

Technological change and shifting industrial leadership in the US gaming machine industry, 1965-95

Mirko Ernkvist

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Introduction to paper

Gaming machines have come to dominate US casinos and currently offer the single largest forms of gambling in the US in terms of revenue. Through both legalization and the technological development in electronics, the gaming machine industry has grown rapidly since the middle of the 1970s onward. New market segments have also been created in the process. Initially, spinning reel-gaming machines dominated the market, but by the end of the 1970s, video poker and other video-based gaming machines made inroads into the market, followed in the late 1980s by gaming machines connected through statewide networks called Wide Area Progressive games.

Despite the size of the market, the extensive technological change the industry has experienced and its importance as leisure consumption, the business history of the firms that manufacture gaming machine has thus far received little academic attention.

The ability to create player appeal is the foundation of the performance of a gaming machine. Throughout gaming history, technological change has constantly been able to alter the way gaming machines create player appeal. Ranging back to the late 20th century, gaming machines have gone through considerable technological change from mechanical to electromechanical and from electromechanical technology to electronic. Coupled with these advantages, a number of other technological changes in the different subsystems of gaming machines also occurred.⁵⁷

Through the middle of the 1960s until the beginning of the 1980s, Bally from Illinois was the world's leading gaming machine manufacturer with a nearly monopolistic market share in the US. Bally's successful growth not only was caused by the growth of gaming machine manufacturing, but also by a far-reaching vertical integration and expansion of businesses into adjacent entertainment industries. Frequently referred to as the IBM or General Motors of gaming machines at the time, Bally was seen as the "master of innovation, development, manufacturing and salesmanship" (Fey, 2002: 200). However, during the 1980s, Bally's dominating market share in the gaming machine market decreased, and IGT, a new firm from Nevada rapidly gained market share. During the second half of the 1980s, IGT became the new market leader when it surpassed Bally both in terms of the number of gaming machines sold annually (see Figure 34) as well as in terms of gaming machine revenues (see Figure 35). The leading position in terms of total installed base of gaming machines in the US soon followed (Table 1). Throughout the 1990s, IGT maintained its position as the leading gaming machine manufacturer in a rapidly expanding market.

Table 13: US market share (percentage), installed gaming machines

	1986	1990	1995	2003
IGT	27	44	68	69
Bally (Bally Gaming 2003)	57	26	12	10
Universal Distributing	3	17	7	
Sigma	1	4	7	1
Williams Gaming				7
Aristocrat				6
Other	12	9	7	8

Source: Atlantic City Action (1986, 1990); Deutsche Bank (2003); Slot Manager (1996).

Descriptions of how Bally lost its leadership to IGT have been offered in general terms. Casino managers have described how “Bally kind of fell asleep” (Michael Gaughan in Stevenson, 1989) at the end of the 1980s and how “It was a matter of one company feeling comfortable and another feeling hungry” (Andy Hommel, cited in Rasmusson, 1998:36). Industry analysts have argued that Bally had difficulties in responding to new technologies and customer demands and that “Bally’s management team was losing focus” (Joseph Coccimiglio cited in Rasmusson, 1998:36). After being such a successful dominating firm in the US gaming machine market, what were the precise circumstances behind Bally’s decline in industrial leadership in the gaming machine manufacturing market and why did IGT gain that industrial leadership?

This paper which consists of a chapter from my upcoming dissertation describes the circumstances whereby IGT first managed to make an inroad in the US gaming machine manufacturing market by capturing the emerging market-segment for video-based gaming machines during the late 1970s and early 1980s. Until that time, the market for gaming machine in the US had only consisted of spinning-reel gaming machines and it was estimated that Bally had over 4/5 of the market for these machines by the end of the 1970s.

6. William Redd's founding of IGT and capturing of the video poker market

"I was already a millionaire several times over. I never thought of this company [IGT] in terms of dollars or cents or what you call gross volume or gross profit. The only thing that I do think of and I do believe in is that IGT will actually surpass Bally in its total volume...and profitability. I'm gonna be bigger than Bally."

Si Redd cited in Selesner (1982a:42).

As described in the previous chapter, many of Bally's divisions encountered problems during the second half of the 1980s. However, the failure of the gaming machine manufacturing division were puzzling when taken into consideration that it were the original core business of Bally Manufacturing that the company had dominated in terms of market share during the 1960s and 1970s. At the end of the 1970s digital technology made its breakthrough in the gaming machine industry and would provide a number of new innovative opportunities. Bally was unable to capture the new gaming machine market segments in the form of video poker and WAP games, but also encountered decreasing market shares in the market segment for spinning reel gaming machines. Instead, the new company IGT became the market leader in all these market segments. As argued in this study, the discontinuous technological shift to digital technology was highly problematic for Bally and at the same time created innovative opportunities for new competing firms. In the theoretical part four ways in which a technological shift can be discontinuous to leading firms in an industry was described, including: (1) being disruptive to its business model by being (initially) unattractive to its business model, (2) by changing the competitive advantage of a specific organizational structure, (3) by making existing capabilities obsolete and requiring new dynamic capabilities, and (4) by requiring significant new ways to think about a technology. In this chapter and the following two, the development of the different gaming machine market segments are described and related to the discontinuous circumstances of the technological shift to digital technology.

This chapter begins by describing the entrepreneurial circumstances behind the creation of IGT in which the company's founder William Redd had an important entrepreneurial function. In relation to this the chapter also describe how Bally passed up on the opportunity of this new emerging market segment and propose an explanation for this. Subsequently the chapter describes how the video poker became a new market disruption in the gaming machine industry that became instrumental in capturing and creating the market for local players.

6.1.29. Si Redd's entrepreneurial function at Bally distributing company

"The gambling people out in Nevada treated a lot [gaming] machine the same way that they do a blackjack table or a dice table. As long as you can put a new cover on it, it won't ever wear out. Well it's true the slot might not wear out but you must have something new. So the minute when I saw what was going on I was intent on mimicking what the companies in the old coin-operated amusement field had tried to do, and that was to keep on introducing new models. I think this was one of the reasons why we [Bally Distributing] were lucky."

Si Redd, cited in Public Gaming (1982b:44).

William Silas "Si" Redd (Nov 16, 1911-Oct 14, 2003) started his career in the coin-op industry in the 1930s and during the subsequent decades he was a distributor for several

companies in the amusement field and also established his own distributing company in Boston that covered the New England region (*Public Gaming*, 1982; Hagen, 2001). When his existing distributorship encountered difficulties after being under pressure from organized crime⁵⁸ he accepted the new opportunity that was created in 1967 when Bally's William O'Donnell searched for a new manager to take over the distributorship of Bally in Nevada (Hagen, 2001). At the time, Bally Manufacturing Company did not yet have a gaming license to be a distributor in Nevada. In 1967 Si Redd bought 70% of the gaming machine distributing company (then called Currency Gaming) that previously had been owned by Dick Graves for 60,000 USD with the rest of the company being owned by Bally's President, William O'Donnell (Selesner, 1982)⁵⁹. Subsequently, Currency Gaming changed its name to the Bally Distributing Company and after acquiring another distributor of Bally in the state ("Bally Sales"), the distributor became the only distributor for Bally's gaming machines in Nevada.

At the time when Si Redd took over the distributor, Bally had thus far had limited success in the Nevada market and was more reliant on the international market⁶⁰ (*Public Gaming*, 1982b: 44). However, during the 1970s Bally Distributing became highly successful in Nevada and Si Redd became known in the state as the "slot machine king" (*Public Gaming*, March 1982b).

Si Redd came to Nevada at a time when market conditions soon became more favorable in Nevada. The growth of casino gaming that had been limited during most of the second half of the 1960s started to grow rapidly at the end of the 1960s (Figure 7 p 60) which prompted new casino investments. At the same time there was a large potential replacement market of old mechanical gaming machines. Bally's first electrometrical gaming machines were technologically innovative compared to the old mechanical gaming machines. However, to succeed in Nevada Bally needed the entrepreneurial function to overcome the markets resistance towards their innovation that still existed towards their new machines. They also needed to be more successful in connecting the new innovative opportunities of electromechanical technology with the market needs in Nevada and constantly develop new player appealing features for their expanding product line. At the time of when Si Redd took over Bally Distributing, Bally Manufacturing had successfully introduced the "Money honey" model, but then thus far only released a few subsequent models (see Figure 24 p 103).

At the time operators of gaming equipment kept their gaming machines until their mechanical lifespan ended which often was over a decade. Because it was the table games that made up for the majority of the revenues and gaming machines in many cases were seen as a necessary addition, there were considerable barrier among casino operators to make the investments to replace existing gaming machines before their mechanical lifespan had reached an end.

In the amusement game industry the lifespan of games was often shorter and distributors were used to sales strategies to obsolete old equipment by constantly introducing new games. When Si Redd took over Bally Distributing, he applied many of the sales strategies from his years as amusement game distributor to the gaming industry (KNPR, 2005)⁶¹. One of these strategies was fuel the replacement cycle of gaming machines by constantly introducing player appealing innovations for gaming machines. Si Redd's demand creating strategy involved constantly pushing Bally to introduce new gaming machine innovations for the Nevada market. Bally distributing constantly suggested new player appealing innovations to Bally's engineers in Chicago to make creative destruction the imperative of the industry. According to Si Redd, "They [Bally's engineers] thought I was a son of a bitch. Just when they had things set, I'd be looking to change this or that" (Si Redd cited in Hagen, 2001).

The annual number of gaming machines that Bally released increased rapidly at the end of the 1960s (see Figure 24 p 103). For Bally in Chicago, it was important for its R&D market to receive innovative inputs from the distributors that had direct input and knowledge of the players preferences. It is notable that while Bally's initial gaming machine, the Money Honey from 1963, had introduced engineering innovations, such as the improved hopper mechanism (see chapter 5.1.22 p 91), Si Redd pushed for improvements that often were based on the difficult, largely tacit knowledge of what constituted player appeal for gamblers. These innovations required the ability to sense and interpret the preferences of different gamblers. One of his first improvements was to take away the lemon as a losing symbol and replace it with a blank spot, in order to limit the negative play experience of losses.⁶² He also pushed for more exciting multiplier gaming machines that could accept bets of multiple coins and give the chance of larger jackpots. The multiple coin machines increased the number of coins that could be wagered with each pull, which increased the handle. He also pushed for the introduction of more exciting machines on which the gamblers could win on multiple lines, something that increased the money wagered. Subsequently, he pushed for Bally's successful line of dollar machines in the middle of the 1970s, which had high payback percentage, but more than made up for this by their high volume of play (handle). Bally Distributing did not invent all these things, but by their ability to interpret the market and suggest innovative improvements, they were an important in providing inputs and direction for Bally Manufacturing's R&D facility. Another important person that provided an important role in linking the R&D efforts to the market was Bally's factory representative in Nevada, Doc Kaufman.

To accomplish rapid growth for these new innovative Bally gaming machines, Bally Distributing pioneered sales and marketing techniques to overcome the resistance of casinos to adopting these innovations. Si Redd had a sales strategy for making it possible to introduce new machine first without cost on a participation basis during a test period and then given an option to the operators to buy the machine after a test period if the machine had proven successful (or the choice of continuing with the participation of profits). Especially, for casinos and operators with less financial capital, the participation strategy allowed them to introduce new gaming machines more rapidly.⁶³

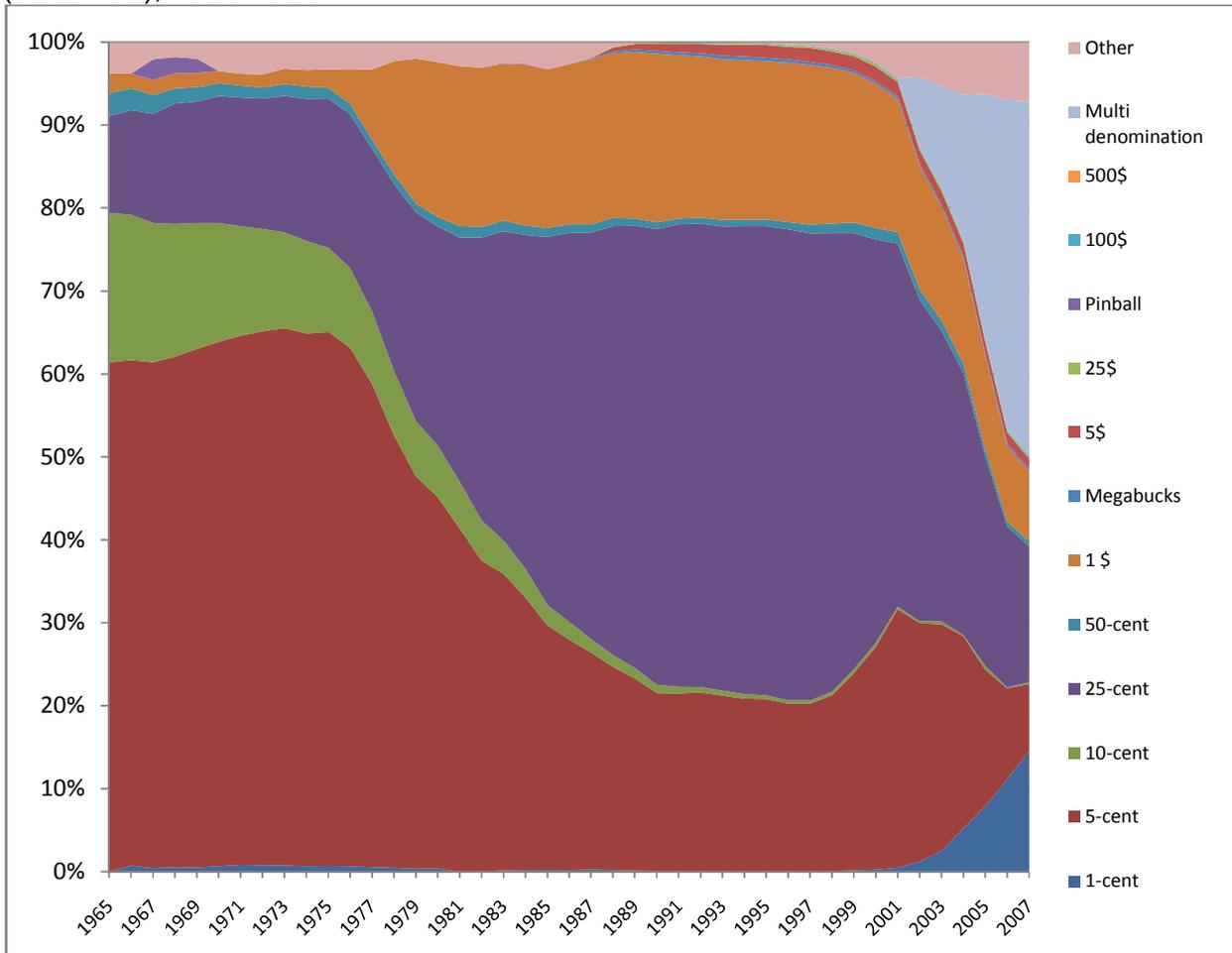
"What it came down to was that any new innovation we could put on the slot that was different for the player, well, it was an easy sell. Our policy with store keepers was that they didn't have to buy it, just place it in their stores and give us half of the increase. First, we would tell him to pay us in 90 days. Then we'd put it in and say just give us one half the increase and he'd say 'well I'll take that 90-day deal because I'm going to pay you a lot faster'" Si Redd in Public Gaming (1982b: 44).

This sales strategy involved higher risks on behalf of the distributor and a prerequisite for its successful implementation was that Bally's gaming machine actually had considerably higher player appeal (win/unit) than the average and that the distributor had the ability to sense which machines would prove successful on different locations. Both of these conditions were there in the case of Bally Distributing and the upside of the strategy was a rapid growth of sales.

Bally Distributing and Si Redd also attacked the established, engrained view among many casinos of a comparatively high payout ratio for gaming machines. To keep players excited and playing longer, he pushed for a number of small jackpots in addition to a few big jackpots. He also attacked the prevailing payout percentage by trying to convince casinos to increase the payout percentage and make their profit by the increasing play volume instead.⁶⁴ These efforts to increase payback percentage were pushed even further with the rapid growth of dollar gaming

machines in the second half of the 1970s . At the time nickel denomination gaming machines had dominated the market and the introduction of dollar denomination was an effort to extend the market for gaming machines from the low-end to the more high-end part of the casino gaming market.

Figure 28: Share of total number of gaming machines, different denomination, Nevada (statewide), 1965-2006



Source: Quarterly Statistical Report, Nevada Gaming Commission. Note: Fiscal Year ended June 30, includes all licensed gaming machine in the state (non-restricted and restricted).

Table 14: Percentage share of Nevada casino revenues, different games , 1976, 1983, 1993 & 2003

	Twent-one	Craps	Roulette	Keno	Other table games, keno and poker	25-cent gaming machines	1\$ slot	5-cent	Other gaming machines
1976	27.6	21.1	3	7.2	9.3	8	3.1	15.5	5.3
1983	18.6	5.3	1	7	3.3	24.2	23.4	13.1	4.1
1993	14.95	6.24	2.36	2.28	11.05	29.63	20.91	7.6	4.98

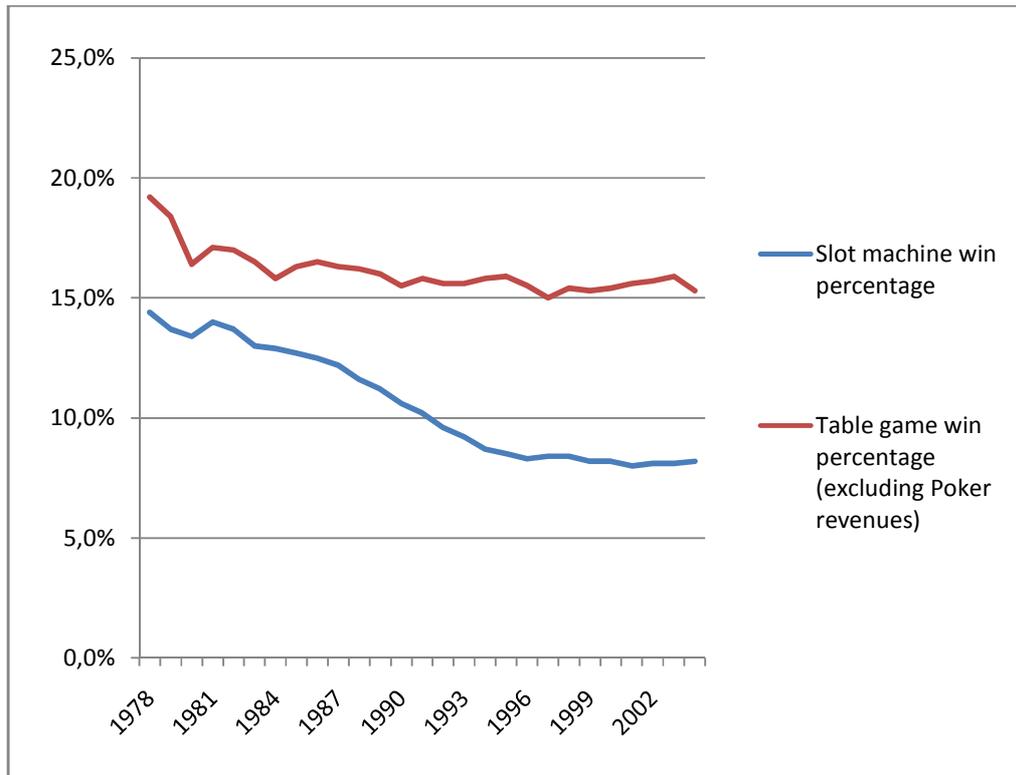
2003	11.36	4.68	2.76	0.76	6.12	20.67	13.17	23.89	16.59
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Source: Nevada Gaming Control Board, *Gaming Revenue Report* (various years). Note: Does only include non-restricted locations with >1 MUSD in annual revenues. Note: Data before 1976 is not available.

