology, vol. 78, no. 4, pp. 772-790.

Asakura, R. 2000, Revolutionaries at Sony: The Making of the Sony PlayStation and the Visionaries Who Conquered the World of Video Games, McGraw-Hill, New York.

Bloom, S. 1982, Video Invaders, Arco, New York.

Bossong-Martines, E., (ed.) 1999, Industry Surveys, Computers: Software, Standard & Poor's, New York, vol. 167, no. 39, Section 1.

Brock, G. 1982, The Telecommunications Industry: the Dynamics of Market Structure, Harvard University Press, Cambridge, Mass.

Calgary Herald 'PlayStation2 ratchets up game wars: Battle for supremacy in huge gaming machine industry', 30 Mar. 2000, p. S6.

Campbell, C. 2000, 'Frontline Marketing', Games Business, 1 Mar. p. 24.

Chan-Olmstead, S. 1991, 'A Structural Analysis of Market Competition in the U.S. Syndication Industry, 1981-90', Journal of Media Economics, Fall, pp. 9-28.

Chick, T. 2000, 'Broadband Gaming: A brave new approach for online games- or the same old route, only faster?' NextGeneration, Oct., p. 78-86.

Chronis, G. 1996, 'Sega Claims a 1 Percent Lead in 1995 Combined Video Game Market Share', Video Store, 21 Jan. p. 12.

– a. 2000, 'Games to Rule Set Tops', Games Business, 1 Mar., p. 1, 8.

– b. 2000, 'It's War: X-Box Team Goes for the Throat', Games Business, 1 Apr., p.1, 6.

– c. 2000, 'Revenue-Sharing Comes to Games', Games Business, 15 Apr., p. 5.

Cohen, S. 1984, Zap! The Rise and Fall of Atari, McGraw-Hill, New York.

Cooper, J., & Mackie, D. 1986, 'Video games and aggression in children', Journal of Applied Social Psychology, no. 16, pp. 726-744.

CorpTech 1999, CorpTech Directory of Technology Companies, 1999, 14th Ed., CorpTech, Woburn, Massachusetts.

Croal, N. 2001, 'Online Games Get Real', Newsweek, 5 Feb. p. 62-63.

Czitrom, D. 1982, Media and the American Mind, University of North Carolina Press, Chapel Hill, North Carolina.

Dietz, T. 1998, 'An examination of violence and gender role portrayals in video games: Implications for gender socialization and aggressive behavior', Sex Roles, no. 38, pp. 425-442.

Dill, K.E., & Dill, J.C. 1998, 'Video game violence: A review of the empirical literature', Aggression and Violent Behavior, no. 3, pp. 407-428.

Executive Office of the President, Office of Management and Budget 1998, North American Industry Classification System, United States, 1997, Bernan Press, Lanham, Marylan.

Farrell, J. & Saloner, G. 1986, 'Installed Base and Compatibility: Innovation, Product Preannouncements, and Predation', International Journal of Industrial Organization, vol. 14, no. 6, pp. 673-699.

Forrester Research 1998, 'Video Games: Replay'.

Funk, J.B. 1993, 'Reevaluating the impact of video games', Clinical Pediatrics, no. 32, pp. 86-90.

Funk, J.B & Buchman, D.D. 1996, 'Playing Violent Video and Computer Games and Adolescent Self-Concept', Journal of Communication, vol. 46, no. 2, pp. 19.

Gaither, C. 2001, 'Field Becomes Crowded and Highly Profitable', New York Times, 17 Dec., p. C17.

Gallagher, S. & Park, S.H. 2002, 'Innovation and Competition in Standard-Based Industries: A Historical Analysis of the U.S. Home Video Game Market', IEEE Transactions on Engineering Management, vol. 49, no. 1, pp. 67-82.

Gamasutra [Homepage of the Gamasutra game developer association] [Online] 19 Jan. 2002 – last update. Available: http://www.gamasutra.com. Accessed 19 Jan. 2002.

Gaudiosi, J. 2001, 'New Systems Give Games New Life', Video Store, 25 Nov.-1 Dec., vol. 23, no. 48, p. 8, 33.

Graser, M. 2000, 'Triumph of the Tech Toys: DVD, vidgames and other gadgets open outlets for H'wood product', Variety, vol. 377, no. 10, p. 31.

Greco, A. 2000, 'The Structure of the Book Publishing Industry', in The Media and Entertainment Industries: Readings in Mass Communications, ed. A. Greco, Allyn & Bacon, New York.

Griffiths, M. 1999, 'Violent Video games and aggression: Review of the literature', Aggression and Violent Behavior, vol. 4, no. 2, pp. 203-212.

