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American Professional Sport Facilities: Considerations for the Future

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Abstract

This work reveals American professional sport facilities impose staggering financial and spatial costs on the surrounding communities and suggests three areas future professional sport facility designers should consider before partaking in future renovations or new construction opportunities. The three areas include reducing the size, considering the environment, and embracing interaction and telecommunication technology. This work supports future American professional sport facilities are quite capable of reducing their size and costs while also maintaining or creating social and financial benefits for itself and the local community. For example, the professional sport facility can support more community-oriented activities through using the 'innards' of the stadium to justify public money. The professional sport facility will also need to respect the physical and biological environment and can through the use of renewable sources of energy (e.g. sun, water, wind). Finally, future professional sport facilities ought to embrace interaction and telecommunication technology to help improve the spectator experience.

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American Professional Sport Facilities: Considerations for the Future

Howard (1999) found over 120 new or significantly renovated sport facilities emerged in the United States for around $16 billion between 1990 and 1999. Other reports generated similar conclusions about this decade's spending. For instance, Bernstein (1998) suggested professional sport facility construction totaled nearly seven billion dollars during the 1990s. For Major League Baseball (MLB) and the National Football League (NFL) the 1990s specifically produced $4.4 billion ($5.7 inflation adjusted) in new facility spending (See Table 1.1). The future demonstrates this construction trend will continue in MLB and the NFL (2000-2012) for approximately $13 billion (See Table 1.2). Despite adjusting for inflation, extreme and massive costs noticeably increased versus the previous decade's spending on new sport facilities by $8.5 billion. Interestingly, this recent construction period (1990-present) reveals more than half of MLB and NFL organizations will compete in new facilities built since 1990 (See Table 1.3 and 1.4).

The current era of professional sport facility construction owes its substantial cost increase to a strict focus on accommodating all the needs of the owners, players, investors, and media or its various stakeholder groups (Seifried, 2005). Eisinger (2000) and others also posit entertaining spectators also dramatically altered the shape and function of today's, and therefore size and cost of sport facilities (Bess, 1999; Ritzer & Stillman, 2001; Seifried, 2005). Ron Turner, a Sr. Vice President and Director of Kansas City's Sport Architecture firm, Ellerbe Becket, described this allowed the professional sport facility to evolve into a "miniature city," which unsurprisingly consumes tremendous amounts of energy (Gunts, 1992 p.87). Other works overwhelmingly support this conclusion (Bess, 1999; Weiner, 2000). Bess (1999) distinctively demonstrates this "miniature city" and energy cost description through his discovery that architectural designs increased current sport facility volumes nearly 500% from previous sport building projects. Consequently, the average MLB and NFL facility built since 1990 averages an astounding 27.87 acres (See Table 1.5).

The colossal retractable roof facilities completed during the 1990s and throughout this decade also demonstrate the dramatic rising costs vividly as they average $416,266,667 ($485,230,367 inflation adjusted) per build from 1990 to 2006, while their outdoor counterparts average another $298,292,857 ($356,667,779 inflation adjusted) of damage (See Tables 1.1 and 1.2). Sharma (1999) additionally reveals retractable roof facilities inflict at least another $300,000 more in maintenance costs annually than unroofed facilities to further the burden. Fascinatingly, the retractable roof exists as a massive and costly structure primarily due to its engineering and shear weight (Leventhal, 2000; Seifried, 2005). For instance, Miller Park's (Milwaukee) pivoting roof panels occupy approximately eleven acres and weigh roughly twenty-four million pounds (Seifried, 2005). Safeco Field (Seattle) possesses a sliding retractable roof approximately nine acres in size. Additionally, this structure weighs twenty-two million pounds so it can protect itself against six to seven feet of snow and winds approaching seventy miles per hour (Seifried, 2005). Finally, Sherman (1998) describes Chase Field (Phoenix) as so immense it can hold eight America West Arenas, Phoenix's 19,023-seat basketball venue, inside.

Bess (1999 p. iii) believes these outrageous costs stem from the unwillingness and inability of community officials to devise appropriate limitations on sport team owners.