In 1975, there were only 1077 dollar gaming machines in Nevada; in 1979 that number had grown to 13615 which represented an increased their relative share of total number of gaming machines in Nevada during this period from 2.2 to 17.5 percent during the same period (see Figure 28). The growth were also reflected in Nevada casinos where dollar gaming machines increased its share of total gaming revenues from 3.1 to 23.4 percent between 1976 and 1983 (Table 14). Some of the dollar gaming machines had a payback percentage as high as 93-97%, compared to the 84-85% payback percentage that had dominated gaming machines before the introduction of dollar gaming machines (Fey, 2002: 199). Often the dollar gaming machines were placed in groups in a dollar carousel at the casino floor which increased the win for many casinos because of the excitement they created (Nelson, 1994: 138).

Bally Distributing was in the middle of a shift towards increasing presence of gaming machines on the casino floor. Gaming machines started to gain market share in relation to table games in Nevada from 1975 onward and as argued earlier, the breakthrough of dollar gaming machines with high payback percentage was initially a contributing factor to this development (see chapter 4.2). The dollar spinning reel machine was the first gaming machine that had the ability to expand the market for gaming machines by moving upmarket, a part of the market that previously only had been controlled by table games.⁶⁵ At the same time a large number of players that had been nickel-players also shifted and started to play the dollar-slots (Public Gaming, 1982c).

Figure 29: Gaming machine and table games win percentage, New Jersey (Atlantic City) 1978-2005



Source: New Jersey Gaming Regulatory Board

A significant long-term improvement in the payback percentage for gaming machines occurred during this time as evidenced by accounts from casino managers and manufacturers (see e.g. Selesner, 1980b). Unfortunately, statistical data from Nevada before the second half of the 1980s regarding this development is lacking. However, the available data of casino gambling in Atlantic City 1978-2005 describes this trend (Figure 29).⁶⁶ The decrease in gaming machine win percentages in Atlantic City during the 1980s and into the beginning of the 1990s was in sharp contrast to the development of table game win percentage (table drop) that was almost constant during the same period (see Figure 29). During the middle of the 1970s, digital technology would enable the introduction of video-based gaming machines. Si Redd's entrepreneurial role in this new market segment eventually led to the formation of what would become IGT.

6.2. The disruption of Video Poker and other video gaming machines

Opportunities to create entirely new types of gaming machines became possible with the shift to digital technology. In terms of context, Si Redd was at the right place as distributor in the industry and at the right time to envision and take advantage of the new opportunities. He also possessed the personal skills, background in the amusement industry, sales knowledge and financial resources that was necessary to succeed with the new opportunities that emerged when amusement video game technology made its breakthrough in the gaming machine industry. The entrepreneurial opportunity was also influenced by the reaction of the other actors in the industry, that is, Si Redd's ability take advantage of the new technological opportunity were dependent on Bally's inability to envision the potential value in the same opportunity.

During the early 1970s, Bally Distributing developed and manufactured what was considered as specialty gaming machines. These machines were called specialty machines because they served a special niche market compared to the main market of electromechanical spinning reel gaming machines. Specialty machines were produced in small quantities, often using a large number of specific components. This made them ill suited to the ordinary production process among the large gaming machine manufacturers. They were not seen as competing with the main market, instead their attraction often served a novelty value and casinos often placed them near the entrance to highlight this novelty value hat could draw attention from people passing by.

These specialty machines were developed and manufactured by Bally Distributing in its office in Reno where the company had a small group of engineers involved in these projects. Different types of specialty machines existed before the breakthrough of digital technology and Bally Distributing (Currency Gaming) had developed specialty machines in the form of gigantic "Big Bertha" machines before Si Redd took over the company (Nelson, 1994:136). However, the development of digital technology enabled new opportunities to experiment with different types of new gaming machines. Several other small companies had also tried to create new types of gaming machine based on digital technology, starting with efforts to incorporate electronics in gaming machines at the middle of the 1960s. This included efforts from small companies such as Nevada Electronics, Nevada Air Products, Dale Electronics, Raven Electronics, Gamex and Fortune Coin.⁶⁷ The first generation of gaming machines that incorporated electronics were not able to expand beyond their niche market as specialty products. During the 1970s digital technology developed rapidly, the performance of integrated circuits increased rapidly following Moore's law and at the end of the 1970s microprocessors had become viable options for use in gaming machines.

It was the introduction of video-based gaming machines that offered entirely new opportunities for digital gaming machines. Si Redd saw the potential for digital video gaming machines after the first wave of amusement video games had revolutionized arcades throughout the US with the introduction of Pong at the end of 1972 (Jörnmark & Ernkvist, forthcoming). Similar to many other innovative opportunities under uncertain conditions Si Redd's vision of the opportunity was not clearly defined at the beginning. However, as testified by Si Redd the attention he devoted to the area seems to have been driven by the perceived potential advantage that video-based gaming machines offered in terms of lower operational costs and new types of games.

“I could see three or four things: First, video slots wouldn't give any service problems. Second, it would be so much harder to cheat it (Not that these thieves can't learn anything!). Third, I knew that with a video slot you could do so many things that you couldn't do otherwise”

Si Redd in *Public Gaming*, March 1982

It is likely that Si Redd's background in the amusement business and his position in the industry as distributor and manufacturer of specialty machines at Bally Distributing were factors that influenced the attention he devoted to the new field. As argued earlier, Si Redd's personal conviction of the need for constant product innovation in the gaming machine industry had been influenced by the amusement game industry. When the video-based amusement game “Pong” made its breakthrough in arcades at the end of 1972, it sent out a signal of the opportunities of digital video-based gaming machines although many perceived it as a novelty.⁶⁸ Bally Distributing had a small engineering group for its specialty machines that could experiment with video-based gaming machines. Bally Manufacturing did not perceive the same value in the opportunity.

“But it [the video market] really began about ten years ago [1973] when Atari made a machine called 'pong'. I was with Bally at the time. Bally turned it down. I recommended that they buy Pong. Pong was an amusement device and it was just the beginning. We [Bally Distributing] saw what Pong could do as an amusement machine and we had engineers who could vision doing the same thing with keno, poker or '21.' So we [Bally Distributing] bought some used pong games and converted them to blackjack machines. The rest of it was luck. On the video poker we just got lucky. We didn't know it was that good. It certainly wasn't that we were so great or ingenious. For some reason or another draw poker just caught on. So much that today thousands and thousands of people who play poker in our machines in Las Vegas, never play a slot machine. In fact, I've heard a lot of them say, 'What, me play a slot machine? Never, I'm not an idiot but I do love my poker.’” Si Redd in *Public Gaming* (1983c)

At the middle of the 1970s Si Redd's Bally Distributing was experimenting with video based gaming machines in various forms, starting with a black and white video 21 and continuing with a range of other machines. They were not the only company in the US that responded to this potential at this time.⁶⁹ Fortune Coin⁷⁰ was a new company founded Stanley Fulton and Walter Fraley that developed a video based spinning reel machine (1975) and color video poker (1977). Subsequently Si Redd managed to acquire Fortune Coin around 1978 when he had formed his new entrepreneurial venture. The acquisition put IGT at the technological forefront in video-based gaming machine technology. The circumstance whereby Si Redd sold Bally Distributing and became founder of this new entrepreneurial venture focused on video-based gaming machines is the focus of next part.

6.2.30. The creation of the predecessor to IGT

In the theoretical discussion, the nature of Schumpeterian entrepreneurship characterized by idiosyncratic perception under uncertain circumstances was described. The aim of this chapter is to describe the circumstances underlying the creation of IGT. The next chapter then describe video-poker as a new market disruption. Subsequently the rationale behind Bally Manufacturing's neglect of video-based gaming machines is discussed and why the business model of video poker business was well suited for IGT as a disruptor.

In 1973, Bally Manufacturing applied for its own gaming license to sell and operate gaming machines in Nevada. When Bally subsequently received its Nevada license, the company was anxious to acquire Bally Distributing Company of Reno in 1975 in line with their overall strategy of integration of distributors (see Chapter 5.2.26 p 107). As highlighted by William

O'Donnell in the Annual Report, the acquisition was seen as an important part of Bally's strategy.

"Of all the developments which took place recently, however, the most significant is the licensing of Bally by the State of Nevada. This paves the way for Bally to begin negotiations to acquire its largest distributor, Bally Distributing Company of Reno, Nevada, a firm which distributes and operate gaming equipment and also develops speciality slot machines and other gambling devices."

President's message from William O'Donnell in the *Bally Annual Report 1974*.

Negotiations took place in 1975, and Bally Distributing was acquired in June 30 1975. In what later would stand out as an important event in the gaming machine industry, Si Redd subtracted an equivalent of around 1.5 million USD from the selling price to retain the rights to specialty gaming machines and video gaming machines (*Public Gaming*, 1981 and 1982b, Selesner, 1982a). The latter represented the video gaming machines that Bally Distributing had started to experiment with, among them video "21" and poker on a TV screen.

In relation to the sales the parties also signed a non-compete agreement that prevented Bally from competing with Si Redd's company in the market for video-based gaming machines (excluding video reels), this agreement was amended in 1978 to be valid until April 1984 in Clark County and until April 1983 in all other areas throughout the world (IGT Prospectus, 1981: 16; *Public Gaming*, 1981 and 1982b). Hence, already at the beginning Si Redd's new entrepreneurial venture managed to negotiate favorable growth conditions to appropriate the economic returns of the market for video-based gaming machines. After the sales, Si Redd continued as President for Bally Distributing until 1978 and until this time, Si Redd's new company had a joint venture agreement with Bally Distributing according to which Bally Distributing developed and manufactured the video-based gaming machines for the company. In combination with the expiration of the joint-venture agreement Si-Redd hired the engineers involved in video based gaming machines at Bally Distributing as well as all the inventory. Si Redd also entered a consultancy agreement with Bally Distributing in 1978 that granted him Bally stock options, but prevented him to compete with Bally's spinning reel market. However, in 1981 Si Redd terminated the agreement (IGT Prospectus, 1981:30).

Description of Bally's management's inability to recognize the opportunities of video-based gaming machines is fraught with the risk of ex-post rationalizations of the events. While Si Redd has given depiction of the event from his point of view, William O'Donnell has (to the author's knowledge) not been giving any public account. As recalled from Si Redd's point of view, the video gaming rights were a smaller part in the larger negotiation over the sales of Bally Distributing. Bally's CEO William O'Donnell gave up the rights for in the negotiations rather hastily. It was not a trade-off to acquire Nevada Distributing that Bally necessarily had to do, but rather one that they did in order to acquire Bally Distributing at a lower price. Bally Manufacturing initially agreed to purchase Si Redd's part of Bally Distributing for cash and stock equivalent to around 9 MUSD, but later offered only 7.5 MUSD after which more negotiation followed (Selesner, 1982a).

"We got into a negotiable situation [about the acquisition of Bally Distributing]. I didn't have attorneys, advisors or anything. Well, now all of a sudden I've got attorneys coming out of my ears. And...I said to Bill [William O'Donnell], 'Damn, Bill, we're a million-and-a-half apart. Those video machines are worth a million-and-a-half'...Well O'Donnell says to me, 'Oh, they are, are they?' And I said 'Yeah.' So he says, 'Okay, all of you attorneys, get in here...we just settled this thing. Si, you said these machines are

worth a million-and-a-half, didn't you?' And I said, 'That's right.' So he says, 'Well, you SOB, you just keep the videos...and that equals \$9 million.' And I said, 'Well, you SOB, I'll just do that.'"

Si Redd cited in Selesner (1982a:43).

Si Redd received 5.8 MUSD and 266,667 common stock⁷¹ of Bally Manufacturing for his 70% share of Bally Distributing in 1975 (IGT Prospectus, 1981:30). Given Si Redd's 1967 purchase price of 60,000 USD for his 70% shares the selling price was a reflection of the exceptional development that Bally Distributing had gone through. At the time, Si Redd was in his mid 60s. Considering that individuals that attempts to create a new firms is highly eschewed towards younger people in the 25-35 age group (Lévesque & Minniti, 2006: 188) his entrepreneurial decision was far from the norm. Si Redd later argued that the aforementioned sales incident had filled him with a "desire and inspiration" to compete with Bally (Selesner, 1982a:43).

Si Redd's new entrepreneurial business in 1975 was first called A-1 Supply, subsequently renamed SIRCOMA in 1979 and then renamed IGT in 1981⁷². During the early years of the video-based gaming machines the entrepreneurial function involved in creating new market were important. It was a high degree of uncertainty regarding the market opportunity for video-based gaming machines, the customers of the gaming machines, what the player appeal of the products were, the appropriate business model to approach the market and what types and game designs of video-based games that could become successful.

During the first uncertain years, IGT was characterized by a widespread experimentation of different types and designs of video-based gaming machines. Besides video poker, this included experiments with video keno, video bingo, video "21", video reel, video racing, and video dice gaming machines (Selesner, 1982a, Rodesch Associates, 2007, IGT Prospectus, 1981).⁷³ Most of these different types of video based gaming machines never reached beyond a niche market. However, in the late 1970s IGT came out with a video poker machine ("Draw Video Poker") with a design that had a high degree of player appeal. From then on, IGT's video poker sales grew rapidly in Nevada.

The ability to mobilize resources is crucial in new entrepreneurial ventures and in this regards Si Redd had a significant advantage. Difficulties to gain access to finance are one such resource constraint that are a major barriers for new entrepreneurial ventures, especially under highly uncertain circumstances when it is difficult to rationalize the opportunities present and under circumstances of rapid growth when the companies requires a large amount of working capital (Alvarez & Barnet, 2006; Aldrich & Martinez, 2001). Financial capital was even more difficult to attract in the gaming machine industry at the time due to the reputation of the industry (Selesner, 1982a). Si Redd had an ability to self-financing his entrepreneurial venture due to his strong financial position after the sales of Bally Distributing and during the first years of operations IGT was indebted to Si Redd with a highest total principal amount as much as 4 MUSD (IGT Prospectus, 1981:27). The resources also allowed IGT to acquire technological capabilities and develop its R&D in the video-based gaming field at an early stage. IGT aggressively acquired small innovative companies and hire individuals already involved in video gaming technology during the second half of the 1970s. The Fortune Coin company was acquired 1978 and inventors such Logan Pease (from Fortune Coin) and Dale Rodesch that made several breakthrough in video based technology worked for IGT.

Table 15: IGT (A-1 Supply, Sircoma) revenues and operating income, 1976-1990

Year	Total revenues (million)	Total operating income (million)
1976	0.5	
1977	2.8	
1978	9	2.2
1979	18.7	3.3
1980	39.5	14.2
1981	61.5	23.7
1982	62.2	10.6
1983	60	12.5
1984	73.3	15.2
1985	56.6	-1.1
1986	41.6	-14.4
1987	83.1	6.4
1988	98.7	12.8
1989	151.2	20.9
1990	210.3	30.0

Source: IGT Annual Reports (1981-1990), IGT Prospectus (1981). Note: During 1986 IGT changed fiscal year reporting standard from December 31 to September 30. The number for the year 1986 represents revenues and operating income for the 12-months period ended September 30.

In May 1976, IGT (A-1 Supply) was approved for a gaming license in Nevada. The company went through an exceptional rapid growth during the end of the 1970s and early 1980s when the revenues increased from 2.8 MUSD in 1977 to 61.5 MUSD in 1981 (see

Table 15). At this later date, net income was also high which partially reflected the Schumpeterian rent that IGT could gain in the form of premium priced video poker machines.

IGT strengthened its professional management team to run the company in the early 1980s. In June 1980 IGT appointed George Drews, prior a casino manger at Harrah's, as the company's new President and COO⁷⁴. In 1981, IGT went public on NASDAQ and in connection with this, the company brought in a professional management team with experience of casino operations and digital technology.⁷⁵ Si Redd remained involved in the company as Chairman and CEO during the first half of the 1980s, and during this time, the company was still run as an entrepreneurial company in which the fonder were involved in all the different aspects of h business and the day-to-day operations of the company (author's interview).

Table 16: IGT Product segment sales and game operations (MUSD), 1978-1985

Year	Amusement		
	Gaming product sales (MUSD)	Game product sales (MUSD)	Game operation revenues (MUSD)
1978	4,3	1,9	2,7
1979	5,2	5,7	7,8
1980	16,9	10,7	11,9
1981	32,7	10,9	16
1982	39,2	6,4	16,6
1983	37,6	6,4	18
1984	53,4	2,8	17
1985	43	1	12,5

Source: IGT Annual Report, 1981-1986, IGT Prospectus (1981).

Of all the experimentation with different types of video-based gaming machines that IGT undertook, it was video poker that became the most successful product by the end of the 1970s. When approaching the Nevada market, Si Redd initially used a similar sales technique that he had pioneered at Bally Distributing whereby they first rented their gaming machines to casinos and street venues on a revenue participation basis. Because IGT's video poker machines were sold at a considerable higher price than spinning reel gaming machines and at a premium compared to other video poker manufacturer, many operators were reluctant to buy the machines outright. However, the player appeal of IGT's video poker machines was such that they had considerable higher win/unit and after a renting period of a few months, most operators choose to purchase the machines. This strategy was especially important during the first years after video poker was introduced when IGT had to convince operators of the concept and the competitiveness of its video poker machines. Hence, in 1980 4.8 MUSD of the company's 16.9 MUSD sales of gaming machines were of gaming machines that IGT had rented to the operator on a participation basis (IGT Prospectus, 1981:14). In order to develop this sales technique, IGT built up a gaming machine route network in Nevada that served casinos and convenience venues. In the early 1980s, the company was the largest gaming machine route operator in the state of Nevada. For many operators with limited financial capital, gaming machine placement on a participation basis was a method to finance the purchase price of IGT's gaming machines and some operators were in debt to the company (IGT Prospectus, 1981:45). Besides being an

important sales channel, IGT's gaming route operations also put them in close contact with the local gamblers in Nevada. As argued later in chapter 6.3 this was important in guiding the innovative search of player appealing video poker designs and connects it to the preferences of the local gamblers that became its main market. The revenues from the IGT's gaming operations that included the games that it had on participation basis in Nevada grew rapidly until 1980, a result of that more operators started to buy their video poker directly and that competition in the gaming machine route market increased (Table 16).