Heil, S. & Peck, T., (eds.) 1998, Encyclopedia of American Industries, 2nd Edition, Gale, Detroit, Michigan.

Herman, L. 1997, Phoenix: The Fall and Rise of Videogames, Rolenta Press, Union, New Jersey.

Hotelling, H. 1929, 'Stability in Competition', Economic Journal, vol. 34, Mar., pp. 41-57.

Hutsko, J. 2000, '88 Million and Counting: Nintendo Remains King of the Handheld Game Players', New York Times, 25 Mar., p. B1.

Interactive Digital Software Association 1998, '1998 State of the Industry Report, Executive Summary'.

– 1999, 1999 State of the Industry Report'.

– 2000, Press release: 'Sixty Percent of All Americans Play Video Games, Contributing to the Fourth Straight Year of Double-Digit Growth for the Interactive Entertainment Industry'.

– 2001, 'Economic Impacts of the Demand for Playing Interactive Entertainment Software'.

Kalorama Information, LLC 2000, 'The U.S. Market for Video Games and PC Entertainment Software', 13 Sep.

Kent, S. 2000, The First Quarter: A 25-Year History of Video Games, BWD Press, Bothell, Washington.

Komiya, K. & Litman, B. 1990, 'The Economics of the Prerecorded Videocassette Industry', in Social and Cultural Aspects of VCR Use, ed. J. Dobrow, Erlbaum, New York.

Laber, E. 2001, 'Men Are From Quake, Women Are From Ultima', The New York Times, 11. Jan. 11, p. D1.

Levander, M. 2001, 'Where Does Fantasy End?', Time, 4 June, p. 22.

London Financial Times 1998, 'Toys for the boys: The video game industry is so huge that it can afford to ignore women. But it needs to hook the under-12s', 12 Dec., p. 1.

Litman, B. 1979, 'The Television Networks, Competition, and Program Diversity', Journal of Broadcasting, Fall, pp. 393-409.

– 1998, The Motion Picture Mega-Industry, Allyn & Bacon, Needham Heights, Massachusetts.

Lundrigan, J. 2000, 'Sega's New Deal', Next Generation, 5 May, p. 24-32.

NextGeneration 2000, 'Videogaming: The Odyssey', 4 Apr., p. 70-77.

Neuman, W. 1991, The Future of the Mass Audience, Cambridge University Press, Cambridge.

PC Data 1998, Press release: 'PC Data Releases 1998 Video game statistics. Company press release'.

PCGamer 2001, '3dfx Goes Kaput: NVIDIA buys out 3D-card maker', Mar., p. 27.

Picard, R. 1989, Media Economics, Sage, Thousand Oaks, California.

Poole, S. 2000, Trigger Happy: Videogames and the Entertainment Revolution, Arcade Publishing, New York.

Preston, J. 2000, 'M.I.T. hosts inaugural videogame conference', NextGeneration, Apr., p. 17-18.

Ritchell, M. 2000, 'Video Game Ratings Depend on Humanity of the Victim', The New York Times, 4 Oct., p. C1.

Russo, T. 2001, 'Games Grow Up. But is the Rest of the World Ready?', NextGeneration, Feb., p. 55-60.

Saltzman, M. 2000, 'How to Pick Up Girls: Retailers, Pay Attention!', Games Business, 1 Mar., p. 31-32.

Schwartz, J. 2000, 'X-Box Spells Quicksand for Microsoft', Forrester Research, 17 Mar.

Schutte, N. S., Malouff, J. M., Post-Gordon, J. C., & Rodasta, A. L. 1988, 'Effects of playing video games on children's aggressive and other behaviors', Journal of Applied Social Psychology, no. 18, pp. 454-460.

Sherry, J., Lucas, K., Rechtsteiner, S., Brooks, C. & Wilson, B. 2001, 'Video Game Uses and Gratifications as Predictors of Use and Game Preference', Paper presented at the International Communication Association Convention, 26 May, Washington, D.C.

Stellin, S. 2000, 'Big Web Portals Lose Influence to Sites with Games', The New York Times, 4 Sep., p. C3.

Strom, S. 2001, 'Outlook for Changes at Sega Pushes Shares 19% Higher', The New York Times, 24 Jan., p. W1.

Toyama, K. 2000, 'New PlayStation Games for $10?' NextGeneration, Apr., p. 15.

Video Game Yellow Pages [Industry Directory] [Online] 19 Jan. 2002 -last update. Available: http://www.vgyellowpages.com. Accessed 19 Jan. 2002.

Vogel, H. 1998, Entertainment Industry Economics, Cambridge University Press, Cambridge.

Wade, C. 2000, 'News Analysis', Games Business, 1 Apr., p. 12.

Wired 2000, 'Infoporn: Mass Distraction', May, p. 105.