This inability or unwillingness to limit spending likely surfaces from a fear teams will leave them for a new location because of the competition for major league status. Essentially, this fear produces a tremendous amount of leverage for the professional sport organization during facility discussions because a move can strip a city of its precious image (Euchner, 1993; Gunts, 1992). The owners, as a financially driven group, seek facilities, which increase revenues to offset rising player salaries and improve the overall worth of their team (Euchner, 1993; Gunts, 1992; Howard & Crompton, 1995; Ritzer & Stillman, 2001; Rockerbie, 2004; Smith, 2000; Sullivan, 2001). Consequently, adding structures, which significantly enhance the spectator's experience and thus, the size of the facility, appears necessary to assuage ownership requests and increasing attendee comfort and entertainment demands. Interestingly, despite the additional features new stadiums embrace, these civic monuments produce few if any tangible benefits for their communities (Baade & Dye, 1988; Bess, 1999; Blickstein, 1995; Euchner, 1993; Noll & Zimbalist, 1997; Seifried, 2005).

Some examples like AT & T Park and its 5,200 square foot medical clinic and Turner Field's day care center serve as exceptions but on the average these types of community oriented activities fail to find a home in the professional sport facility (Epstein, 1998b; Smith, 2000). Weiner (2000) and others recommend sport facilities attempt hosting community-oriented businesses and services to increase the tangible worth of their likely large public investment (Baade & Dye, 1988; Bess, 1999; Euchner, 1993). Clearly, this exists as a sound objective because it appears difficult to justify hundreds of millions of the public's dollars when teams and other professional events utilize sport facilities so few days of the year.

Again, professional sport facilities today function as entertainment zones and generally do not support community activities because that is not their primary purpose (Baade & Dye, 1988; Bess, 1999; Smith, 2000, 2003; Weiner, 2000). This is important to understand. Typically, professional sport facilities focus their services and benefits towards improving the financial condition of the professional organization and its stakeholders (i.e. owners, sponsors, media). Euchner (1993, p.182) enthusiastically promotes American cities need to do a better job of developing policies that "enhance stability in fundamental services and activities such as energy, transportation, housing, health care, and education." This work proposes the professional sport facility could serve to help accomplish this need. Furthermore, this inquiry seeks to suggest three areas future professional sport facility designers should consider so they can accommodate this call from the scholarly field identified above and still create an attractive bottom line for sport organizations. The three areas include reducing the size, considering the environment, and embracing interaction and telecommunication technology.

Research Design and Method

This research was part of a larger study dealing with the evolution of the professional sport facility in the United States. It utilized historical methods to study this phenomenon. Historical research is the attempt to systematically establish conclusions, trends, and facts about past environments based on evidence collected and interpreted from valid or authentic sources (Ary, Jacobs, & Razavieh, 1996; Johnson & Christensen, 2000). Using historical sources, from this study's perspective, provides an excellent opportunity toward a more complete understanding of past culture but also how the future may be altered. Essentially, studying the past helps us understand the future.

Historical study requires the researcher to pursue primary (e.g. newspapers, pictures, interviews, architectural plans) and secondary (e.g. journal articles, scholarly books) sources and examine these materials through completing an historical criticism. The historical criticism completed for this work aimed to certify the validity and reliability of the primary and secondary source evidences so accurate conclusions or predictions could be prepared. Internally, the researchers evaluated the information used for this manuscript by asking whether or not each source provided accurate or trustworthy information (Wineberg, 2001; Ary et al, 1996). Externally, this research inquiry; "ask if the documentation includes valid techniques, and if the source in question has been falsified in any way," (Ary et al, 1996; Berg, 1998 p. 350). This check was especially helpful when analyzing biographical information on sport facilities like ballpark dimensions or construction costs. Thompson (1967) suggests completing an historical criticism appears important for developing or acknowledging a theme within a larger event. In this case, the theme concerns expectations about the future of facility construction.

Finally, the process of examining trends of sport facility construction required the researchers to perform triangulation. Triangulation benefits this study because valuable and important causal inferences can be appropriately established (Brewer & Hunter, 1989). Denzin (1978) supports this point as he argues for the combining numerical data and written information because it supplements or enhances individual strengths and reduces weaknesses of arguments or predictions. Overall, triangulation appears logical and necessary for this paper because findings from this technique improve the overall validity of its position.