The growth potential of video poker was not only limited to Nevada. At the beginning of the 1980s, IGT were generating an important stream of revenues from its video-based products as amusement games sold in other US states (Table 16). These were machines were "for amusement only" and sold without money payout features. In many US states, the regulation concerning the legality of these amusement machines were very vague at the time (IGT Prospectus, 1981:22). Over time, many states enforced regulation against these machines. The competition on this market also increased considerably in 1981 and the sales price level was considerably lower than for video-based gaming machines. This was a market environment of price competition in which IGT had difficulties to attract a significant premium price for their player appeal of their products and their revenues in this market decreased after 1981 (Table 16).

6.3. Video Poker as a new market disruption

"The players like the video poker because it has all the ingredients for the kind of game they want. They can sit down. They can be restful. They can stay there and play for hours. You really can't stand up and play a slot machine for any great length of time and comfortable. But with the video poker the player is rested. The player gets to make his own decisions and the game is not too fast for him or too tiresome. And most of all, some way or another, the player gets an extra thrill knowing he did something to help himself win"

Si Redd (Public Gaming, 1982:34).

In the theoretical part the difficulties that incumbent firm has when faced with new-market disruptions were discussed (Chapter 2.2.5 p 33). Such new-market innovations are not initially seen as a threat to incumbent firms because they initially create a new market segment and then later starts to attract customers from the incumbent firm's main market. Arguably, video poker could be characterized as a new-market disruption. The difficulties that Bally had in addressing this new market opportunity and IGT's ability to take advantage of it was shaped by this disruptive nature of the opportunity. In this chapter video poker as a new-market disruption is studied. Subsequently, the reason why it was disruptive against Bally's business model, but an opportunity for IGT is discussed.

The history of IGT's breakthrough with draw video poker illustrated the new-market disruptive opportunity of video-based gaming machines with its ability to broaden the appeal of gaming machines by making them more attractive to men and experienced players that enjoy risk and skill elements. Video Poker was able to grow largely based on its ability to attract and retain regular and local players.

Similar to other new-market disruption video-based gaming machines was first captured a specific niche market. As argued earlier, during most of the second half of the 1970s video-based gaming machines in various forms (video poker, video reel, video keno, video “21”, video dice, video horseracing etc.) were seen as novelty machines, often placed close to the entrance of casinos to attract customers. For a couple of years, video-based gaming machines were not able to reach out to the larger market.⁷⁶

When IGT released its draw video poker a few years later in 1979, it began to reach beyond this niche market status. It was when video draw poker included the game design “Jacks or Better” that they became profitable enough for many operators to use (Sion, 1996). During this time the underlying digital technology had developed rapidly which had been translated in improvement among many of the performance variables that makes gaming machines competitive among operators and players. Moore’s Law illustrated the rapid and consistent way in which chip technology developed (Mollick, 2006). Accordingly, chip performance increased at approximately 30 percent each year (Mollick, 2006).⁷⁷ Similar to the amusement video game market, video-based gaming machine technology went from discreet components to integrated circuits and microprocessors. The performance improvement from Moore’s law was clearly seen in the development of video-based gaming machines during their first early years. They went from a black and white version to color with sound, the graphics developed, and a payout schedule (Jacks or Better Draw Poker) that did catch on among players. The gaming machines themselves became more reliable and malfunction risk decreased. When microprocessor were used, it became possible to change the game on a machine just by replacing the memory chip with the game (IGT Prospectus, 1981:18).

Other improvements in performance variables were a result of IGT’s innovative search for more player appealing game designs that made the games better in line with gambler’s preferences. The successful “draw video poker” was the result of this innovative search and the several factors were underlying IGT’s innovative search during this period (discussed bellow).

IGT’s draw poker became a new market disruption that created new demand among local players and later also drew away some players from the mainstream spinning reel and table market. Arguably, a combination of many features made IGT’s video poker such a successful growth driver. The large variety of winning possibilities with many small and a few large jackpots, the skill elements involved that affected some of the chances of winning with some percentages, and the long playtime in relation to the amount of money wagered were the most important of these new features (see

Table 17). Of these factors, the skill element represented an entirely new performance variable for gaming machines. Video poker enabled decision making on part of the player and rewarded the player with a somewhat higher average payback percentage based on his level of skill during play. The hold percentage of video poker was on average around half that of a spinning reel machine with the same denomination (IGT, 2005), but operators made up for the lower hold percentage by the comparatively longer playtime (retention) that player spent on the machines and the high number of recurrent players.

Table 17: Video-poker as a new-market innovation in relation to electromechanical gaming machines

<i>More gambling for the money with more jackpot options</i>	Video poker offered more gambling time and a number of jackpots for the money compared to ordinary spinning reel games.
<i>Introduced the new element of skill into the gaming machine market</i>	Video poker introduced some elements of skill to the gaming machines, an area previously limited to the table game department. To a limited degree, patrons could influence the outcome of their play. This created a degree of interactivity with the game that not had been possible before.
<i>High retention of players</i>	Video poker had an ability to retain players longer during play and had a high degree of repeat players.
<i>Low degree of service and security problems</i>	Video poker had few service and security problems due to a lack of mechanical parts.
<i>Created new markets for gaming machines</i>	Video poker became the local players game. Its exceptional earning potential became an important driver in the creation of the neighborhood casino, as its skill and liberal playing time attracted local residents.

Source: Author's elaboration

Due to the skill element and comparatively long playtime for the money (if played skillfully) players that previously had found skill elements only in table games and local residents at neighborhood casinos that played regularly started to migrate to playing video poker. It was the combined effect of being the first to serve the cognitive preference for some (but not too much) skill in gambling among certain players and the long playtime for the money that enabled video poker to become something more than a novelty game and succeed in the emerging local gaming market.

Due to the growing population in Nevada in general and Las Vegas in particular, there was a growth in the potential market for local gamblers. However, video poker was the new-market disruption that provided the profitable underlying gambling activity that enabled this growth of the local gaming market that were seen in the growth of local casinos and convenience venues in Nevada.⁷⁸

It was primarily a rational economic response underlying the attraction of video poker among local residents.⁷⁹ For local players that had more time than money, an innovation that could prolong gambling time and at the same time offer elements of skill that kept play from getting as monotonous as ordinary spinning reel machines had much attraction value. The longer playing time of video poker was possible due to the player appeal of the machines and the variety of jackpots that was possible because of the technology.

"If you were to take \$100 and play slots, you'd get about an hour of play, but video poker was designed to give you two hours of play for that same \$100. That's because there are a number of smaller jackpots (straights, full houses, etc.) as well as the big jackpot (royal flush)." Si Redd in Koch (2001).

Given the different player preferences among the local experienced residents of Las Vegas and visitors to Nevada, the success of video poker in the local neighborhood casinos with regular customers (who competed more on the price of their gaming offerings (Eadington, 1999)) presented a clear rationale. Indeed, the initial player appeal for video poker was so large that IGT claimed that they on average had twice as much revenues compared to traditional spinning reel machines at the beginning of 1982 (*Public Gaming*, 1982b:46).

While traditional spinning reel machines had not been profitable enough for a number of street venues and neighborhood casinos, video poker had the revenue potential to create growth for these types of establishment (*Public Gaming* 1983b). Although no specific statistics regarding the increasing share of video poker was published by Nevada Gaming Control Board, a number of estimates support the view that video poker was essential for the growth of local casinos in Nevada. In an article from 1988, *Gaming & Wagering Business* estimated that video poker contributed far more than 50% of the gaming machine revenues at local-oriented casinos (Hevener, 1988:10).⁸⁰

The radically different preference for video poker by local residents (in comparison with visitors) in Las Vegas is also revealed in several surveys of player preferences. UNLV's Las Vegas resident poll found that already in 1984, 32% of gambling Las Vegas residents cited video poker as the game their preferred game and as of 1998 that share had increased to 54% (Schull, 2002). Other surveys confirmed this picture of the preferences among local gamblers for video poker and that this preference was considerably higher than for tourists.⁸¹

Not only local casinos proliferated from video poker. Video poker machines were also crucial in the growth of convenience gaming venues in Las Vegas, which were dominated by convenience stores, restaurants, bars, grocery stores, and drugstores that cater to local residents (*Nevada Quarterly Report*)⁸². When video gambling took off at the beginning of the 1980s, a gaming machine route operator emphasized the crucial importance of the technological shift to video gaming machines to the growth of these local markets.

"We have over 500 [gaming] machines in Las Vegas bars and only two of those are [spinning reel] slot machines. We cannot make enough money on the slot machine in a bar today to pay the license fee. Through I never thought I'd see it happen, I think the days of the traditional slot machine, certainly among experienced players like the locals in bars around here, are numbered." Colin Foster (*Public Gaming*, 1983:31)

Another slot route operator, Richard Iannone, at Gaming & Technology, Inc., (GATI) argued that a similar rapid expansion of video poker had taken place at their slot route, where the gaming machine mix had changed from around 10% video poker in 1982 to 80% in 1985 (*Gaming & Wagering Business*, 1985). Other accounts from gaming machine route operators from the late 1980s and 1990s also confirmed the huge dominance that video poker established in restricted gaming locations in Nevada.⁸³

The data of the total market share of video-based gaming machines during the 1980s is based on estimates from manufacturers and industry consultants, therefore less reliable and regular than data from state gaming regulatory agencies. Nevertheless, these estimates show the rapid growth of video-based gaming machines in general and video poker machines in particular. IGT estimated that in the beginning of 1982 around 9% of the total installed base of gaming machines in the US consisted of video-based gaming machines, primarily video poker (Selesner, 1982a:43). Another estimate from later that same year estimated the installed base to 10-12% (10-12.000 machines) (*Wall Street Journal*, 1982). As of 1986, the share of video-based gaming machines in Nevada had increased to 19-24% (20.000-25.000 machines) (*Gaming & Wagering Business*, 1986b).⁸⁴In the middle of 1988, IGT estimated that the penetration of video poker had increased to around 28% (34,000 machines) of installed base in Nevada (Hevener, 1988:10). In 2003, it was estimated that video poker consisted of around 28% of the total installed base of US casino gaming machines (Deutsche Bank, 2003:19).

6.3.31. Rationale for Bally's initial neglect of the video based gaming market

When studying the rationale behind Bally's initial neglect of the video poker, one must keep in mind the high degree of uncertainty regarding the potential of video-based gaming machines in the middle of the 1970s. Moreover, there is limited available material regarding the underlying decisions that led to this neglect, which means that there are some risks involved in assessing this rationale.

According to the theory of disruptive innovations, the market incentives of new market innovations are not initially attractive in relation to the business model of incumbent firms (see chapter 2.2.5). Viewed from this perspective, it is possible to argue that the rationale behind incumbent Bally's neglect of what initially was a specialty product ill suited to its business model. As a new-market disruption, Bally did not initially see these specialty products as a threat to its electromechanical spinning reel business, but instead as products in a small, specific market of its own.

Market incentives that make it difficult for incumbent firms to pursue disruptive innovation meant that video gaming machines initially were ill suited to the resource allocation policy that was underlying Bally's business model. Video gaming machines were initially manufactured in such small quantities and by such a different, specific manufacturing and assembly process (compared to spinning reel gaming machines) that the fixed overhead costs of Bally made the company's scale and scope in manufacturing the machines disadvantageous.

The uncertainties involved in video poker did also involve cognitive difficulties of interpreting and evaluating the new opportunity. Bally had much more difficulty in picking up early market signals of the opportunities of video based gaming machines. With Bally's focus on a main market of spinning reel gaming machines, they were also at risk of interpreting the video poker opportunities based on biased existing views of what constitute player appeal from the spinning-reel market. This view was different, and in some respect in complete conflict with the player appeal involved in video poker. This was e.g. seen in such dichotomies in the player appeal of video poker and spinning reel gaming machines as skill element vs chance and long playtime vs. short playtime. Organizational structure might also have contributed to Bally's difficulties to see the new innovative opportunities. Both the more hierarchical organization with structured committee-based decision making regarding R&D activities might have had made it difficult for the new-market disruption to win support. This was further amplified by Bally's geographical location in Illinois, far from the market. Si Redd, who was closer to the market and with previous experiences from the specialty machine market and amusement game, was better positioned for the video poker market opportunity. Bally's geographic location with its production and headquarter in Illinois being far away from the market in Nevada might have further aggravated this difficulty.

Besides these explanations, intra firm resource competition might have played the most important role in the neglect of the video poker. Bally had a strong R&D center focused on electromechanical gaming machine technology in Illinois and the prospect of Bally Distributing in Nevada developing video poker might have seemed like a threat that competed for resources. This threat was further emphasized by the fact that video poker made obsolete the reel and handle mechanism of electromechanical spinning reel machines. Hence, in this specific case video poker

was potentially cannibalizing both to the geographical and technological basis of the R&D activities of Bally in Illinois. As argued in the upcoming chapter 0, this dynamic of resource competition could be seen around the same time when efforts to develop a new digital spinning reel gaming machines were taken by Bally in a new research center in Nevada, which soon were met with strong opposition in Illinois.

6.3.32. IGT as the new-market disruptor

The previous chapter described video poker as a new market disruption. IGT was a first mover in the video-poker market, but even after when other competitors entered the market, the company's video poker machines remained the most player appealing in the industry. This chapter will focus on how IGT's business model suited for the new-market disruption.

As a new-market disruption, IGT had advantages in the form of more favorable initial market-incentives to approach the video poker market than Bally had. These market incentives existed already at the time when Bally Distributing was involved in the specialty gaming machine market that Bally Manufacturing shunned. With a different production technology compared to electromechanical spinning-reel machines and an initial small market, Bally Distributing had market incentives to be involved in specialty game machine production that Bally Manufacturing lacked. Because microprocessor based video gaming machines had replaced many of the complex mechanical parts involved in the manufacturing of mechanical gaming machines (see chapter 5.2.25 p 104), the manufacturing barriers to enter the video poker market was lower for a new, small companies. However, as argued in the theoretical part of this study, new-market disruptions also involves other forms of difficulties related to the uncertainties involved in new-market opportunities that go beyond issues of market incentives. The ability to interpret the new emerging market as it develops, the creation of a business model that suites the new market and the revisiting of deeply held cognitive assumption (stemming from the products of the mainstream market) of what constitute the nature of the products might be important issues in such a new market (Chapter 2.2.6). Moreover, the new-market might requires new types of firm capabilities (2.2.4) and the comparative advantages of a specific organizational structure of a firm might change if the new-market disruption also involves changes in the underlying production technology (see chapter 2.2.7).

In the previous chapter (6.3) regarding the new-market nature of video poker it was emphasized that video poker involved very different characteristics compared to spinning-reel machines (skill instead of pure chance, long playtime instead of short etc.). As a result, the new market required the revisiting of deeply held assumptions of what constitute the nature of the player appeal of gaming machines. The new-market for video poker machines of local gamblers had their specific preferences compared to the mainstream market. It was a long period of innovative search before a player appealing design of video poker emerged on the market at the end of the 1970s that could take video poker from its niche market status.

Hence, the new uncertain market required an ability to interpret the new market. Arguably, both the personal skills of Si Redd, the R&D capabilities in digital gaming technology that IGT developed, the companies sales strategy and its close contact with the market where important parts of its early success with video poker.

Early on, Si Redd's personal intrinsic understanding of different players and network in the industry was important. Compared to Bally, which did not do extensive player feedback at the time (Author's interview), IGT early on did use an external research firm (Drossler Research Corp.) to study the specific player characteristics of some of their video gaming products in the

early 1980s (*Public Gaming*, 1981). As discussed earlier, IGT also employed a number of experienced casino managers with extensive knowledge of the market and player preferences (Selesner, 1982a). With both development and manufacturing facilities in Nevada, IGT was close to its casino customers. This close proximity most likely contributed positively to refining IGT's ability to interpret the new market.

As a new market disruption, the contact with the new emerging market for video poker in the form of local gamblers that was somewhat different from the main casino gamblers was important. Si Redd early on acquired a lucrative slot route, Casino Services, which enabled his company to be in constant connection with gaming market for local players that would come to dominate the video poker market. This contact with the local players throughout the slot route helped the company to interpret the new emerging market for its video-based products in the ongoing explorative process. Video Poker was perfected through several years of trials in the market whereby new altered versions were introduced.

With IGT's ability to acquire companies at the forefront of digital gaming technology as well as attracting individuals in the field, the company soon developed the R&D capabilities that were needed for the new technology.

In the uncertain new-market, it was also of utter importance to overcome the resistance towards video poker with its initial high sales price (see below). As argued earlier, IGT's sales strategies and their financial business model for sales was very successful in this regard through its leasing models (6.2.30). With its sole focus on video-based technology, the IGT did not have any company internal group interest in the old technology that it had to overcome. The strategy of constantly introducing new player appealing innovation that Si Redd had during his time at Bally Distributing was present in IGT as well.⁸⁵

IGT had also developed an organizational structure that was better adapted to the more modular production technology of video poker gaming. As an entrepreneurial company owned by its founder (until 1981), Si Redd could take decision based on his personal beliefs of the new market and the company did not have the layers of hierarchy that could make it difficult to interpret the signals coming from the new-market. The geographical location of its operations in Nevada where the market was a significant advantage when interpreting the new market compared to Bally in Illinois.

In contrast with the vertically integrated manufacturing at Bally, IGT had also developed a less integrated firm in production that could rapidly respond to the volatile new video gaming market environment.

"Basically, I haven't been a strong believer in vertical integration, although there are selected opportunities. I like to keep our fixed costs low because of our rapid growth in the past few years and we have been able to expand using multiple sources of suppliers to provide all the basic components. It gives us a great deal of flexibility in making quick shifts within the product mix and enables rapid expansion." George Drews, President IGT 1984 (*Public Gaming* March 1984)

The response to more flexible production was also built into the IGT's products. The game on microprocessor video-based machines could be changed by setting in a new memory chip on the circuit board. When IGT released their Fortune II gaming machine platform in 1983, it had one cabinet and one set of electronics that could accommodate any program memory within the line (*Public Gaming*, 1983)⁸⁶.

Video poker as an innovative opportunity represented the beginning of the shift to digital technology in the industry, an era of discontinuous innovative opportunities for the gaming

machine industry with specific characteristics. The technological shift was the beginning of an innovative period in the gaming machine industry when it became possible to reap higher Schumpeterian rents by introducing new player appealing games with an extent and frequency that had not been possible before. Video poker was the first example of this as the increased player appeal of IGT's video poker machines enabled them to reap considerably higher win/unit than spinning reel gaming machines that could be translated to premium sales price. Later on, other gaming machine innovations would have the same effect. It was a pattern of Schumpeterian rents that would be repeated again during the 1980s onward in the gaming machine industry. As depicted in this empirical study, WAP games, some themed and branded gaming machines (e.g. Wheel of Fortune), multi-hand video poker) and other games were all able to provide significant above average win/unit and hence render a higher selling price for their manufacturer after the introduction.