Reduce the Size

Professional sport facilities today often include structures like restaurants, halls of fame, hotels, and entertainment zones like playgrounds, arcades, and pools to create the "miniature city" identified above (Jenkins, 1998; Leventhal, 2000; Sherman, 1998; Smith, 2000, 2003). Sheard (2001) argues the current era of professional sport facilities uniquely provide these structures to keep spectators at the venue for longer periods of time during and in between events so they can provoke as much spending as possible. Interestingly, sport facilities did not always solely focus on removing money from their patrons. For example, historical records show the space within the sport facility accommodated areas for other activities like rifle shooting and indoor track (Serby, 1930). Additionally, early modern era (1903-1952) facilities acted as dormitories or community housing areas, laboratories, horse/cattle stables, and automobile repair, woodworking, or machine shops (American Architect, 1920; Serby, 1930). Weiner (2000) recommends we can better address the needs of the professional sport facility's surrounding community and therefore, justify its cost better by using the stadium's innards like they did in the past. The "innards of a stadium" are those areas underneath the seating arrangements and within the actual site of the building.

The University of Pennsylvania's Franklin Field II demonstrates many of these areas. For instance, editions of the American Architect (1923) and Architectural Forum (1923) both describe multiple rooms existing inside Franklin Field II. This facility expectedly accommodated team rooms, storage areas, showers, training rooms, ticket counters, a physician's office, and administrative space. However, two squash courts with a seating gallery, five regular squash courts, one rifle range, a dirt surface large enough to practice indoor track events like the pole vault or jumping (i.e. long jump, broad jump, triple jump), and university housing also appeared within the structure. Overall, most early modern sport facilities exploited their available space under stands and within concourses or hallways to maximize the use of the facility (Serby, 1930). Appropriately, this directly kept the size and cost of the venue from spiraling out of control.

It appears surrounding the professional sport facility with vast amounts of automobile parking also does little to help the community because it does not prompt individuals and groups to stay, participate, and interact with local neighborhood's commercial ventures, which surround the perimeter of the sport facility (Euchner, 1993). According to Seifried. (2005), this was a major criticism of the Late Modern era (1953-1991) of sport facility development. The current "Post Modern" era of professional sport facilities often create their own community and encourage onsite spending by building the "miniature city" and it's associated structures described above. However, spending at this "miniature city" typically only benefits the sport organization and not necessarily the locals who provided funds for its construction. Therefore, Bess (1999) and Seifried (2005) suggest future ballparks should look to encourage spending around the periphery of the sport facility through community-based activities (e.g. housing, health care, or education) offered or supported using the innards of the ballpark so ultimately the size of the venue will not continue to expand and construction costs will remain low.

Bess (1999) and Parrish (1998) both recommend avoiding a suburban location and choosing an urban setting for professional sport facilities because site constraints imposed by the urban environment force sporting venues to be smaller. A smaller physical footprint should persist as a desirable objective because it serves to reduce the cost of the overall project for those private investors and the public (Bess, 1999). Specifically, Bess (1999) assumes sport facilities emerging one-third less in size create half as much construction spending, even in an urban location. Recent examples and discussions from New York, Dallas, and San Francisco demonstrate this idea could be important to sport organizations because many cities expect their teams to contribute more financially to facility funding if not all for their construction.

Bess (1999) recommends fighting our compulsion to abolish all obstructed seating positions could help realize this goal for the contributing public and sport organizations. Obstructed viewpoints created from expansion efforts of the early modern era of sport facility design provoked recent stadium developers to position upper decks farther away from the field and introduce vertical circulation systems outside the constraints of the structure to make sport facilities larger (Bess, 1999; Progressive Architecture, 1971; Rader, 2002; Richmond, 1993; Ritter, 1992; Seifried, 2005). Ideally, we could limit the size of the professional sport facility by placing vertical circulation and parking structures inside, underneath or above the confines of the building's location rather than expanding out.

Improved engineering techniques and innovative building materials clearly allow us the opportunity to accomplish this feat. For example, the Great American Ballpark in Cincinnati currently possesses a large parking garage underneath the facility. Even as far back as 1931, Serby suggested an athletic organization could design parking in these locations for large stadiums requiring ten acres or more of parking accommodations. A side consequence of this action might produce smaller concourses with fewer amenities (e.g. concession options and merchandise stands) but with improving seating options (i.e.

smart seats- described below) people can order these items delivered to their seat without suffering a loss of quality in the product, service, or spectator experience.

Consider the Environment

In order to help pay off their staggering costs, Parrish (1998) and others recommend professional sport facilities also attempt to utilize ecologically friendly or renewable sources of energy such as wind, sun, water, and geothermal activities (Blickstein, 1995; Sheard, 2001; Temko, 1993). For example, the kinetic energy produced by the wind could operate turbines capable of producing tremendous amounts of renewable electricity. The power output necessary to work the turbines typically requires a wind speed range many offshore or at high altitudes places produce (Archer & Jacobson, 2004). Perhaps cities like Denver, Chicago, and San Francisco could take advantage of their location to capture this source of energy. Likewise, a tide, wave, or current's hydroelectric power generates endless supplies of energy which facilities could harness to alleviate operating costs. Several major league cities like Pittsburgh, Jacksonville, and Cincinnati, to name a few, host sport facilities near or next to water which act as available sources of energy. Solar power also appears as a viable methods to offset construction and annual expenditures. For instance, the enegy collected by cells on solar panels can generate electricity and heat buildings or food areas through heat pumps and ovens. Clearly, these structures work best in places with plenty of direct sunlight. Thus, places like Arizona, Southern California, and Texas appear as prime places to capture solar power. Interestingly, Sheard (2001) also claims solar heating can help benefit the environment because it producing seventy percent less carbon dioxide emissions. Clearly, those facilities harnessing these types of power would do a lot to increase attitudes concerning the environment because the energy produced would relieve costly burdens current structures often impose on the public and sport organizations.

Wind fans and thermal chimneys also serve to reduce sport facility size and costs by decreasing our dependence on massive air conditioning units. Sherman (1998, p. 218) adds Chase Field in Phoenix, AZ surfaced as a 21.9 acre facility partially due to its, “six massive chillers which would cool the stadium on those 110-degree days.” Wind fans and thermal chimneys, like the one at the Royal Selangor Turf Club in Kuala Lumpur, Malaysia and others in the Pacific side of the world demonstrate the success of using natural ventilation. Thermal chimneys perform this activity by allowing convective currents created through hot air’s desire to rise out of a building (Lomas, Eppel, Cook, & Mardaljevic, 1997). The thermal chimney is produced by providing a warm area with an exterior outlet at the top of the facility. Ultimately, this ventilates the structure and allows the airflow to deliver a nice breeze throughout the venue. This type of structure is particularly excellent for tropical or excessively hot or humid climates to reduce heat and move air inside the facility. Future facilities in the southern United States could benefit greatly from incorporating thermal chimneys.

Temko (1993) predicted improvements with high strength steel and other new materials along with accompanying innovative construction techniques would produce truly incredible structures in the future. Many of the skyrocketing costs of professional sport facilities concerns the selection of building materials with their exceptional design. This work suggests future professional sport facility designers should utilize durable low-maintenance materials like pre-cast concrete, glass, plastic, fiberglass, and Teflon as they cost less yet still remain aesthetically pleasing and strong enough to keep costs manageable and designs fresh (Blickstein, 1995). Temko (1993) encourages the use of natural light and tall windows where possible for the illumination of the facility. This appears appropriate for professional sport facilities because internal and exterior lighting often consume a large amount of energy used by the venue. Energy saving lamps and light reflector technology can help reduce power consumption while remaining bright and lasting longer than conventional lamps.

This study offers combining tall windows, with a self-cleaning glass feature, will also overtime help reduce costs to the facility. Obviously, the use of natural light cuts down on the amount of electricity used to light up the structure but the self-cleaning glass serves as an added bonus because it harnesses solar power through the use of a metal oxide coating on one side of window to remove debris (Romeas, Guillard, & Pichat 1999). When raindrops fall they form sheets of water on the window and wash away loose particles. On sunny days, the ultraviolet energy from the sun activates the oxide coating to accelerate the decomposition of organic matter attempting which collects on the window's surface. Overall, this combination reduces illumination costs and the need for manpower armed with perhaps toxic chemicals to clean the facility under potentially dangerous conditions (e.g. working in elevated lifts/baskets or repelling from the side of a building).