As a result of this new period of creative destruction the gaming machine industry transformed itself from an industry with rather homogenous spinning reel machines to one in which the market became divided between commoditized regular gaming machines with low margins and high performing machines for which manufacturer could reap extensive Schumpeterian profits through high selling prices or revenue sharing agreements. Gaming machine manufacturers with IGT at the forefront developed a business model where they only rented many of the most successful high performing machines to casinos. However, increasing competition, price reduction due to Moore's Law, and the ability to decrease costs by combining a number of discreet components into a single microchip rapidly brought down prices for video poker. IGT who had sold their video poker machines for 12,000 USD/unit at the end of the 1970s reduced their prices to 7,500 USD/unit by the end of 1982 (Selesner, 1982c). By comparison, spinning-reel gaming machines sold for less, 4000-6000 USD/unit at the same time (Selesner, 1982c). The increasing competition in the video poker market was the primary reason for the rapid decline in price. This increasing competition and its impact on IGT in the video poker market is the subject of the next chapter.

6.3.33. New competitors in the video poker market

"There isn't a week that goes by that I don't get some literature from a different company manufacturing a [video] poker machine. Everyone and their brother is manufacturing these poker machines, so it is very important who you deal with. A lot of people who've sent these poker machine materials no longer exist."

Mando Rueda (1983), VP Gaming, Harrah's (Public gaming, August 1983:44)

After the period 1979-1981 in which IGT could sell its video poker games at a significant premium price, the competitive environment for the video poker became much more competitive. A number of small manufacturers entered the market and subsequently Bally entered the Nevada market as well in 1984. In the middle of the 1980s, the competitive situation became even fiercer when a number of Japanese companies established themselves on the Nevada market.

In the video poker market, the rapid growth of video poker and the high premium price that IGT had sent out signals of the profit opportunities in the market that attracted a number of companies. The manufacturing barriers to enter the industry were also significantly lower due to the shift to digital technology. A few standardized electronic components replaced much of the complex electromechanical manufacturing and assembly that had previously had characterized

gaming machine production. Service problems did also decrease.⁸⁷ Some of the new firms that entered the US market were also attracted by the growth in New Jersey and the specific regulation of the new jurisdiction. The New Jersey regulation forced casino operators to buy no more than 50% of their equipment from a single supplier (see Appendix 1 p 236). As a result, most casinos bought close to their limits of machines from Bally and then bought the remainder from other manufacturers.

Table 18: Gaming machine manufacturers on the US market, 1981 and 1982

Company	Subsidiary	State (Country for non-US)	Key personel	Distributor	Distributing	Nevada gaming License (1982)	Product line (1982)
<i>Advanced Patent Technology (APT)</i> (founded 1968) and its subsidiary <i>United Coin Machines</i> . Changed name to Gaming & Technology Inc in 1982, to United Gaming Inc in 1988 and to Alliance Gaming Corp. in 1994. Acquired Omega Products in 1984.		Nevada	Richard Iannone, President. Randy C Miller, General Manager	United Coin Machine	Status Game	Yes (1968)	Electromechanical spinning reel, Video gaming
<i>Amstar Electronics</i>		Arizona	Hank Vandendrop, president; Don Reed, VP/GM	Silver Slots		Yes	Video gaming Electromechanical spinning reel machines, electronic spinning reel machines, video gaming
<i>Bally Manufacturing Corp.</i>		Illinois	Mahlon Barber, president gaming division; Alan Maiss, president	Bally Distributing		Yes (1974)	gaming machines, video gaming
<i>Games of Nevada. Acquired by Progressive Gaming in 1995</i>		Nevada	Mickey Wichinsky, owner; Victor Tsao, chief engineer; John Rosenberger, R&D		Bell Fruit	Yes	Video gaming
<i>Harwyn Industries</i> and its subsidiary <i>Comet Press</i> (distributor)		New Jersey	John R O'Donnel, president; Perry, executive VP finance		Christopher	No	Electronic spinning reel machines, video gaming
<i>International Game Technology (IGT)</i>		Nevada	Si Redd, chairman & CEO; George Drew, president; John Bengtsin, VP/mktg Julia Gillmann, GM; Don Hutmier, director of mktg;		Aristocrat	Yes (1976)	Electronic spinning reel machines, Video Gaming
<i>Meyco Games</i>		California	Robert Meyer,	Comstock games ; Mills Novelty		Yes	Video gaming

president

<i>Nevada Novelty Omega Enterprises and its subsidiaries Cal-Omega and Casino Electronics. Acquired by Gaming & Technology Inc (Advanced Patent Technology) in 1984.</i>	Nevada	Louis Benneti, owner; Arnie Franklin, VP/merch.	Yes (1978)	Video gaming
	California	Stan Fulton, VP; Jef Sarno, Chief engr; Lou Pavloff director intl sales	Yes	Video gaming
	Connecticut	Irv Yaffa President, Larry Dunn VP	Distributed through Advance Patent Technology	Video gaming
<i>Summit System and its subsidiary Playtime Distributing (formerly Game Plan of Nevada).</i>	California	James Halverson, President, Inge Telnaes, director of mktg, Dan Duley mktg, Gary Burnett mtg	Yes	Electronic spinning reel machines, Video Gaming, Conversion kits

Non US Gaming manufacturers with US distributors

<i>Ainsworth Nominees, Aristocrat</i>	Australia (New South Wales)	Graeme Fullerton, mgr international operations IGT C W Pinkerton, chairman; Jim Stevenson, managing director	Distributed through IGT	Electronic spinning reel machines
<i>Bell-Fruit Manufacturing Co. Ltd</i>	England	John Lane, export sale mgr; Phil Thomas, export sales exec.	Distributed through Games of Nevada)	Electronic spinning reel machines, video gaming
<i>J.P.M. (Automatic Machines) Ltd.</i>	England	Levin Computer (with its subsidiary Trans Atlantic Game). Did not have a gaming license in Nevada and New Jersey due to regulatory problem.	No	Electronic spinning reel machines

Source: Gaming Business Magazine (1982), Public Gaming Magazine (1981b), Public Gaming Magazine (1982a), Selesner (1980a)..

The new firms entering the US gaming machine market at the end of the 1970s and early 1980s were a combination of start-ups, US firms engaged in other industries, and gaming machine manufacturers from other countries (see Table 18). Some of these companies were only focused on video-based gaming machines. In the early 1981 four companies were in the process of developing vide-based gaming machines (Game-A-Tron, Summit System, GDI and OTX) As

of 1982 the number of video based gaming machine competitor had increased to 12 companies. Of these companies, about half of them were only focused on the video-based gaming machine with the rest of the companies involved in spinning-reel gaming machines as well (Table 18). Given this rapid influx of new companies in the market 1981 and onward, the subsequent downward price pressure was not surprising.

While casino managers were interested in companies with new innovative products, they were reluctant to buy from many of the smaller, unproven companies due to the risk of future supply of reserve parts and an unproven history of service, machine reliability, and player appeal.

Subsequently the competition increased further in 1984 when two large Japanese gaming machine manufacturers (Sigma Game and Universal) entered the Nevada market at the same time that Bally was legally able to enter the video poker market in Nevada. IGT's non-compete agreement with Bally had given IGT a respite to build up its own firm competencies in video gaming without having to compete with Bally in video-based gaming for almost a decade. After the video-poker market took off around 1980, Bally tried to enter the market prior to the end of the non-compete period. However, IGT successfully pursued legal actions against Bally in 1982 and the Federal Court in Nevada imposed a restraining order on Bally that hindered them from manufacturing, selling or leasing video poker machines until their non-compete agreement actually ended (NYT, 1982; *Las Vegas Review-Journal*, 1991).

The geographical location of the new US manufacturers that entered the market at was primary the state of Nevada and California (Table 18). This was a notable shift from the dominance of manufacturers in the state of Illinois that had characterized the mechanical era of gaming machines. It was a reflection that the access to skills in digital technology as well as proximity to the market had become much more important in gaming machine industry in connection to the shift to digital technology in the industry. During the middle of the 1980s, the new competition to IGT's video poker machines came from Sigma, Universal and Bally Manufacturing. Compared to the other small gaming machine companies, Bally and Universal had resources to compete in the video poker market that many of the other small video-poker companies lacked.

The innovators advantage of Schumpeterian rents that IGT decreased rapidly. Previously IGT had been able to transform this first mover innovative advantage to a considerable premium prices for their video-based gaming machines. However, the increased competition on the market meant that IGT had to lower their average selling price for their video poker machines considerably.⁸⁸

For IGT, the competitive market conditions in video-based gaming machines after the successful 1979-1981 period were reflected in the company's financials. After 1981, revenue growth stagnated until 1986 and during the same time, a high operational profit turned into a considerable operational loss (

Table 15 p 127). The total number of gaming machines that IGT shipped had stagnated to around 5000 unit/year during the period 1982-1984 (see Table 19).

Table 19: IGT gaming machines shipped, 1982-2005

Year	Number of gaming machines shipped
1982	4812
1983	4670
1984	4698
1985	7143
1986	9645
1987	11875
1988	13404
1989	18708
1990	26981
1991	31000
1992	46100
1993	68900
1994	95000
1995	73000
1996	85000
1997	78000
1998	76955
1999	115982
2000	100907
2001	119864
2002	124000
2003	134805
2004	159200
2005	141900

Source: IGT Fact Sheet (1991), *IGT Annual Reports* (various years).

Following the difficult conditions that IGT encountered, the company had to make a strategic change of its business. In many regards, the declining price of video poker followed a common pattern for electronic industries when further innovation in a specific product segment became more difficult and different barriers to hinder imitation by the competition was absent. In the amusement video game industry, a similar dynamic had occurred after Atari released Pong in 1972 and a number of competitor had entered the market with rapidly declining prices as a result (Ernkvist, 2008). The development followed Schumpeter's discussion of how the innovators Schumpeterian rents are recognized by other actors in the system with the result that the first mover Schumpeterian rents for the innovator rapidly decreases. The context of a shift to digital technology shaped this general pattern in its own specific way. In many instances, a shift to digital technology often lowered the barrier to entrance by simplifying the manufacturing process (see Braun & Macdonald, 1982). At the same time, Moore's Law made possible a rapid price reduction of the digital parts involved (microprocessor, memory chips). Combined, these factors produced an intense competitive market with rapidly falling prices. In the US video poker market there were little in terms of IP that could hinder the influx of competition. However, even in such

case as the amusement game industry where patent for the Pong concept existed, this did little to hinder the large number of companies that entered the market (see Baer, 2005). In the amusement video game market, constant innovation had been the solution for Atari (Ernkvist, 2008).

During IGT's early years, Si Redd had a similar strategy to constantly fuel the process of creative destruction so that the company could stay ahead of the competition and reap new Schumpeterian rents. However, unlike the arcade video game market in which players embraced the constant introduction of new video game concepts, IGT's strategy was more difficult in the gaming machine industry. IGT envisioned that a number of new concepts, even a previously unfamiliar concept for the gaming industry, would be introduced through video gaming machines. Moreover, the company also expressed the view that the market could grow to as much as "60, 70 or 80 percent" (Selesner, 1980: 43).

"We [IGT] believe that this [video gaming machines] is the future of the industry. Someday, it may be three years it may be two years, but we must come to it. And, not to be immodest, but I have always been a proponent of coming up with something new, I've always believed if you don't obsolete your own equipment, somebody else will." Si Redd, March 1980, cited in Selesner (1980)

These far-reaching visions proved to be too optimistic for remainder of the 1980s. Video-based gaming machines continued to grow, but not as fast as these predictions. Other game concepts than video poker did not become as successful and it was first in the 1990s that video-reel gaming machine growth took off. The VLT (Video Lottery Terminal) market that could have provided growth opportunities for video-based gaming machines in different US-states did not start its legalization process before the end of the 1980s.

In the second half of the 1980s, IGT managed to transform itself from a company almost solely dependent on video-based gaming machines to a broader manufacturer of digital spinning-reel gaming machines and as an innovator in WAP (Wide Area Progressive) games. The company also changed to a more market driven and international company. This strategic change coincided with a change of management as a broker, Charles Mathewson, took over as CEO and Chairman. The subsequent two chapters describe the development in these market segments (spinning-reel gaming machines and WAP games). It starts with the description of how the shift to digital technology influenced the spinning-reel market segment that had been the only dominating market segment before video-based gaming machines.

7. Bibliography

8. Primary Sources

8.1.34. Archival material

UNLV Special Collections.

8.1.35. Interviews, oral history and personal communications

Personal Interviews conducted by author (manager may refer to former as well as current position)

Interview with Manager, Gaming Manufacturer: December 2007
Interview with Manager, Gaming Manufacturer: December 2007
Interview with Manager, Gaming Manufacturer: December 2007
Interview with Manager Gaming Manufacturer. May 2006
Interview with Manager, Gaming Industry Analyst, May 2006
Interview with Manager, Gaming Machine Distributor: April 2006
Interview with Manager Gaming Manufacturer: November 2005
Interview with Manager Gaming Manufacturer: November 2005
Interview with Manager, Casino, May 2006

Personal communication:

Manager, Gaming manufacturer, April 2007
Manager, Gaming manufacturer, April 2007
Manager, Gaming manufacturer, December 2007
Manager, Gaming manufacturer: January 2008

Oral histories conducted by others

Dixon, M (1992). Playing the cards that are dealt: Mead Dixon, the law, and casino gaming. Interviewed by Ken Adams. University of Nevada Oral History Program.
Gavin Isaacs, Executive Vice President, Bally. Interviewed by Frank Legato for *Global Gaming Business Magazine*, October, 2006.
KNPR (2005). "The Las Vegas I Remember: Si Redd" Radio interview with Si Redd (unknown date). Retrieved August 15, 2005. Available at: <http://www.knpr.org/LVIR/detail.cfm?FeatureID=2435>
Marcus Prater, President of Marketing, Bally. Interviewed by Frank Legato for *Global Gaming Business Magazine*, November, 2006.
Nelson, W (1994). Always bet on the butcher: Warren Nelson and casino gaming, 1930s-1980s. Interviewed by Ken Adams. University of Nevada Oral History Program.
Richard Haddrill, CEO, Bally. Interviewed by Frank Legato for *Global Gaming Business Magazine*, October, 2006.
Tim Parrot, CEO Aristocrat. Interviewed by Frank Legato for *Global Gaming Business Magazine*, September, 2006.
Tom Nieman, VP Gaming Solutions, JCM. Interviewed by Frank Legato for *Global Gaming Business Magazine*, February, 2007.

8.1.36. Official publications and databases

ACCVA (various years). Visitors Profile Study. Atlantic City Convention & Visitors Authority.

Findlaw (1999). WMS Gaming Inc v. International Game Technology. United States Court of Appeals for the Federal Circuit, Nos. 97-1307,98-1053.

IGT v. Global Gaming Technology Inc (1999) United States Court of Appeals for the Federal Circuit. Nos. 98-1246, 98-1390.

Kefauver, E. (1950a). First interim report of the special committee to investigate organized crime in interstate commerce. Senate Report 2370, August 18, Washington: United States Government Printing Office.
Retrieved August 1, 2007 from

<http://www.nevadaobserver.com/Reading%20Room%20Documents/Kefauver%201st%20Interim%20Report.htm>

- Kefauver, E. (1950b). Virgil Peterson hearings before the special committee to investigate organized crime in interstate commerce. Second part, December 18, Washington: United States Government Printing Office.
- Kefauver, E. (1950c). William J. Moore hearings before the special committee to investigate organized crime in interstate commerce. Second part, November 15, Washington: United States Government Printing Office.
- Kefauver, E. (1951a). Second interim report of the special committee to investigate organized crime in interstate commerce. Senate Report 141, January 29, Washington: United States Government Printing Office.
- Kefauver, E. (1951b). Third interim report of the special committee to investigate organized crime in interstate commerce. Senate Report 307, May 1, Washington: United States Government Printing Office.
- Kefauver, E. (1951c). Final report of the special committee to investigate organized crime in interstate commerce. Senate Report 725, August 31, Washington: United States Government Printing Office.
- LVCVA (2004a) "Las Vegas Visitor Profile" Las Vegas Convention and Visitors Authority.
- LVCVA (2004b) "Clark County Residents Study" Las Vegas Convention and Visitors Authority.
- LVCVA (2006a) "Las Vegas Visitor Profile, Calendar Year 2006" Las Vegas Convention and Visitors Authority.
- LVCVA (2006b) "2006 Clark County Residents Study" Las Vegas Convention and Visitors Authority.
- LVCVA (2008). "Historical Las Vegas Visitor Statistics, 1970-2007". Las Vegas Convention and Visitors Authority. Retrieved July 1, 2008 from <http://www.lvcva.com/press/statistics-facts/index.jsp>
- Nevada Gaming Control Board, Quarterly Report. (various years)
- Nevada Gaming Control Board, Nevada Gaming Abstract (various years)
- Nevada Gaming Control Board, Gaming Revenue Report (various years)
- Nevada State Gaming Control Board (1983). Agenda Item 6 "New Games/Devices (Request for Approval) Device: Virtual Reel Slot Machine." Transcript of discussions, pp. i, ii, iii, 2-97. Sierra Nevada Reporters. August 10. Carson City, NV.
- Nevada Gaming Commission (1988a). Nevada State Gaming Control Board v. Universal Distributing of Nevada. Complaint for disciplinary action. Case-No. 88-4. April 29: 1-15.
- Nevada Gaming Commission (1988b). Nevada State Gaming Control Board v. Universal Distributing of Nevada. Stipulation and Order. Case-No. 88-4. September 22: 1-8
- Nevada Gaming Commission (1989a). Hearing to consider: Further action required pursuant to the declaratory ruling issued on December 1, 1988, by the Nevada Gaming Commission, as described therein, and in the Stipulation and Order approved by the Nevada Gaming Commission on September 22, 1988, in the matter of Universal Company, Ltd., and Universal Distributing of Nevada, Inc., Case No. 88-4. January 26, Las Vegas, Nevada. Sierra Nevada Reporters: 212-308.
- Nevada Gaming Commission (1989b). Hearing to consider: Universal's Motion for Reconsideration/Rehearing of the Decision of Nevada Gaming Commission made on December 1, 1988, concerning Universal's Petition for Declaratory Ruling, and if necessary, a hearing to consider further action required pursuant to the decisions of the Nevada Gaming Commission made on December 1, 1988, and February 23, 1989, and pursuant to the Stipulation and Order approved and entered by the Nevada Gaming Commission on September 22, 1988, in the matter of Universal Company, Ltd., and Universal Distributing of Nevada, Inc., Case No. 88-4. February 23, Las Vegas, Nevada. Sierra Nevada Reporters: 256-300.
- Nevada Gaming Commission (1989c). In the matter of the petition of Universal Co., Ltd, and Universal Distributing of Nevada, Inc, for a declaratory ruling. Declaratory Order. Case-No. 88-8. March 15.
- Nevada Gaming Control Act (2007). Regulation 14, revision 03/06. Nevada Gaming Commission. Retrieved December 2007 from http://gaming.nv.gov/stats_regs/reg14.pdf
- New Jersey Casino Control Commission. Quarterly Financial Reports (various years).
- New Jersey Casino Control Commission. Monthly Gross Revenue Tax Returns (various years). (Add years to both of these, if possible)
- New Jersey Casino Control Commission. New Jersey Casino Control Act. New Jersey Casino Control Commission. New Jersey Casino Control Commission Regulations.