Improving the comfort level for all participants at a professional sport facility is important and clearly providing the appropriate levels of humidity, temperature, wind, and illumination, as identified above, appears necessary to accomplish this objective (Parrish, 1998). Puhalla, Krans, & Goatley's (2002) work suggests the growing senior population in the United States is one major group in the future who should be carefully considered before sport facility design. Specifically, Crompton (1999) discovered roughly one-eighth of the U.S. population included people sixty-five and older in 1990. However, based on current demographic trends proposed by the U.S. Census Bureau (2004), this figure is expected to increase to approximately one-fifth (20.7%) of the total American population (419,854,000) by 2050. This work believes the senior group's needs should emerge as a main consideration because of the vast amount of leisure time and disposable income they enjoy. For example, in 1948 almost 50% of those sixty-five and older continued to participate in regular employment but by the finish of the 1990s, this number declined to 15% (Crompton, 1999). Appropriately, Blickstein (1995) predicts future generations of professional sport facilities will develop based on market forces because the sport industry may need to convince people to attend the facility rather than watch at home. Clearly, focusing on comfort with the appropriate aesthetic look for seniors is a potentially profitable investment for future professional sport facilities because the growing senior market will likely look for places to go and events to spend their well-earned retirement.

Embrace Interaction and Telecommunications

The professional sport facility, generates, processes, and disseminates information for those in direct and remote or virtual attendance (Seifried, 2005 p.291). Mitchell (1995) supports two types of presence exist, physical and virtual. The growth of computer technology survives as the most significant development of the late 20th century because people exponentially depend on computer technology to provide them with cultural, economic, educational, and social forms of interaction (Adams, 1997). Necessarily, future professional sport facilities will need to continue their evolution into high tech buildings and television studios because of the way spectators desire to view and interact with professional sport (Boyle & Haynes, 2000; Seifried, 2005; Sheard, 2001; Smith & Patterson, 1998).

Interaction with the sporting event is important to recognize because Sweet (2001) and others predict sport spectators will continue to desire more interaction with professional sport in the future (Seifried, 2005; Sheard, 2001; Smith & Patterson, 1998). Sack (1997) suggests interaction regularly produces meanings through the shared social relationships and behaviors. Sheard (2001) expects the spectator of the future to participate more with the facility itself rather than exist as a passive member of the audience. Oriard (2001) supports this as he argued football spectators understand they need to become active participants in order to make the event a great spectacle. Appropriately, Chema (1996) and others believe individuals interacting more with the facility spend more money when they believe they can effectively impact the event because it provides them with some powerful experience (Bakker & Bakker-Rabdau, 1973; Smith & Patterson, 1998). Thus, future sport facilities should include opportunities for direct and remote interaction because experiencing interaction or contact is valuable socially and economically (Chema, 1996; Smith & Patterson, 1998).

Gershman (1993) and Golenbock (2000) demonstrate the benefits of direct interaction with their descriptions of how former St. Louis Browns (MLB) owner Bill Veeck (1951-1953) provided Sportsman's Park spectators several chances to interact with his American League team. Specifically, spectators attending St. Louis Browns games interacted with Manager Zack Taylor's on-the-field decisions by holding up signs with the words "hit" or "bunt." This marketing strategy served to produce record attendance and profits for the St. Louis Browns during this time period. Similarly, in the late 1980s and early 1990s, Pokey Allen, head football coach of Portland State University, embraced a similar fan involvement strategy to increase attendance and profits for his institution (Canzano, 2005). During these football seasons, Allen allowed fans with “run” or “pass” cards and “go” or “punt” signs to determine what strategy he used during the game. Allen also provided his fans another opportunity to interact with the sporting event through submitting plays to him they drew up for the game. During one football season, Allen would pick one play out for each home game and execute it during the contest. Expectantly, this campaign was wildly popular with the fans and helped produce significantly improved attendance at home football games.

Smart Seat technology now appears in a variety of facilities across the country to promote direct interaction experiences between spectators and event to produce a better experience (King, 2001). Currently, facilities like Tropicana Field (Tampa, FL) and San Diego Stadium installed “Choice Seats,” as they are also called, in a small section of their venue. These special seats, “incorporate a touch screen computer monitor linked to an in-house television network so spectators can view immediate replays of game action, read game information or statistics, and order food or beverage service,”(Seifried, 2005 p.264). Smart Seats like these also allow other entertainment opportunities like the watching of television programs, the playing video games, and the ordering of concessions or merchandise to enhance the overall experience (Alm, 1998; Bernstein, 1999; Blickstein, 1995; Davis, 1998; John & Sheard, 2000). Williams (2001) believes professional football and baseball will also soon enjoy the ability to control camera angles for their viewing pleasure through personal video recording (PVR) in their smart seats. Blickstein (1995) and others show us many current smart seats also possess the ability to generate warmth for customers on cold days and cool-off spectators during hot weather (John & Sheard, 2000).

Clearly, this technology appears impressive when comparing them to the old wooden or metal seats provided in the previous eras of sport facility development and this work proposes these types of seats will eventually find a home throughout all major professional sport facilities. Additionally, we should not be surprised if smart seat and home Internet technology is eventually used to covertly allow fans to call plays for their team like the handheld signs, described above, did in the past to enhance the spectator experience. Essentially, this work supports the idea spectators will get the opportunity to impact the core product (i.e. the sporting event). Sport organizations with poor or dwindling interest could recognize this as an opportunity to generate improved fan support through this direct and remote interactive experience. Additionally, this type of fan involvement could also produce better job security for head coaches, as they might not always be solely accountable for their team's performance.

Euchner (1993) suggests, in the future, professional sport facility planners should also consider those in virtual/remote attendance as much as those physically at the facility. Consequently, the next modern professional sport facilities should also embrace telecommunication and computer needs within its design because it no longer represents a space to be filled and emptied strictly for those attending athletic events. Adams (1997) implies the Internet and television allows multidirectional instantaneous interactions, which would provide individuals the ability to occupy a place different from the one they literally rest. This concept is also known as extensibility. Mitchell's (1995) work implies we should view computer and television networks as a living place because a variety of individuals possess the ability to travel to this location instantly through the voluminous amount of sensory information they provide.

Future professional sport facilities will need to work toward this goal of extensibility to increase the popularity and spending upon the sports they host. Consequently, the number of television camera locations will likely multiply throughout the facility much like they did over the past fifty years. Sheard (2001) acknowledges older facilities of the Late Modern era (1953-1991) rarely contained more than four television locations. However, the current professional sport facilities support adequate room for twenty or more television camera locations (Sheard, 2001). In the future, we should expect this figure to increase because television producers often utilize multiple shots (i.e. close-ups, long shots, and over the field views) to generate more interest in the event for both direct and remote spectators (Chandler, 1988; Sheard, 2001). Bess (1999) assumes most professional baseball contests will likely take place at night so the sport facility should identify the most important concerns with night game productions and implement conditions best broadcasting these contests. Producing the event in this manner, makes it a dramatic event and therefore easier to captivate the audience and change their interaction with the event from a passive viewer to an active participant.

Conclusion

The professional sport facility can be identified as a primary place because it exits an artificial structure which influences, affects, and controls a variety of people and activities. Primary places possess rules on exclusion and inclusion to differentiate one group of people from another (Sack, 1997). Sack’s (1986, 1997) work indicates the territorial partitioning of individuals within a professional sport facility naturally accompanies the increasing maturation or evolution of the sport itself. The enclosure efforts sport entrepreneurs brought to professional sport facilities will not likely subsist because people generally seek to control an appropriate amount of space to meet their psychological and physical needs. Therefore, the large areas occupied by luxury boxes will not likely fall in the future because again most individuals tend to acquire enough space to improve their privacy or opportunities for choice (Sundstrom, Town, Brown, Forman, & McGee, 1982).