- NGISC (1999). National Gambling Impact Study Commission Final Report. Report to the Congress. Retrieved August 1, 2005 from <http://govinfo.library.unt.edu/ngisc/reports/fullrpt.html>
- NORC (1999a). Gambling impact and behaviour study. Report to the National Gambling Impact Study Commission, April 1. Retrieved March 1, 2008 from <http://www2.norc.org/new/gamb-fin.htm>
- NORC (1999b). Gambling impact and behaviour study. Appendix D.. Retrieved March 1, 2008 from <http://www2.norc.org/new/gamb-fin.htm>
- NPTG (1976). Gambling in America. US Commission on the Review of the National Policy Toward Gambling. Washington, D. C. .
- NRS (2005). Nevada Gaming Control Act and Ancillary Statutes. Nevada Gaming Commission and State Gaming Control Board.
- Productivity Commission (1999) Australia's Gambling Industries., Report No. 10, AusInfo, Canberra. Available at: HYPERLINK "http://www.pc.gov.au/inquiry/gambling/finalreport/index.html" <http://www.pc.gov.au/inquiry/gambling/finalreport/index.html>
- United States Patent and Trademark Office (USPTO), Patent Full-Text and Full-Page Image Database of issued patents. (is this a separate entry or a continuation?)
- US Census Bureau (2003). HS-41, Transportation indicators for motor vehicles and airlines, 1900 to 2001. *Statistical Abstract of the United States 2003*. US Census Bureau.
- US Court of Appeals (1999). "WMS Gaming v. International Game Technology, 97-1307,98-1053". Retrieved August 1, 2007, from <http://www.ll.georgetown.edu/federal/judicial/fed/opinions/97opinions/97-1307.html>
- US Court of Appeals (2005)"Action Gaming, Inc .,and IGT, v. Alliance Gaming Corp and United Coin Machine Co. and Bally Gaming". Appeal from the United States District Court for the District of Nevada in Case No. 01-CV-1109.
- United States District Court for the Northern District of Illinois, Eastern Division (1981). Fred ZILKER, etc., Plaintiff, v. Sam W. KLEIN et al., Defendants. Casa No. 77C1672. April 6, 1981.
- WMS Gaming Inc. v. International Game Technology (1996). Memorandum opinion findings of fact and conclusions of law. James F Holderman, District Judge. Case No 94 C 3062. United States District Court for the Northern District of Illinois, Eastern Division. September 19, 1996

8.1.37. Company Publications

- Alliance Gaming (1996).
- Ainsworth Game Technology (2001). Ainsworth IPO Prospect. *Ainsworth Game Technology*. Retrieved August 1, 2007 from http://www.ainsworth.com.au/investor_prospectus.htm
- Anchor Gaming, Annual Report (various years).
- Aristocrat Prospect (1996). Aristocrat Leisure Limited, Prospectus, 3 June. Macquarie Underwriting Limited: 1-106.
- Aristocrat (2007) "Aristocrat History". *Aristocrat Gaming*. Retrieved June 1, 2007 from <http://www.aristocratgaming.com/history.aspx>
- Aruze (2007a). "Aruze's product history for the Japanese domestic market". Aruze. Retrieved September 1, 2007 from http://www.aruze.com/en/company/profile/profile2007_pdf/45_50.pdf
- Aruze (2007b). "Aruze's product history for the overseas gaming market". Aruze. Retrieved September 1, 2007 from http://www.aruze.com/en/company/profile/profile2007_pdf/51_55.pdf
- Alliance Gaming, Annual Report (various years).
- Bally Serive Instructions & Parts Catalog (1973, September). Slot machines service instructions & parts catalog, all standard 3 reel models. Manual number 2400. Bally Manufacturing Corporation.
- Bally Gaming, Annual Report (various years).
- Bally Gaming (2006) *The History of Bally Technologies: A Remarkable 75 Years as the Leading Name in Gaming*. Bally Gaming.
- Bally Gaming International Prospectus (1991). November 11. SEC filing number 3342227
- Bally Gaming International Prospectus (1992). September 23. SEC filing number 3348694
- Bally Gaming International, Annual Report (1991-1995).
- Bally Gaming International (1991-1995). Quarterly financial reports.
- Bally Manufacturing Annual Report (various years)

- Bally Manufacturing Corporation (1979). "An Introduction to Bally Slot Machines", Manual 6000. Bally Manufacturing Corporation.
- Bally Technologies, Annual Report (various years).
- Casino Data Systems, Annual Report (various years).
- Christiansen Capital Advisor (various years). "Gross annual wages of the United States".
- Harrah's (1991-2006) "Profile of American Casino Gambler". Harrah's.
- IGT, Annual Report (1981-2007)
- IGT Prospectus (1981). International Game Technology Prospectus, October 22. Merrill Lynch White Weld Capital Market Group. SEC file number 273053
- IGT (2005) "Introduction to Slots and Video Gaming", IGT, available at <http://media.igt.com/Marketing/PromotionalLiterature/IntroductionToGaming.pdf>
- IGT (2006) "A Brave New World...An Introduction to Server- Based Gaming". Special edition of *Slot Line*, February 2006. Available at: http://media.igt.com/marketing/PromotionalLiterature/SlotLine_sb.pdf
- IGT (2007) "Gaming glossary". IGT. Retrieved July 1, 2007 from <http://www.igt.com/Content/base.asp?pid=8.17.36.14>
- IGT (2007b). "A history of pachisuro slot machines). IGT. Retrieved August 1, 2007 from <http://www.igt.com/Content/base.asp?pid=8.17.36.242&bhcp=1>
- IGT (2007c). "A short history of gaming machines". IGT. Retrieved August 1, 2007 from <http://www.igt.com/Content/base.asp?pid=8.17.36.15>
- Jackpot Enterprises, Inc., Annual Report (various years).
- Progressive Gaming, Annual Report (various years).
- Rodesch Associates (2007). Casino Machines. Retrieved December 31, 2007 from <http://www.rodesch.com/navcas.html>
- Silicon Gaming, Inc., Annual Report (various years).
- Multimedia Games, Annual Report (various years)
- WMS Gaming, Annual Report (various years).
- WMS Gaming (2000). "WMS Industries and IGT Settle Patent and Antitrust Litigation; WMS Enters Into Patent License with Anchor Gaming". WMS Gaming, September 19. Retrieved August 1, 2007 from <http://ir.wmsgaming.com/phoenix.zhtml?c=76037&p=irol-newsArticle&ID=117908&highlight=>

8.1.38. Periodicals and Newspapers

- Casino Journal*
- Chicago Sun-Times*
- Gaming Business Magazine*
- Gaming & Wagering Business*
- Global Gaming Business*
- International Gaming & Wagering Business*
- Las Vegas Business Press*
- Las Vegas Review-Journal*
- Las Vegas Sun*
- Loose change*
- Los Angeles Times*
- New York Times*
- Public Gaming Magazine*
- Reno Gazette Journal*
- Spectrum Gaming Group* (publisher of Michael Pollock's *Gaming Industry Observer*).
- Strictly Slots*
- Time Magazine*

9. Secondary Sources

- Ackerman, F. (1997). Consumed in theory: Alternative perspectives on the economics of consumption". *Journal of Economic Issues*, 31(3): 651-664.

- Adams, M, Day, G., & Dougherty, D. (1998). "Enhancing new product development performance: An organizational learning perspective". *Journal of Product Innovation Management*, 15: 403-422.
- AGA (various years), "States of the States: the AGA survey of Casino Entertainment" American Gaming Association.
- AIPC (2006). "The changing electronic gaming machine (EGM) industry and technology". Victorian Gambling Research Panel. Retrieved August, 1, 2007 from http://www.justice.vic.gov.au/wps/wcm/connect/DOJ+Internet/resources/file/eb1b9c414fca0cd/Changing_EGM_industry_and_technology_full.pdf
- Aldrich, H. & Martinez, M. A. (2001, Summer). "Many are called, but few are chosen: An evolutionary perspective for the study of entrepreneurship". *Entrepreneurship Theory and Practice*, 41-56.
- Alvarez, S. & Barney, J. (2006) "Discovery and creation: Alternative theories of entrepreneurial action". Fisher College of Business, Working Paper, May 9. Retrieved August 1, 2007 from <http://ssrn.com/abstract=900200> <http://ssrn.com/abstract=900200>.
- Anonymous (1950). "Slot machines and pinball games". *The Annals of the American Academy of Political and Social Science*, 269, May: 62-70.
- AP (1988). "'Near-miss' slots in Nevada casinos come under fire". *The Toronto Star*, October 29, G14.
- AP (1995). "Reno slot company to pay \$38,000 in fines", *The Las Vegas Review-Journal*, 21 April:2b
- Anders, G (1998) "Indian Gaming: Financial and Regulatory Issues". *The Annals of the American Academy of Political and Social Science* (556): 98-108.
- Baer, R. (2005), *Videogames in the beginning*, Springfield US: Rolenta Press.
- Balakrishnan, S & Wernerfelt, B (1986) "Technical Change, Competition and Vertical Integration" *Strategic Management Journal* (7)4: 347-359
- Barker, Y & Britz, M (2000). *Jokers Wild: Legalized Gambling in the Twenty-first Century*. Praeger Publishers.
- BBC (2007). "Russian law to restrict casinos". *BBC news*, December 21. Retrieved August 1, 2007 from <http://news.bbc.co.uk/1/hi/world/europe/6200023.stm>
- Bear Stearns (1998). "International Game Technology". *Bear Stearns*, November 23. Becker, M (2004) "Organizational routines: A review of the literature". *Industrial and Corporate Change* 13 (4): 643-677.
- Bednarski, P (1987). "High-rolling Bally betting its future on casinos" *Chicago Sun Times*, March 15, p.1.
- Bednarski, P. (1986) "Trump countersues Bally over stock purchase". *Chicago Sun-Times*, December 17, p 61.
- Bednarski, P. (1989) "Behind Bally's move to Reno. Slot machines, not politics, called key" *Chicago Sun-Times*, May 14: 59
- Besen, S M. & Farrell, J (1994) "Choosing how to compete: Strategies and Tactics in Standardization". *The Journal of Economic Perspective* 8 (2): 117-131
- Bessen, J. (2003) "Patent thickets: Strategic patenting of complex technologies" (March 2003). Retrieved April 2, 2008 from <http://ssrn.com/abstract=327760>
- Berry, K. (1990) "Hardware makers cash in on America's Betting Mania" *The New York Times*, Sep. 16, 1990. (p. F-4).
- Blakey, R.,G., (1984). "Legal regulation of gambling since 1950". *The Annals of the American Academy of Political and Social Science*, 474, July: 12-22.
- Blois, K. J. (1999) "Trust in business- to- business relationships: An evaluation of its status". *Journal of Management Studies*, 36 (2): 197-215
- Bollinger, J (2006). "I'm Walking, Yes, Indeed, But Not Talking The Great 1929 Slot Machine Scandal". *American Mafia*, April 2006. Retrieved August 1, 2007 from http://americanmafia.com/Feature_Articles_348.html
- Braun, E & MacDonald, S. (1982). *Revolution in miniature*, 2nd edition. Cambridge UP
- Bresch, S. and Lissoni, F., "Knowledge networks from patent data: Methodological issues and research targets", in Moed, H., Glänzel W., and Schmoch, U. (2005). *Handbook of Quantitative Science and Technology Research The Use of Publication and Patent Statistics in Studies of S&T Systems*. Netherlands: Springer.
- Bresnahan, T. Greenstein, S, Henderson, R. (2006, October) "Making Waves: The interplay between market incentives and organizational capabilities in the evolution of industries". Working Paper. Retrieved August 1, 2007 from <http://mba.tuck.dartmouth.edu/digital/Programs/Seminars/HendersonPaper.pdf>
- Brewer, K., P., & Cummings, L., E., (1995). "Gaming Language: Getting a handle on slots. *Cornell Hotel and Restaurant Administration Quarterly*, 36: 74-78.

- Brooks, G., Ellis T., & Lewis, C., (2007). "Pachinko: Declining popularity or a continuing Japanese social problem?". *Japan Focus*, 829, May 21. Retrieved August 1, 2007 from <http://japanfocus.org/products/details/2425>
- Brown, M. (1981). "The problem of slot security". *Public Gaming Magazine*, March Issue, p. 39.
- Bruyat, C. & Julien, P. (2000) "Defining the field of research in entrepreneurship". *Journal of Business Venturing*, 16: 165-180.
- Burbank (2000) *License to Steal* University of Nevada Press.
- California Antique Slots (2007). List of bally electromechanical models, Bally E1000 and Bally E2000 models. Retrieved November 1, 2007 from <http://www.california-antique-slots.com/>
- Casino Journal (2007). "A Conversation with Bally Technologies CEO Richard "Dick" Haddrill". *Casino Journal*, May issue. Retrieved August 1, 2007 from HYPERLINK "http://www.casinojournal.com/article.php?ida=2349" <http://www.casinojournal.com/article.php?ida=2349>
- Chandler, A. (1962), *Strategy and Structure: Chapters in the history of the industrial enterprise*, MIT Press: Cambridge: Massachusetts.
- Chandler, A. (1977). *The visible hand: The managerial revolution in American business*. Cambridge: Harvard Belknap.
- Chandler, A. (1990) *Scale and Scope: The Dynamics of Industrial Capitalism*. Cambridge: Belknap Press
- Chandler, A. (2001), *Inventing the Electronic Century*, Free Press
- Cho, T. & Hambrick, D. (2006). "Attention as the mediator between top management team characteristics and strategic change: The case of airline deregulation." *Organization Science*, 17(4): 453-469
- Christensen, D. (1972). *Slot machines: A pictorial review*. Chicago: D.G. Christensen Publishing.
- Christensen, C. (1997) *The Innovators Dilemma: When New Technologies Cause Great Firms to Fail*. Harvard Business School Press.
- Christensen, C & Raynor, M (2003) *The Innovator's Solution*. Harvard Business School Press.
- Christensen, C. (2006), "The Ongoing Process of Building a Theory of Disruption", *The Journal of Product Innovation Management*, 23 (5): 39-55
- Christiansen, E M (1998) "Gambling and the American Economy". *The Annals of the American Academy of Political and Social Science* (556): 36-52
- Cohen, W. M., Nelson, R. & Walsh, J.P. (2000). "Protecting their intellectual assets: Appropriability conditions and why US Manufacturing firms patent (or not)". NBER Working Paper 7552.
- Coleman, D. (1987) "The uses and abuses of business history". *Business History*, 29(2): 141-156
- Conlisk, J. (1996) "Why Bounded Rationality?" *Journal of Economic Literature* (34) 2: 669-7000
- Connor, M (1995) "Using technology to keep players in their seats". *International Gaming & Wagering Business*, April 1.
- Connor, M (1996), "The Rise of the Slot Machine". Supplement to *International Gaming & Wagering Business*, May issue, p.6-10
- Cortada, J. (2003). *The Digital Hand: How Computers Changed the Work of American Manufacturing, Transportation, and Retail Industries*, Oxford University Press.
- Darrow, A. (1980)"Slots on top down under" *Gaming Business Magazine*, December: 6-8
- D'Aveni, R. MacMillan, J. (1990), "Crisis and the content of managerial communications: a study of the focus of attention of top managers in surviving and failing firms", *Administrative Science Quarterly*, 35(4): 634-57.
- D'Aveni, R. & Ravenscraft, D (1994) "Economies of Integration Versus Bureaucracy Costs: Does vertical integration improve performance?" *Academy of Management Journal* 37 (5): 1167-1206
- Davis, J. A. & Otterstrom, S. M. (1998) "Growth of Indian Gaming in the United States", p 53-66 in Meyer-Arendt, K and Hartmann K ed. (1998), *Casino gambling in America: Origins, trends, and impacts*. New York: Cognizant Communication
- Davis, E (1981) "Bell-Fruit ripe to enter U.S. market", *Gaming Business Magazine*, October: 42
- Davis, M P (1984) "A 'virtual' success", *Gaming & Wagering Business*, October: 14
- Davis, M. P. (1985) "Slot regs; East meet West". *Gaming & Wagering Business*, October issue, p 29
- De Vany, A (2003). *Hollywood economics: How extreme uncertainty shapes the film industry*. Routledge.
- Delfabbro, P & Winefield, A (1999a) "Poker-machine gambling: An analysis of within session characteristics." *British Journal of Psychology* (90): 425-439
- Delfabbro, P. & Winefield, A. (1999b) "The danger of over-explanation in psychological research: A reply to Griffith". *British Journal of Psychology*, 90, 447-450
- Delfabbro, P & Winefield, A (2000) "Predictors of irrational thinking in regular slot machine gamblers". *The Journal of Psychology*, 134(2): 117-128