The future could likely produce more luxury boxes or turn a greater percentage of current facility seats into this structure, which will not aid in decreasing facility operating and construction costs or increase community benefits. However, we are capable of reducing the size and costs of future professional sport facilities in a variety of ways to benefit the community, sport organization, and league (e.g. NFL Stadium Fund) both financially and socially as called for by the aforementioned scholars. First, we can make attempts to eliminate the “miniature city” most contemporary facility support today. We can better utilize the innards of the stadium to support community-oriented activities while still accommodating the necessary structures to fiscally run a professional sport facility. Again, Bale (2000) suggests future developers of professional sport facilities will receive a tremendous amount of pressure to make certain their structures host more events other than sporting activities. Selecting an urban location serves to limit the area a professional sport facility can consume. Considering the physical and biological environment also helps us achieve a reduction in size and improve the debt through the using of renewable sources of energy (e.g. sun, water, wind) and the introduction of structures like wind fans and thermal chimneys. Recently, the San Francisco Giants announced they their plans to install 590 solar panels at AT & T Park to provide energy to the local grid as an example of contributing back to the community (McIntire-Strasburg, 2007). Careful selection of construction materials and design of the facility also serve to keep costs low while maintaining an aesthetically pleasing location. Finally, embracing interaction and telecommunication technology will help improve the experience and impact of the professional sport facility by providing more choices and options for people to participate directly or remotely to an event.

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Name	Location	Type of Building	Original Cost	Adjusted Cost with Inflation	Year
Tropicana Field	St. Petersburg, FL	Dome	$138,000,000	$212,520,000	1990
U.S. Cellular Field	Chicago	Outdoor	$167,000,000	$247,160,000	1991
Oriole Park	Baltimore	Outdoor	$235,000,000	$338,400,000	1992
Georgia Dome	Atlanta	Dome	$210,000,000	$302,400,000	1992
Jacobs Field	Cleveland	Outdoor	$175,000,000	$238,000,000	1994
Americquest Field	Arlington, TX	Outdoor	$191,000,000	$259,760,000	1994
Alltel Stadium	Jacksonville, FL	Outdoor	$134,000,000	$176,880,000	1995
Coors Field	Denver	Outdoor	$215,000,000	$283,800,000	1995
Edward Jones Dome	St. Louis	Dome	$280,000,000	$369,600,000	1995
Bank of America Stadium	Charlotte, NC	Outdoor	$248,000,000	$317,440,000	1996
FedEx Field	Washington, D.C.	Outdoor	$250,500,000	$315,630,000	1997
Turner Field	Atlanta	Outdoor	$235,000,000	$296,100,000	1997
Chase Field	Phoenix, AZ	Rectractable Roof	$411,000,000	$517,860,000	1997
M & T Bank Stadium	Baltimore	Outdoor	$220,000,000	$277,200,000	1997
Raymond James Stadium	Tampa, FL	Outdoor	$168,500,000	$212,310,000	1997
Cleveland Browns Stadium	Cleveland	Outdoor	$314,000,000	$379,940,000	1999
LP Field	Nashville, TN	Outdoor	$290,000,000	$350,900,000	1999
Safeco Field	Seattle	Retractable Roof	$517,600,000	$626,296,000	1999
Total			$4,399,600,000	$5,722,196,000	
Average			$244,422,222	$317,899,778	

Table 1.1 Professional MLB and NFL facilities built 1990 to 1999. Cost inflation column calculated with help from the U.S. Department of Labor Bureau of Labor Statistics Calculator