- Delfabbro, P (2004) "The Stubborn Logic of Regular Gamblers: Obstacles and Dilemmas in Cognitive Gambling Research". *Journal of Gambling Studies* (20): 1-21
- Delfabbro, P. , Falzon, K, & Ingram, T. (2005). The effects of parameter variations in electronic gambling simulations: Results of a laboratory-based pilot investigation". *Gambling Research*, 17(1): 7-25.
- Deni, L (1980) "'Cheat squad' puts the finger on Las Vegas casino cheats". *Gaming Business Magazine*, September.
- Deutsche Bank (2003). "Gaming Equipment. The reel deal." Deutsche Bank, September 12.
- Deutsche Bank (2005) "The Russian gaming market". Deutsche Bank, January 25.
- Deutsche Bank (2006) "Japanese Gaming Market: Tremors in Transition", May 25. Deutsche Bank.
- Dombrink, J. & Thompson, W. N. (1990) . *The last resort: Success and failure in campaigns for casinos*. University of Nevada Press.
- Doocey, P. (1993) "The gaming industry celebrates the birth of the new machine age". *Gaming & Wagering Business*, October 15.
- Doocey, P. (1994). "Slot play in France: Too much success?". *Gaming & Wagering Business*, August 15.
- Dosi, G, Nelson, R & Winder, S (2000), *The Nature and Dynamics of Organizational Capabilities*, Oxford UP
- Dow Jones News Service (1992). "Bally Gaming - Intl Game: Settlement Terms Confidential". Dow Jones Newswires, January 16.
- Dowling, N. Smith, D & Thomas, T. (2005) "Electronic gaming machines, are they the 'crack-cocaine' of gambling?" *Addiction* 100: 33-45
- Downton, F. (1979) "Gaming machines and the law: statistical problems" *The Journal of the Operational Research Society*. 30(4): 331-340
- Dworin, P. (1984) "Aristocrat to go it alone after IGT break", *Gaming & Wagering Business*, October.
- Eadington, W/. (1976). *Gambling and Society: Interdisciplinary studies on the subject of gambling*. Springfield: Charles C Thomas.
- Eadington, W. (1984) "The Casino Gaming Industry: A study of Political Economy". *The Annals of the American Academy of Political and Social Science* (474): 23-35
- Eadington, W. (1987)."Economic perceptions of gambling behavior", *Journal of Gambling Behavior*, 3(4): 264-273
- Eadington, W (1996). *The Gaming Industry: Introduction and Perspectives*, New York: Wiley.
- Eadington, W (1998a) "Contribution of Casino-Style Gambling to Local Economies". *The Annals of the American Academy of Political and Social Science* (556): 53-65
- Eadington (1998b), "Casino Gaming-Origins, trends and impacts" in Meyer-Arendt, K and Hartmann K ed. (1998), *Casino gambling in America : Origins, trends, and impacts*. New York: Cognizant Communication
- Eadington, W. (1999) "The Economics of Casino Gambling", *The Journal of Economic Perspective*, 13 (3): 173-192
- Eadington, W. (2004) "Comment on Kindt's Paper" *Managerial and Decision Economics* 25(4): 191-196
- Eadington, W. (2005) *An analysis of the recent history and likely future of Nevada gaming industry*. Report prepared for the Nevada Resort Association, May 2005.
- Eadington, W. (2006) "Vegas Stripped". *Significance*, March 2006: 5-9
- Edell, L (2005) "Game Watch: The State of Table Games", *Global Gaming Business*. 4 (2)
- Edwards, J. (1995). "Alliance-Bally Gaming battle long one". *The Las Vegas Review-Journal*, October 8:14E
- Edwards, J. (1996). "Games mark changing of the guard" *The Las Vegas Review-Journal*, May 5: 15E
- Engelhardt, J. (2007). "How Sam Klein made his money". *The Palm Beach Post*, November 6: 16A
- Encarnation, D. (1993). *Rivals beyond trade: America versus Japan in global competition*. Cornell University Press.
- Ernkvist, M (2008)."Down many times, but still playing the game: Creative destruction and industry crashes in the early video game industry, 1971-1986", pp 161-191 in Gratzner, K and Stiefel, D (2008). *History of Insolvency and Bankruptcy from an International Perspective*, Södertörn Academic Studies 38.
- Falkiner, T., Horbay, R. (2006). *Unbalanced Reel Gaming Machines*. Paper presented at the 2006 International Pokies Impact Conference, Melbourne, Australia. Retrieved August 1, 2007 from <http://www.gameplanit.com/UnbalancedReels.pdf>
- Fey, M. (2002), *Slot machines, America's Favourite Gaming Device*, Liberty Belle Books, Nevada.
- Fromson, B. D. (2003) Hitting the Jackpot: The inside story of the richest Indian tribe in history. *Atlantic Monthly Press*
- Fulton, S. (2007)."The History of Atari: 1971-1977". *Gamasutra*, November 6. Retrieved July 1, 2008 from http://www.gamasutra.com/view/feature/2000/the_history_of_atari_19711977.php?print=1
- Gambling Law US (2007) "Gambling Law US". Retrieved July 2007 from <http://www.gambling-law-us.com/>
- Gambling Review Report (2001), Department for Culture, Media and Sport, Gambling Review Body, Available at: http://www.culture.gov.uk/Reference_library/Publications/archive_2001/gamb_rev_report.htm

- Gaming Business Magazine (1982). "Tear out Guide to Slots & Video Gaming Machines". Gaming Business Magazine, October issue (unnumbered pages).
- Gaming & Wagering Business (1985) "Slot makers seek technology jackpot" Gaming & Wagering Business, October: 23
- Gaming & Wagering Business (1986a) "Slots, the 'Rodney Dangerfield' of casinos, are finally getting some respect". Gaming & Wagering Business, October issue: 30-31.
- Gaming & Wagering Business (1986b) "Slot managers looking beyond the price to company behind slot". *Gaming & Wagering Business*, October issue: 30-31.
- Gaming & Wagering Business (1987) "Universal's Okada: Following Ford's example". *Gaming & Wagering Business*, November.
- Gaming & Wagering Business (1988) "Executive Q & A; Maiss' career decision leads him from banker to Bally's" *Gaming & Wagering Business*, June 15.
- Gaming & Wagering Business (1989) "Bally moves gaming mfg. to new LV plant" *Gaming & Wagering Business*, July.
- Gaming & Wagering Business* (1990) "LV mega-plant puts Bally where the action is", *Gaming & Wagering Business*, July.
- Gans, J, Hsu, D and Stern, S. (2002) "When does start-up innovation spur the gale of creative destruction?" *The RAND Journal of Economics* 33(4):571-586
- Garreau, J. (1991). *Edge city: Life on the new frontier*. New York: Doubleday.
- Gartner, W. B. (1988, Spring) "Who is an entrepreneur? Is the wrong question". *American Journal of Small Business*, pp. 11-32
- Garud, R, Kuranaswami, A and Langlois, R (ed.) (2002), *Managing in the Modular Age: Architectures, Networks and Organizations*. Blackwell Publishing.
- Gavetti, G. (2005) "Cognition and Hierarchy: Rethinking the Microfoundation of Capabilities' Development" *Organizational Science* 16 (6): 599-617
- Gavetti, G & Rivkin, J (2007) "On the Origin of Strategy: Action and Cognition over Time". *Organization Science* 18 (3): 420-439
- Gilbert, C. (2006). "Change in the presence of residual fit: Can competing frames coexist?". *Organization Science*, 17(1): 150-167
- Green, M. (2004) "The (Slot) World According to Bob". *Slot Manager* July 2004, Retrieved August 1, 2007 from [http://www.ascendgaming.com/sm/magazine_archive/The\(SI97200423557PM.htm](http://www.ascendgaming.com/sm/magazine_archive/The(SI97200423557PM.htm)
- Greenless, M. E. (1988). *Casino accounting and financial management*. University of Nevada Press.
- Griffiths, M (1993)."Fruit machine gambling: the importance of structural characteristics". *Journal of Gambling Studies*, 9(2): 101-120
- Griffiths, M (1994) "The role of cognitive bias and skill in fruit machine gambling" *British Journal of Psychology* (85): 351-369
- Griffiths, M. (1999) "Gambling Technologies: Prospects for Problem Gambling" *Journal of Gambling Studies*, 15 (3): 265-283
- Griffiths, M & Delfabbro, P (2002) "The Biopsychosocial approach to gambling" *The Electronic Journal of Gambling Issues*, (5). Retrieved August 1, 2007 from <http://www.camh.net/egambling/issue5/feature/index.html>
- Griffiths, M (2006) "The Lost Gamblers" *Significance*, March 2006: 13-15
- Griffiths, M (2007) "Positive Thinking Among Slot Machine Gamblers" *International Journal of Mental Health Addiction* (5):39-52
- Grindley, P.C. & Teece, D.J. (1997). "Managing intellectual capital: Licensing and cross-licensing in semiconductors and electronics". *California Management Review*, 39: 8-41
- Grinols, E & Mustard, D (2001) "Management and Information Issues for Industries with Externalities: The Case of Casino Gambling". *Managerial and Decision Economics* 22: 1-3
- Grinols, E (2004). *Gambling in America: Costs and benefits*. Cambridge University Press.
- Gros, R. (2008). "IGT spells success". *Global Gaming Business Magazine*, February issue. Retrieved March 21, 2008 from http://ggbmagazine.com/articles/IGT_Spells_Success.html
- Hagedoorn, J (1996) "Innovation and Entrepreneurship: Schumpeter Revisited". *Industrial & Corporate Change*, 5 (3): 883-896
- Hagen, C. (2001). "Quarter Master". *Las Vegas Life*, November issue. Retrieved October 1, 2007 from http://www.lvlife.com/2001/11/si_reed.html

- Hall, B., and R. Ziedonis. (2001). "The Patent Paradox Revisited: An Empirical Study of Patenting in the US Semiconductor Industry 1979-1995." *RAND Journal of Economics* 32(1): 101-28.
- Hall, B., Jaffe, A. & Trajtenberg, M. (2005), Market Value and Patent Citations, *Rand Journal of Economics*, 36(1): 16-38
- Harrigan, K. (2007). "Slot machine structural characteristics: Creating near misses using high award symbol ratios". *International Journal of Mental Health Addictions*, forthcoming.
- Havas, A. (1993) "Bally Gaming: 'We can stand toe-to-toe with any company'". *Las Vegas Business Press*, August 9, 10(25):3
- Helfat, C. E. & Lieberman, M. B. (2002) "The birth of capabilities: market entry and the importance of pre-history". *Industrial and Corporate Change*, 11 (4): 725-760
- Helfat, C. E., Finkelstein, S., Mitchell, W., Peteraf, M., Singh, H. Teece, D. & Winter, S. (2007). *Dynamic capabilities: Understanding strategic change in organizations*. Wiley.
- Henderson, R. (2006) "The Innovator's Dilemma as a Problem of Organizational Competence" *The Journal of Product Innovation Management* 23(5): 5-11
- Hevener, P. (1987) "Matheson sees bright future for IGT". *Gaming & Wagering Business* (8)7:1, 31
- Hevener, P. (1988) "Video Pokers". *Gaming & Wagering Business*, October issue, p 10.
- Hevener, P. (1990) "Bally will not go Chapter 11". *Gaming & Wagering Business*, 11(11): pp 1, 12.
- Hevener, P. (1991a) "Slot Marketing Grows Up: The Age of Individualization"; *Gaming & Wagering Business*, March
- Hevener, P (1991b). "Maiss to preside at Bally Gaming". *Gaming & Wagering Business* 12(11), pp 1, 8.
- Hirsch, P (1972) "Processing Fads and Fashion". *The American Journal of Sociology*, 77 (4): 639-659
- Holbrook, D., Cohen W.M., Hounshell, D. A., and Klepper, S. (2000), "The nature, sources, and consequences of firm differences in the early history of the semiconductor industry", *Strategic Management Journal* 21 (10-11): 1017-1041.
- Holmén, M., Magnusson, M. & McKelvey, M. (2007). "What are innovative opportunities". *Industry & Innovation*, 14(1):27-45
- Holtmann, A. (2007). "Full version of John Acres Q&A". *Casino Journal*, August 2. Retrieved August 31, 2007 from <http://www.casinojournal.com/enews-details.php?id=2681>
- Hoskisson, R, Hill, C. Kim, H. (1993) "The multidivisional structure: organizational fossil or source of value?" *Journal of Management*, 19 (2): 269-298
- Hoy, G. (2003) "Lady Luck smiles on aristocrat", *ABC Online*, June 22. Retrieved July 1, 2007 from <http://www.abc.net.au/insidebusiness/content/2003/s885356.htm>
- Hughlett, M. (1995). "Ballys settle battle". *Times-Picayune*, April 4: C1
- Hsu, C. (1999). *Legalized casino gaming in the United States: The economic and social impact*, Haworth Press.
- IGWB (1996) "A slot maker for all seasons". *International Gaming & Wagering Business*, September.
- IGWB (1996b) "IGT enters interactive game machine market". *International Gaming & Wagering Business*, September.
- Jaffe, A & Trajtenberg, M. (2002). *Patents, Citations, and Innovations: A Window on the Knowledge Economy*. MIT Press.
- Janson, D. (1980). "Gaming unit sums up objections to Bally casino, citing crime ties". *The New York Times*, December 16, p. 4.
- Jörnmark, J. & Ernkvist, M. (forthcoming). Arcades do what other industries don't. *Annals of the History of Computing*.
- Jörnmark J. & Ramberg, L. (2004) "Globala förkastningar: En historia om råolja, microchips och bolaget Altitun". *Studentlitteratur*.
- Jörnmark, J, Axelsson, A and Ernkvist, M (2005) Wherever Hardware, There'll be Games. The evolution of hardware and shifting industrial leadership in the gaming industry 1968-2004 Paper presented at the DIGRA conference in Vancouver, June 2005. Retrieved August 1, 2006 from <http://ir.lib.sfu.ca/handle/1892/1600>
- Kandara, J. (2000). "Application of the doctrine of equivalents to means plus function claims: WMS Gaming Inc. V. International Game Technology". *Duke Law Journal*, 50: 887-916
- Kaplan, M. (2003) "A Piece of the Action". *Wired* 11(9). Retrieved August 1, 2007 from http://www.wired.com/wired/archive/11.09/vegas_pr.html
- Kaplan, S. (forthcoming a). "Cognition, capabilities and incentives: Assessing firm response to the fiber-optic revolution". *Academy of Management Review*.
- Kaplan, S. (forthcoming b). "Framing contests: Strategy making under uncertainty". *Organizational Science*.

- Kaplan, S & Henderson, R (2005) "Inertia and Incentives: Bridging Organizational Economics and Organizational Theory". *Organization Science*, 16 (5): 509-521
- Kaplan & Tripsas (2008). "Thinking about technology: Applying a cognitive lens to technical change." *Research Policy*, forthcoming (article in press).
- Kaufman, S. (1993). *Origins of Order: Self-Organization and Selection in Evolution*, Oxford University Press, Oxford
- Kendall; M G & Murchland (1964) "Statistical aspects of the legality of gambling" *J. R. Statistical Society*. 127: 359-383
- Kilby, J., Fox, J., & Lucas, A. F. (2004). *Casino Operations Management*, 2nd ed. New York: Wiley & Sons
- Kennedy, D. (1981) "Why the 'lottery-slots' plans were killed", *Gaming Business Magazine*, December: 16-18
- Kindt, J. W. (1998) "Follow the Money: Gambling, Ethics, and Subpoenas". *The Annals of the American Academy of Political and Social Science* (556): 85-97
- Kindt, J. W (2001)"The costs of addicted gamblers: should the states initiate mega-lawsuits similar to the tobacco cases? *Managerial and Decision Economics* 22: 17-63
- King, R (1964). "The Rise and Decline of Coin-machine Gambling". *The Journal of Criminal Law, Criminology, and Political Science*, 55(2): 199-207
- King, R (1966). "The Pinball Problem in Illinois. An overdue solution", *The Journal of Criminal Law, Criminology, and Political Science*, 57(1): 17-26
- Klein, H (1982) "Gaming still looks good to Bally's Mullane", *Gaming Business Magazine*, September.
- Knight, F. (1921). *Risk, Uncertainty and Profit*. New York: Houghton Mifflin
- Knight-Ridder, C (1991). "Bally to offer gaming machine shares." *The Las Vegas Review-Journal*, August 24: 3a
- Kobylarz, X. (2006) "Firms bet big on gaming industry patent litigation", *The Recorder*, October 16.
- Koch, E. (2003) "Gaming Pioneer Known for Invention, Generosity Dies", *Las Vegas Sun*, October 15.
- Kretschmer, M., Klimis, G and Choi, C (1999) "Increasing Returns and Social Contagion in Cultural Industries", *British Journal of Management*, 10(1): 61-72.
- Krugman, P. (1991)."History and industrial location: The case of the manufacturing belt," *American Economic Review*, 81(2): 80-83.
- La Fleur, T. (1984, September). "The VLT experiment: a 'no-lose' situation for Illinois". *Gaming Business Magazine*, September Issue, p 44.
- Lambos, C. & Delfabbro, P. (2007)." Numerical Reasoning Ability and Irrational Beliefs in Problem Gambling". *International Gambling Studies*, 7(2):157-171
- Lampel, J & Shamsie, J (2004). "Capabilities in motion: New organizational forms and the reshaping of the Hollywood movie industry". *Journal of Management Studies*, 40(8): 2189-2210.
- Lancaster, K. (1966)"Change and innovation in the technology of consumption". *The American Economic Review*, 56(1/2): 14-23.
- Lancaster, K. (1991). *Modern Consumer Theory*. UK: Edward Elgar.
- Lane, R. (1992). "Back into the breach". *Forbes*, 150(11): 96
- Langlois, R. and Robertson, P. (1995) *Firms, Markets, and Economic Change: A Dynamic Theory of Business Institutions*, London: Routledge
- Langlois, R. (2002) "Modularity in Technology and Organization" *Journal of Economic Behaviour and Organization*, 49 (1): 19-37
- Langlois, R. (2003) "The Vanishing Hand: The Changing Dynamics of Industrial Capitalism" *Industrial and Corporate Change* 12(2): 351-385
- Langlois, R (2003b) "Cognitive comparative advantage and the organization of work: Lessons from Herbert Simon's vision of the future". *Journal of Economic Psychology*, 24(2): 167-187
- Langlois (2006)"The secret life of mundane transaction costs". *Organization Studies*, 27 (9), 1389-1410
- Langlois, R (2007a). *Dynamics of Industrial Capitalism: Schumpeter, Chandler and the New Economy*. Routledge.
- Langlois, R. (2007b) "Organizing the Electronic Century" University of Connecticut Working Paper 2007-07
- Las Vegas Business Press (2007, March 19). Gaughan are the days. *Las Vegas Business Press*. Retrieved August 1, 2007 from http://www.lvbusinesspress.com/articles/2007/03/19/news/iq_13032466.txt
- Las Vegas Review Journal (1991). "Slot maker sues rival for design infringement". *Las Vegas Review-Journal*, November 15: 16B.

- Las Vegas Review Journal (1991). "Six execs who bolted IGT for competitor set to return". *The Las Vegas Review Journal*, March 14: 10D
- Lazonick, W. (2002) "Innovative enterprise and historical transformation". *Enterprise & Society*, 2: 3-47.
- Leech, B. L. (2007) "Does Money Buy Power?: Interest Groups Resources and Policy Outcomes" Paper presented at the Annual Meeting of the Midwest Political Science Association, April 12-15.
- Legato, F (2000) "Behind the Scenes: Survey says", *Strictly Slots*, 2 (9), Retrieved August 1, 2007 from <http://www.strictlyslots.com/archive/0008ss/html/behind.html>
- Legato, F (2000b) "Behind the Scenes: Birth of a slot". *Strictly Slots*, 2(4), Retrieved August 1, 2007 from www.strictlyslots.com/archive/0004ss/html/BehindtheScenes.html
- Legato, F (2004a) "IGT: Tops in Slots, Acquisitions, R&D dollars and Talent Keep IGT at the Top of Its Game". *Global Gaming Business* 3 (10).
- Legato, F. (2004b), "The 20 Greatest Slot Innovations", *Strictly Slots*, March 2004, available at: http://www.strictlyslots.com/archive/0403ss/SS0304_Innovative.pdf
- Legato, F (2006a). "Double Diamond: How IGT turned a simple idea into one of the most successful games in history". *Strictly Slots*, March issue. Retrieved August 1, 2007 from <http://www.strictlyslots.com/archive/0603ss/diamond.htm>
- Legato, F. (2006b). "Hall of Fame. Red, White & Blue, IGT follows up double diamond with another." *Strictly Slots*, May issue. Retrieved August 1, 2007 from <http://www.strictlyslots.com/archive/0605ss/hall.htm>
- Legato, F. (2007). "Ballyhoo! Bally Technologies celebrates its 75th anniversary—looks to the future". *Strictly Slots*, February issue. Retrieved August 1, 2007 from <http://www.strictlyslots.com/archive/0702ss/fame.htm>
- Lester, R. & Piore, M (2004). *Innovation : the missing dimension*. Harvard University Press.
- Lewin, P & Phelan, S. E (2000) "An Austrian Theory of the Firm", *Review of Austrian Economics*, 13 (1): 59-80.
- Lévesque, M. & Minniti, M. (2006). "The effect of aging on entrepreneurial behaviour." *Journal of Business Venturing*, 21(2):177-194
- Levinthal, D. A. (1997) "Adaptation on rugged landscapes". *Management Science*, 43 (7): 934-950
- Levy, F & Murnane, R (2004). *The new division of labour*. New York: Princeton University Press.
- Lieberman, M.B. & Montgomery, D. B. (1998) "First-Mover (Dis)Advantages: Retrospective and link with the resource-based view". *Strategic Management Journal*, 19 (12): 1111-1125
- Lipartito, K. (1995). "Culture and practice of business history". *Business and Economic History*, 24(2): 1-41
- Manzenreiter, W. (1998a) "Pachinko Monogatari: Soziokulturelle exploration der japanischen glückspielindustrie." *Judicum: München*.
- Manzenreiter, W. (1998b). Time, Space, and Money: Cultural dimensions of 'Pachinko' game. P 359-381 in Linhart, S. and Frühstück, S. ed. (1998). *The culture of Japan as seen through its leisure*. State University of New York Press: Albany.
- March, J. (1991). "Exploration and exploitation in organizational learning", *Organizational Science*, 2(1): 71-87.
- Marfels, C (2001a), *Bally, The World's Game Maker*, UNLV International Gaming Institute.
- Marfels, C. (2001b) "Is gambling rational? The utility aspect of gambling". *Gaming Law Review*, 5(5): 459-466
- Markides, C. & Charitou, C (2004) "Competing with dual business models: A contingency approach". *Academy of Management Executive* 18 (3): 22-36
- Masters, R (2005) "Head of the Game", *The Sydney Morning Herald*, January 15. Available at: <http://www.smh.com.au/news/Business/Head-of-the-game/2005/01/14/1105582714216.html>
- McAfee, R P, Mialon H M et al. (2004) "What Is a Barrier to Entry?". *The American Economic Review*, 94(2): 461-465
- McCarthy, J. (1996). "The player: interview with Bally Entertainment CEO Arthur Goldberg". *The Chief Executive*. April issue.
- McGhie Consulting, "Nevada Gaming Statistics" available at <http://www.macrocap.com/Nevada-Gaming-Statistics/>
- McLellan, D. (2003), "Obituary: William Redd / Gaming Tycoon's Video Vision Transformed Enterprise for Slots". *Pittsburgh Post-Gazette*, October 21.
- Meyer-Arendt, K & Hartmann K ed. (1998), *Casino gambling in America : Origins, trends, and impacts*. New York: Cognizant Communication
- Miers, D. (2003). "Gaming machines in Great Britain: A century of change". *Gaming Law Review*, 7(2): 131-147
- Mises, L. (1949). *Human Action: A Treatise on Economics*. New York: Irvington Hudson.
- Moehring, E. (2000). *Resort city in the Sunbelt, Las Vegas 1930-2000*, 2nd edition. University of Nevada Press.
- Mollick, E. (2006) "Establishing Moore's law". *Annals of the History of Computing*, 28(3): 62-75
- Moore, G.. (1965) "Cramming More Components on to Integrated Circuits", *Electronics* 38(8).

- Morrill, R & Ogonowsky, B (2003), "Gambling on Patents", *Gambling Law Review*, 7(6): 411-419
- Morse, E. & Goss, E. (2007). *Governing Fortune: Casino Gambling in America*, Ann Arbor: (?) The University of Michigan Press.
- MPAA (2007) "Movie attendance study". MPAA. Available at: HYPERLINK "http://www.mpa.org/MovieAttendanceStudy.pdf" http://www.mpa.org/MovieAttendanceStudy.pdf
- Murmann, J. P. (2003). *The co-evolution of firms, technology and national institutions*. Cambridge UP.
- Nelson, R (1991) "Why do firms differ, and How Does it matter?" *Strategic Management Journal* 12 (Winter): 61-74
- NYT (1891) "The slot machine beaten: How naughty little Chicago boys get candy and gum". *New York Times*, March 30, retrieved from ProQuest Historical Newspapers.
- NYT (1982) "Bally machine curbed". *The New York Times*, July 14 p. D20.
- Orlikowski, W. & Gash, D. (1994). "Technology frames: Making sense of information technology in organizations" *ACM Transactions on Information Systems*, 12, 174-207.
- Ottum, B & Moore, W. (1997). "The role of market information in new product success/failure". *Journal of Product Innovation Management*, 14: 258-273
- Palermo, D. (1994) "Slot maker surrenders in probe of link to Mafia". *The Las Vegas Review-Journal*, August 2:1d
- Parke, J & Griffiths, M (2004) "Gambling addiction and the evolution of the 'near miss'". *Addiction Research & Theory*, 12(5): 407-411
- Parke, J & Griffiths, M. (2006) "The Psychology of the Fruit Machine: The role of Structural Characteristics (Revisited)" *International Journal of Mental Health Addiction* (4): 151-179
- Penrose, E (1959), *The Theory of the Growth of the Firm*. Basil Blackwell.
- Porter, M., Takeuchi, H, & Sakakibara, M. (2000). *Can Japan compete?*. Basic Book.
- Public Gaming Magazine (1980) "Where is Bally today?". *Public Gaming Magazine*, September/October Issue, pp 22-25, 29-33.
- Public Gaming Magazine (1981a). "Video slot manufacturer sees market continue to expand". *Public Gaming Magazine*, October issue, p. 36-38.
- Public Gaming Magazine (1981b) "The New Generation of Slot". March issue, p 26-38.
- Public Gaming Magazine (1982a). "Inside modern slot machines today. The new technology is taking over". March, p 12-25
- Public Gaming Magazine (1982b) "Si Redd: Pioneer in the video slot machine industry". *Public Gaming Magazine*, March Issue pp 44-46
- Public Gaming Magazine (1982c). "Microprocessor Slots are Wave of Future: Slot Managers Comment on Importance of New Technology". *Public Gaming Magazine*, March Issue, pp 26-32
- Public Gaming Magazine (1983a) "IGT unveils new line of video gaming equipment", *Public Gaming Magazine*, November.
- Public Gaming Magazine (1983b) "Microprocessor-Based Gaming Equipment". *Public Gaming Magazine*, August., p. 41-51
- Public Gaming Magazine (1983c) "Video market fertile ground for IGT". *Public Gaming Magazine*, February Issue, pp. 32-36, 41
- Public Gaming Magazine (1984a). "Aristocrat: A Leader in Gaming Equipment Moves Ahead Again. *Public Gaming Magazine*, November Issue, p 46-49
- Public Gaming Magazine (1984b) "IGT video lottery equipment still fuelling Nebraska revenues". *Public Gaming Magazine*, September, issue, p. 21, 43.
- Public Gaming Magazine, (1984c). "Where is gaming's 'Big Blue' heading?". *Public Gaming Magazine*, September issue, pp 30-42, 60-66.
- Rasmusson, E. (1998). "Hitting the Jackpot". *Sales and Marketing Management*, 150(6): 34-41
- Reuters (1993). "Bally gaming sees July new product launches". *Reuters News*, March 1
- Rinfret P. (2002) "Financial scandals and boards of directors". June 26. Retrieved August 1, 2006 from www.parida.com/directorsfolly.html
- Rivlin, G. (2004) "The Tug of the Newfangled Slot Machines", *The New York Times*, May 9 (need page #)
- Roberts (1991) "Avery's actions 'devious': Ainsworth". *The Sydney Morning Herald*, May 29, p.2.
- Robison, J (2006). "Near misses: the truth". *Midwest Gaming & Travel*, Retrieved August 1, 2006 from http://www.midwestgamingandtravel.com/Articles/articles_slots.htm
- Rosenbloom, R. (2000). "Leadership, Capabilities, and Technological Change: The Transformation of NCR in the Electronic Era" *Strategic Management Journal*, 21(10-11): 1083-1103.
- Rubin, M. (2005) "America's Favourite Casino Game: Nothing Beats Blackjack", *Global Gaming Business* 4 (7).

- Sakakibara, S; Flynn, B. Schroeder, R. & Morris, W. (1997). "The Impact of Just-in-time manufacturing and its infrastructure on manufacturing performance." *Management Science*, 43(9): 1246-1257
- Sauer, Raymond D. (2001) "The Political Economy of Gambling Regulation". *Managerial and Decision Economics*. (22) 1-3: 5-15
- Sayre, A. (2002). "Bally Gaming's ex-chief again contests his plea." *The Baton Rouge Advocate*, 8-A
- Schine, E (1996). "A high roller hits the jackpot". *Business Week*, May 27.
- Schlesinger, J. (1993). "Tough Gamble; A slot machine maker trying to sell in Japan hits countless barriers". *The Wall Street Journal*, May 11, p. A1.
- Schmidt, G. and Druehl, C. (2008). "When is a disruptive innovation disruptive?". *Journal of Product Innovation Management*, 25(4): 347-369.
- Schull, N. D. (2002) *Escape mechanism: Women, caretaking, and compulsive machine gambling*. Center for Working Families, University of California Berkley, Working Paper No 41, April 2002. Retrieved August 1, 2007 from http://escholarship.bc.edu/cgi/viewcontent.cgi?article=1050&context=wfn_bwpaper
- Schull, N. D. (2005) "Digital Gambling: The Coincidence of Desire and Design", *Annals of the American Academy of Political and Social Science* (597): 65-81
- Schumpeter, J. A. (1934). *The theory of economic development: An inquiry into profits, capital, credit, interest, and the business cycle*. New York: Oxford University Press.
- Schumpeter, J A (1943), *Capitalism, Socialism and Democracy*, George Allen and Unwin, Ltd.
- Schumpeter, J. A. (1947). "The creative response in economic history". *The Journal of Economic History*, 7(2): 149-159.
- Schumpeter, J. A. 1949. "Economic Theory and Entrepreneurial History." In *Change and the Entrepreneur: Postulates and Patterns for Entrepreneurial History*. Cambridge, Mass.: Harvard University Press.
- Schuyten, P (1980). "Slot Machines Test Electronics". *The New York Times*, October 16:2
- Schwartz, D. (1997) "'A Fun Night Out:' Shifting legal and cultural constructions of gambling, the slot machine, and the Casino resort". *Gaming Law Review* (1)4.
- Schwartz, D (2002), *Suburban Xanadu : The casino resort on the Las Vegas strip and beyond*. Routledge (location?)
- Schweers, J (1999). "Silicon misses jackpot, retools with Vegas shop". *Las Vegas Business Press*, April 5, 16(14):1
- Selesner, G. (1980a) "Slot machines" *Gaming Business Magazine*, March 1980
- Selesner, G. (1980b) "Slot strategy in the casino". *Gaming Business Magazine*, May issue. P 34-38
- Selesner, G. (1982a) "The making of a new Wall Street favourite: IGT" *Gaming Business Magazine*, April: 42-45
- Selesner, G. (1982b). "Aristocrat: The Australian invasion of America continues". *Gaming Business Magazine*, May issue, pp 46-51.
- Selesner, G. (1982c) "Slots, videos & VLTs: a quantum leap in market potential", *Gaming Business Magazine*, December issue, pp 18-22.
- Selesner, G. (1982d) "Slots, videos & VLTs: the next revolution", *Gaming Business Magazine*, October issue, pp 17-19, 25-31
- Serwer, A. (1997). "Merrill's junk-bond ax for casinos, the buck stops at Richard Byrne". *Fortune*, June 9. Retrieved August 1, 2007 from http://money.cnn.com/magazines/fortune/fortune_archive/1997/06/09/227505/index.htm
- Sévigny, S. & Ladouceur, R. (2003). "Gamblers' irrational thinking about chance events: the 'double switching' concept". *International Gambling Studies*, 3(2):149-161
- Shapiro, C. (2001). "Navigating the Patent Thickets: Cross-Licenses, Patent Pools, and Standard-Setting," in A.Jaffe, J. Lerner and S. Stern, eds., *Innovation Policy and the Economy*, v1, Cambridge MA: NBER
- Sheri, S. (2005). *The casino's most valuable chip: How technology transformed the gaming industry*. Palo Alto: The Institute for the History of Technology.
- Shoemaker, S & Zemke, D M (2005) "The 'locals' market: an emerging gaming segment" *Journal of Gambling Studies*, 21 (4): 379-410.
- Skolnick, J. (1978). *House of cards: The legalization and control of casino gambling*. Boston: Brown Little.
- Sion, M. (1996). "Video poker has special allure". *Reno Gazette Journal*, October Issue. Retrieved August 1, 2007 from <http://www.rgj.com/news/stories/html/2002/06/13/16759.php>
- Smith, J (1995). "Bally Gaming celebrating favourable ruling in Louisiana". *The Las Vegas Review Journal*, February 9: 1b
- Smith, J. (2003) "To the end, preacher's son kept faith in gospel of legalized gambling", *Las Vegas Review Journal*, October 15, Available at: HYPERLINK "http://www.reviewjournal.com/lvrj_home/2003/Oct-15-Wed-

- 2003/news/22368308.html" http://www.reviewjournal.com/lvrj_home/2003/Oct-15-Wed-2003/news/22368308.html
- Smith, G. J. & Campbell, C. S. (2007) "Tension and Contentions: An examination of electronic gaming issues in Canada". *American Behavioural Scientist*, 51 (1): 86-101
- Smith, R.W., & Preston, F.W. (1984). Vocabularies of motives for gambling behavior. *Sociological Perspectives*, 27, 325-348.
- Stevenson, R. "Slot machine maker hits jackpot". *The New York Times*, September 12, pp. D1, D4.
- Stutz, H (1991a). "Gaming lays off 40" *The Las Vegas Review-Journal*: 11e
- Stutz (1991b). "Nevada officials to question Bally's chief about plans". *The Las Vegas Review-Journal*: 1d
- Tanioka, I. (2000). *Pachinko and the Japanese Society: Legal and Socio-Economic Considerations*. Osaka:Osaka University of Commerce, Institute of Amusement Industries Publication Series No 2.
- Tanner, R. (1981). "The Coming of Age of the Slot Machine". *Gaming Business Magazine*, October issue, pp 8-9, 39-40.
- Teece, D., Pisano, G. & Shuen, A. (1997) "Dynamic capabilities and strategic management," *Strategic Management Journal* (18) 7: 509-533
- Teece, D. (2007) "Explicating dynamic capabilities: The microfoundations of (sustainable) enterprise performance", *Strategic Management Journal*, 28(13): **1319-1350**
- Thompson, P. (2000). *The voice of the past: Oral history*. Oxford UP.
- Thompson, W. N. (1995). "The last resort revisited: A comment on changes in America". *Journal of Gambling Studies*, 11 (4): 373-378.
- Thompson, B. (1999) "Inside straight. The South Carolina battlefield". *Gaming Law Review*, 3(1): 5-8
- Thompson, W. N. (2001), *Gambling in America: An Encyclopedia of History, Issues, and Society*. ABC-Clio
- Thompson, W. N. (2004) "Outlook: Slots of Trouble?" *Washington Post*, July 19
- Thompson, W. N. (2005) "Book Review: Suburban Xanadu" *Journal of Gambling Issues* (14).
- Time Magazine* (1949)"I Never sold any Bibles"". *Time Magazine*, November 28, Retrieved October 1, 2007 from <http://www.time.com/time/magazine/article/0,9171,856378,00.html>
- Time Magazine* (1951). "Goodbye, bandits". *Time Magazine*, January 15. Retrieved August 1, 2007 from <http://www.time.com/time/magazine/article/0,9171,814266,00.html>
- Time Magazine* (1953). "Out, damned slots". *Time*, March 2. Retrieved August 1, 2007 from <http://www.time.com/time/magazine/article/0,9171,822638,00.html>
- Time Magazine* (1984). "Forbidden Fruit. *Time Magazine*. May 9. Retrieved August 1, 2007 from <http://www.time.com/time/magazine/article/0,9171,923618-1,00.html>
- Tourangeau, R., Rips, L. J., & Rasinski, K. (2000). *The psychology of research response*. Cambridge UP
- TNS (2006) "World count of gaming machines 2006: A marketing research report". *AGMMA, Australia*. Available at: http://www.agmma.com/Agmma_site/research.html
- Tripsas, M. (forthcoming). "Customer preference discontinuities: a trigger for radical technological change". *Managerial and Decision Economics*,
- Tripsas, M. & Gavetti, G (2000) "Capabilities, Cognition and Inertia: Evidence from Digital Imaging" *Strategic Management Journal* 21 (10/11): 1147-1161
- Turner, N. & Horbat, R. (2004). "How do slot machines and other electronic gambling machines really work?". *Journal of Gambling Issues*, 11.
- Tushman, M. & Anderson, P. (1986). "Technological Discontinuities and Organizational Environments" *Administrative Science Quarterly*, 31(3): 439-465
- USA Today* (2003). "Slot machine cheat bilked casinos with ingenious gadgets". *USA Today*, August 11. Retrieved August 1, 2007 from http://www.usatoday.com/tech/news/2003-08-11-slot-cheats_x.htm
- Vogel, E. (1991)." Bally's stock sale OK'd", *The Las Vegas-Review Journal*, October 12, p. 1f
- Vogel, E. (1997)." Gaming technology's future seen as unclear". *The Las Vegas-Review Journal*, December 17:4b
- Vogel, H. (2004), *Entertainment Industry Economics*. 6th ed., Cambridge: Cambridge University Press.
- Wagenaar, W. A. (1988) *Paradoxes in Gambling Behaviour* Erlbaum.
- Walker, D. M. (2007) *The Economics of Casino Gambling*. Springer-Verlag, Berlin.
- Wall Street Journal* (1982). "Video-game era arrives at growing numbers of casinos". September 22. Article derived from Factiva database.
- Walter, E. (1980) „The man who built Bally: William T. O'Donnel, Sr." *Gaming Business Magazine*, August p 4-6.
- Warshal, B. (2007). "Sam Klein deserved better than Engelhardt's smear". *The Palm Beach Post*, November 13: 15A.
- Williams, D. (2004), *Trouble in River City: The Social Life of Video Games*, Dissertation,

- Department of Communication
Studies, University of Michigan. Retrieved August 1, 2007 from
<https://netfiles.uiuc.edu/dcwill/www/research.htm>
- William, R. J., West, B. L. & Simpson, R.I. (2007). *Prevention of problem gambling: A comprehensive review of the evidence*. Report prepared for the Ontario Problem Gambling Research Centre, Ontario, Canada. August 1, 2007. Retrieved October 1, 2007 from <http://www.uleth.ca/dspace/bitstream/10133/414/4/2007-Prevention-OPGRC.pdf>
- Winter, S. (2003) "Understanding Dynamic Capabilities" *Strategic Management Journal*, (24)10: 991-995.
- Yano Research Institute (various years – need years) *Pachinko related manufacturing industry..* Report, Yano Research Institute, Tokyo: Japan.
- Yin, R. (2003). *Case study research: Design and methods*. 3d ed. Sage Publications.
- Young, A. (1928) "Increasing returns and economic progress" *The Economic Journal*, 38(152): 527-542.

⁵⁷ Currently, the industry is involved in a change from machines to server- based gaming, although this recent change is outside the time period and thus the purview of this study.

⁵⁸ Si Redd's distributing company was called "Redd Distributing Company" Due to the legalization of Shuffle Alley games, the company flourished for some time, but after some time his business encountered difficulties which Si Redd later in his life attributed to organized crime. In an interview he described this situation:

"They [organized crime] kept squeezing me. But I showed a lot of fight. Then I realized what was going on. And they bought the Shuffle Alley business for a very small amount. They were the real reason I moved out here [to Nevada]. Si Redd, cited in Hagen (2001).

⁵⁹ William O'Donnel had purchased 30% of Currency Gaming in November 1965 from Dick Graves for 63,000 (United States District Court for the Northern District of Illinois, Eastern Division, 1981). Dick Graves was a former owner of the Nugget Casino in Sparks, Nevada. Hence, William O'Donnel had obtained a personal gaming distributor license in Nevada in 1965. William O'Donnel first purchased Graves 70% share that then were sold to Si Redd when he obtained his Nevada license (United States District Court for the Northern District of Illinois, Eastern Division, 1981).

⁶⁰ Bally's 1969 Annual Report reported that as much as 85% of Bally's gaming machine sales went to export markets outside the US (*Bally Annual Report*, 1969)

⁶¹ In an interview Si Redd described the influence that his background as amusement game distributor had on the way he approached the gaming machine industry:

"People think that maybe I am smart or I invented all these various things [gaming machine inventions]. It wasn't necessary that I invented them but in the amusement machine business that I was in you had to have something new all the time. You put this pinball machine out and put in a different pinball machine, you are in the moving business, you had to have something new and I was used to it, it was in my blood. When I saw all those slot machines I was ...why can't we improve it, or if it was a nickel why can't we make it double play, it would be a dime. If you could double play, why can't you make it 5 ways so if you playing 5 nickels as 5 quarters. If you could win on 1 reel, why can't you win on 1, 2, 3 reels and you got 15 cents. It was amazingly popular, whereas the old machines would do 30 dollars/day on the casinos part, some of our machines would make 100 dollars/day and they got the money back on a few weeks. It was fantastic. I have always said I was not smart: I was just lucky to be at the right place at the right time. I've used the expression: Partly it was like shooting a fish in a barrel. "Si Redd, cited from KNPR (2005)

⁶² As Si Redd argued, the lemon symbol had a negative impact on players: "A lemon meant that you automatically lost. So if a lemon came up on the first reel, the customer says, 'Aw, shit!'" (Si Redd cited in Hagen (2001).

⁶³ The lack of financial capital still hampered the growth of many casino operations at the time, especially since gaming operations still had problems receiving credit lines at banks and major casino companies had just started to be introduced on the stock market.

⁶⁴ Warren Nelson, casino manager at Cal-Neva, described this strategy in an oral history.

“From the beginning, Si and I were open with one another, and we formed a great relationship. He was one of the few who understood what I was doing, loosening up the slot machines to make more money. Si was a great salesman, and he often used my name to sell his machines, saying ‘I’m selling Bally slot machines, and they’re the best in the world. If you don’t believe me, go ask Warren Nelson’”.

Warren Nelson, Manager Cal-Neva, cited from Nelson (1994: 137).

⁶⁵ The high payback percentage in combination with larger betting size and jackpots made them a viable alternative for many gamblers. A closer look at casino revenues shows that the share of total casino gaming revenues derived from dollar gaming machines increased from 3.1% in 1976 to 23.4% in 1983. At the same time, table games in general and craps games in particular decreased significantly in terms of relative casino revenues (see

). It is likely that the nature of craps as a game of chance and its older demographic of players were especially vulnerable to the competition of dollar gaming machines. Other factors are likely to have had an effect as well. It was proposed that the generation of players that played craps extensively during WWII was declining in the casinos. The general change toward a broader casino demographics was also a factor likely to favor gaming machines without any need for previous knowledge and competitive social interaction over table games.

⁶⁶ The Atlantic City numbers should be interpreted with some caution due to the specific regulatory and competitive situation for Atlantic City (see Appendix).

⁶⁷ The first of the efforts to include electronics in gaming machines was not based on video screens. Nevada Air Products (a defense subcontractor) and its inventor Vern Juenke developed a solid state, spinning reel machine prototype, using rear projection, read-out units for the reels. The project was abandoned due to a lack of player appeal and financial problems (Fey, 2002: 213). In 1964, Nevada Electronics had introduced an electronic “21” machine.

Dale Electronics introduced an integrated circuit based poker gaming machine (“Pokermatic”) that used read-out units for the numbers of the cards (developed in 1967) as well as an electronic craps game (developed in 1970). Subsequently the company’s inventor Dale Rodesch and George Johnson developed an electronic spinning reel machine that used a stepper motor for Centronic Data Computer Corporation that was manufactured by Gamex Industries (patent 4,099,722 filed in 1975). Subsequently Dale Rodesch worked with Si Redd’s company that would become IGT and were involved in the development of a number of video based gaming machines for Si Redd during 1975-1977 period (TV 21 in 1975, Dog Race 1975, TV Draw Poker in 1976 and Video Keno in 1977 (Rodesch, 2007)).

Raven Electronics developed a solid state, rear projected spinning reel machine in 1968 and claimed to have produced around one thousand of these until 1971 which does indicate some acceptance for these machines (Fey, 2002: 213). However, the manufacturing costs exceeded the 1,800 USD selling price, which indicates the difficulties small companies had in making production profitable at the time. The expensive technology and the small scale production meant that the machines had to be sold at above-average selling prices for spinning reel gaming machines, and the only way to be able to do this was if the machines had a player appeal with enough above average win/unit. Read-out units were the technology commonly used on these early electronic gaming machines. Around 1971-72, Bally Distributing acquired Raven Electronics Corporation.

Gamex and its parent company Centronics Data Computer Corporation had developed an electronic spinning reel gaming machine in 1974 (patent 4,099,722 by the inventors Dale Rodesch and George Johnson). The machine was a pioneer in the use of stepper-motor technology that became widely used in spinning reel gaming machines during the second half of the 1980s (see chapter 0). The company that owned the patent (then with the name Global Gaming

Technology) tried to sue IGT for infringement of the patent at the end of 1990s. However, the patent were judged invalid because Gamex had demonstrated a working prototype of the Gaming machine in the first half of 1974, more than a year before a patent application for the machine was filed (July 30, 1975) (see IGT v. Global Gaming Technology Inc, 1999).

⁶⁸ Before the first video -based gaming machine appeared in Nevada in 1975, Pong had showed an economic potential for amusement games on TV screens when it revolutionized the amusement game market throughout 1973 and 1974 (Ernkvist, 2008). It is estimated that in 1973 there were over 50,000 amusement video game sold in the US (nine out of ten were Pong), and the following year 75,000 (with a more diversified market) (Ernkvist, 2008; Baer, 2005). However, in 1975, the market contracted sharply to 32,500 units before new innovative concepts enabled it to regain growth (Ernkvist, 2008; Baer, 2005). Hence, by the middle of the 1970s it was clear that Pong had made an important breakthrough in the arcade industry, but there was still a widespread uncertainty regarding the endurance of the video-based amusement market. The volatile early market conditions only amplified the view that it might only be a novelty (Ernkvist, 2008).

⁶⁹ Although it is beyond the scope of this article it should be noted that innovative activity in video poker also took place on markets outside the US during the second half of the 1970s. The English Bell-Fruit Company claimed that they saw the potential for video gaming as early as the first half of the 1970s and patented it for the UK market. Japanese Sigma claimed that they developed video poker a few years later in 1978.

⁷⁰ In 1975 Fortune Coin produced a video spinning reel machine that used a TV screen that sold for 2,500 USD. By using video screens instead of physical reels, it had considerably more stops than physical spinning reel machines at the time. The video reel was followed by a color version of video poker in 1977 (Fey, 2002). For Stanley Fulton, it was the first major entrepreneurial venture in the gaming industry in Nevada and would be followed by a number of other successful entrepreneurial ventures over the next three decades. Over the years, Stanley Fulton would become chairman of the company that would become Alliance (it bought Bally's gaming machine division in 1995 (see Chapter 10.3.47)). He was also involved when Japanese Universal successfully entered Nevada in the middle of the 1980s (see Chapter 10.1). In 1993, he founded Anchor Gaming, which became a highly successful gaming machine company and was sold to IGT in 2001 (see Chapter 12.1.52). Waler Fraley was an inventor that had been involved in early electronic gaming machines. Among other things, he was coinventor of an electronic black-jack gaming device, patent 3,796,433 filed in 1971.

⁷¹ The common stocks was later sold for 4.2 MUSD by Si Redd (IGT Prospectus, 1981:30).

⁷² IGT was created in December 1980 to become parent company of SIRCOMA that then changed name to IGT. This arrangement was made for the company to be in compliance with the gaming laws of Nevada before going public (IGT Prospectus, 1981:3). The name SIRCOMA was an abbreviation for Si Redd COin Machines.

⁷³ Besides the video -based gaming machines, the company also sold other specialty gaming machines, most notably the giant "Big Bertha" and "mini-Bertha" gaming machines.

⁷⁴ George Drews had worked for a decade in Harrah's, lastly as Chief Financial Officer. In February of 1980, Harrah's was acquired by Holliday Inn and most of the operating team at Harrah's was replaced after the merger (Dixon, 1992: 186). As a result, Si Redd saw the opportunity to hire George Drews. George Drews already had been in close contact with the company during his time at Harrah's. Starting in the middle of the 1970s, Harrah's had devoted resources for a project to develop their own electronic spinning reel gaming machine. However, the company did not have adequate internal resources to complete the project, so when Bally and the other gaming machine manufacturers introduced their electronic spinning reel machines, the project was finally abandoned in 1982 (Dixon, 1992: 191-193). A group from Mead Dixon and other persons at Harrah's had far-reaching plans to acquire Sircoma. Harrah's first looked at an acquisition with Sircoma before the merger with Holliday Inn (around

1979), but it did not have enough capital (Dixon, 1992: 193, 194; Selesner, 1982a). After the merger, they did a second look, but the Holiday Inn management in Memphis said no to the idea because they argued that it would be a deviation from Harrah's core business as casino operator and Harrah's lacked the management resources to be a gaming machine manufacturer (Dixon, 1992: 193, 194).

⁷⁵ These included Raymond Douglas Pike, a general counsel that helped IGT in various legal matters. He had previously served in the Nevada Attorney General's office as chief of its gaming division; Others included Jon Bengtson, a former Harrah's Vice President of Management Information Systems; Peter Douglas Dickinson, who became Vice President of Engineering with previous experience as an engineering manager at Hewlett Packard; and Robert Carabine who became VP of Operations with previous experience with Eaton-Kenway. While Jon Bengtson and Robert Carabine did leave in the middle of the 1980s, Peter Dickinson was important to IGT's R&D efforts throughout the 1980s; Raymond Pike successfully managed many of IGT's legal matters throughout the 1990s. It was a young new team of managers. Except for Robert Carabine, they were all in their 30s when they joined IGT.

⁷⁶ For video reels, the first half of the 1980s saw some growth, but technological development in electronic physical spinning reel technology then caught up because of their advantage in the number of reel stops and security. As a result, it would be until the 1990s before technology enabled new innovative opportunities and before video reel machines were able to make their large breakthrough (see Chapter 0).

⁷⁷ While earlier versions of Moore's law (Moore, 1965) differed somewhat from later interpretations; the law in its description of the development from the end of the 1970s onward described the rapid, even increase in the complexity of the memory chip (DRAM) and the rapid, even progress in microprocessor speed (Mollick, 2006). As argued by Mollick (2006) the rapid progression and consistency of the "law" during the last decades are due to a number of technological as well as economic factors. Because the price for the latest microprocessor or DRAM has remained very stable as well as the law, there is the implication that after a year, it will be possible to buy microprocessors or memory with 30% improved performance for the same price or the same memory or microprocessor performance for a significant decrease in price (Mollick, 2006; Jörnmark & Ramberg, 2004).

⁷⁸ Video poker was the innovation that had the ability to reshape the environment through which gaming machines operated by making local casinos and "convenience" gaming in street locations, more economically viable. They were both locations dominated by local residents, and the specific player appeal of video poker for these local residents combined with the growth of Nevada and Las Vegas residents in general during the period made possible a period of rapid growth.

In many regards, video poker had an ability to reshape the environment by giving rise to local casinos and convenience gaming in Nevada in a way similar to how the Amusement Video Game through its player appeal had made possible the growth of shopping mall arcades and amusement games in street locations during the late 1970s (Jörnmark & Ernkvist, forthcoming). Both developments were primarily driven by the high win/unit for the video based machines.

⁷⁹ Some studies have proposed that video poker are more prone to problem gambling than other types of gaming machines. As a result, it could be argued that the attraction for video poker among local players (that are more prone to problem gambling) were driven by the ability of video poker to attract problem gamblers. The argument that video poker is more "addictive" than other types of casino games remains controversial (for a discussion of this, see Dowling, Smith, & Thomas, 2005). Even if this would be the case, it is unlikely that the "addictive" nature of video gaming were more important than the rational economic reason proposed here. Nevertheless, it could have been one factor (although not the most important one) that contributed to the attraction of video poker to local gamblers over time.

⁸⁰ Some studies of specific local-oriented casinos confirmed this view, e.g. in Gold Coast Las Vegas 1,600 (84%) of a total 1900 gaming machines in 1988 was video poker machines (Hevener, 1988:10).

⁸¹ One survey of local resident gamblers in the Las Vegas area conducted in 1998-1999 (Shoemaker & Zemke, 2005) revealed that out of the different casino games, 49.6 % of

respondents played video poker most often (compared to 18.1% for spinning reel machines, 8.6 for Black Jack followed by Bingo, race & sport books, keno, poker, video keno and craps) (Shoemaker & Zemke, 2005). The study also showed a markedly higher preference for video poker among frequent local gamblers. Playing preferences for video poker were 10 percentage units higher for heavy gamblers than for light gamblers (Shoemaker & Zemke, 2005). Not surprisingly, the adverse result between the two groups was true for slot machines.

The surveys conducted by GLS Research for the Las Vegas Convention and Visitors Authority make comparisons between gambling preferences among residents and visitors in the Las Vegas area possible. According to their “Clark County resident study” and “Las Vegas Visitor” profile, around three times as many Clark County residents responded that video poker was the game they played most often compared to Las Vegas visitors for whom spinning reel machines and table games were played far more often (LVCVA, 2004a; 2004b; 2006a; 2006b). The percentage of gambling Clark County residents who played video poker most often was 34 and 29 percent for 2003 and 2005, respectively. For Las Vegas visitors, the corresponding numbers were 9 and 10 percent.

⁸² These non-casino gaming machine establishments in Nevada are called “restricted” (in comparison to the “non-restricted” casino licenses) due to a restriction on the number of gaming machines and other specific regulations surrounding them (see “Definitions”)

⁸³ The development of Jackpot Enterprises, one of the largest gaming machine route operator for convenience venues in Nevada, is revealing in this regard. In 1989, as much as 72 percent of its machines were video poker, as of 1997 that had increased to 96 percent (Jackpot Enterprises Annual Report, 1989, 1997). Accounts from other gaming machine route operators in Nevada in the 1990s gave similar estimates of the high dominance of video poker during that period (see e.g. *Anchor Annual Report*, 1997).

Official statistic from the Nevada Gaming Commission regarding the specific growth of video poker in different location types is not available (the statistics breaks down gaming machines in terms of denomination and not in terms of type of games). However, statistics for the total growth of restricted gaming machines in Nevada reveals that the growth of restricted non-casino establishments (convenience gaming) was especially high during the period 1978-1989 when video poker made its breakthrough as the local game of choice. Arguably, video pokers as an innovation were crucial for the growth of these venues.

⁸⁴ In Atlantic City, the penetration of video gaming machine in 1986 was lower; only 844 of the 16,373 gaming machines in Atlantic City were video based. The comparably lower degree of video based gaming machines in Atlantic City was not only a result of a different player base and the lack of experience with poker; Atlantic City’s specific regulation hindered the amount of casino floor space available for gaming machines (see Appendix 1). The result was that the more rapid playing speed of spinning reel gaming machines had a comparative advantage.

⁸⁵ IGT and Si Redd had the vision and entrepreneurial management that pushed the company to embrace innovation even if it threatened their existing product lines. Si Redd was convinced that constantly staying at the forefront of technological development and creating video gaming machines with such player appeal that they could produce Schumpeterian rents through a significant above average win per unit was the way to conduct business.

“I would wager that ten year from now [1993, authors remark] you won’t even recognize the way the video machines look. There’s no question that the state-of-the-art is improving tremendously. It will get through a tremendous revolution. Most of the progressive casino managers welcome obsoleting the old machines. And the only way we can get them to obsolete is by making sure that the machine takes in enough money so that they get their money back on the investment they make very quickly.”

Si Redd cited in Public Gaming (1983c:35)

⁸⁶ Built in a modular way through standardization, changes to new game concepts were rapid and easy for the casinos that only had to purchase “conversion kits” from IGT (consisting

of a new program memory and new artwork) to change to another game. Through the Fortune II line, the advantages of increasing modularization, such as increasing speed of innovation, enabled the constant introduction of new gaming software. Steven Wynn that was chairman of Golden Nugget at the time, noted the advantage.

“What is significant about IGT’s new [Fortune II] product line is a move away from equipment obsolescence In the past each new generation of equipment would make the prior generation obsolete. Today, with everything becoming modular, a new chip or a board is all that is needed to change games. That is very important.”

Steven Wynn, chairman of Golden Nugget in Public Gaming Magazine (1983).

⁸⁷ Compared to the high need for quality control in production and the assembling of a large number of components in the electro-mechanical era, digital gaming machines had a considerably higher reliability. Service problems were mainly limited to minor problems, such as coin jams. This was especially true with the introduction of microprocessor -driven gaming machines in the early 1980s. They would rapidly take over the previous generations of electronic gaming machines based on TTL integrated- circuits. Video poker did not consist of any moving parts, so previous quality assurance and engineering efforts to limit this problem that was common in electro-mechanical gaming machines became obsolete.

⁸⁸ The development on the market was also mixed during this time. The US encountered slower casino gaming growth after 1982 as well, which affected gaming machine sales negatively (see Figure 7 p 59). However, for video-poker gaming machines the continued relative growth of video-poker in relation to other types of gaming machines meant that this segment of the market most likely continued to grow.