Name	Location	Type of Building	Projected Cost	Adjusted Cost with Inflation	Year Completed
Minute Maid	Houston	Retractable Roof	$265,000,000	$318,070,790	2000
Paul Brown	Cincinnati	Outdoor	$453,200,000	$543,961,060	2000
Comerica Park	Detroit	Outdoor	$300,000,000	$360,000,000	2000
Pac Bell Park	San Francisco	Outdoor	$357,000,000	$428,495,370	2000
Miller Park	Milwaukee	Retractable Roof	$400,000,000	$466,823,260	2001
PNC Park	Pittsburgh	Outdoor	$262,000,000	$305,769,240	2001
Heinz Field	Pittsburgh	Outdoor	$281,000,000	$327,943,340	2001
Invesco Field	Denver	Outdoor	$364,200,000	$425,042,580	2001
Gillette Stadium	Foxboro, MA	Outdoor	$397,000,000	$456,110,850	2002
Reliant Stadium	Houston	Retractable Roof	$449,000,000	$515,853,330	2002
Ford Field	Detroit	Dome	$500,000,000	$574,446,910	2002
Qwest Field	Seattle	Outdoor	$430,000,000	$494,024,350	2002
Soldier Field	Chicago	Outdoor	$365,000,000	$419,346,250	2002
Great American	Cincinnati	Outdoor	$325,000,000	$373,390,490	2002
Lambeau Field	Green Bay, WI	Outdoor	$295,000,000	$331,371,580	2003
Lincoln Financial Field	Philadelphia	Outdoor	$512,000,000	$575,126,260	2003
Citizens Bank	Philadelphia	Outdoor	$346,000,000	$378,577,850	2004
Petco Park	San Diego	Outdoor	$456,800,000	$499,810,300	2004
U of Phoenix Stadium	Scottsdale, AZ	Retractable Roof	$455,000,000	$466,478,820	2006
New Busch Stadium	St. Louis	Outdoor	$365,000,000	$374,208,280	2006
Lucas Oil*	Indianapolis	Retractable Roof	$625,000,000	$625,000,000	2008
Washington Ballpark*	Washington, D.C.	Outdoor	$611,000,000	$611,000,000	2008
New Texas Stadium*	Arlington, TX	Retractable Roof	$650,000,000	$650,000,000	2009
Citi Ballpark*	Flushing, NY	Outdoor	$632,100,000	$632,100,000	2009
New Yankee Stadium*	New York City	Outdoor	$1,020,000,000	$1,020,000,000	2009
NY Giant/Jets Stadium*	Meadowland, NJ	Outdoor	$900,000,000	$900,000,000	2009
New Twins Ballpark*	Minneapolis	Outdoor	$522,000,000	$522,000,000	2010
Cisco Field*	Oakland, CA	Outdoor	$450,000,000	$450,000,000	2012
Total Cost			$12,988,300,000	$14,044,950,910	
Covered Roof Average			$477,714,286	$516,667,587	
Outdoor Average			$459,252,381	$496,548,657	
Average (minus New Yankee, Jets/Giants Stadiums)			$406,542,105	$447,804,094	

Table 1.2 Professional MLB and NFL facilities built 2000 to 2010. * denotes uncompleted but funded facilities and expected completion date from self reports, www.ballparksofbaseball.com, www.stadiumsofnfl.com, and www.ballparks.com

MLB (American)	**Location**	**Year**
AMERIQUEST FIELD	ARLINGTON, TX	1994
ANGEL STADIUM	ANAHEIM, CA	1999
COMERICA PARK	DETROIT, MI	2000
FENWAY PARK	BOSTON, MA	1912
JACOBS FIELD	CLEVELAND, OH	1994
KAUFFMAN STADIUM	KANSAS CITY, MO	1973
H.H. HUMPHREY METRODOME	MINNEAPOLIS, MN	1982
NETWORK ASSOCIATES COLISEUM	OAKLAND, CA	1996
ORIOLE PARK	BALTIMORE, MD	1992
SAFECO FIELD	SEATTLE, WA	1999
TROPICANA FIELD	ST. PETERSBURG, FL	1990
U.S. CELLULAR FIELD	CHICAGO, IL	1991
YANKEE STADIUM	BRONX, NY	1976
MLB (National)	**Location**	**Year**
CHASE FIELD	PHOENIX, AZ	1998
NEW BUSCH STADIUM	ST. LOUIS, MO	2006
CITIZENS BANK PARK	PHILADELPHIA, PA	2004
COORS FIELD	DENVER, CO	1995
DODGER STADIUM	LOS ANGELES, CA	1962
GREAT AMERICAN BALLPARK	CINCINNATI, OH	2003
MILLER PARK	MILWAUKEE, WI	2001
MINUTE MAID PARK	HOUSTON, TX	2000
PETCO PARK	SAN DIEGO, CA	2004
PNC PARK	PITTSBURGH, PA	2001
DOLPHIN STADIUM	MIAMI, FL	1987
AT & T PARK	SAN FRANCISCO, CA	2000
SHEA STADIUM	FLUSHING, NY	1964
TURNER FIELD	ATLANTA, GA	1997
WRIGLEY FIELD	CHICAGO, IL	1914

Table 1.3 (Current Major League Baseball Stadium List) shaded area recognizes those facilities built or enjoying a major structural renovation 1990 to present

NFL (National)	Location	Year
BANK OF AMERICA STADIUM	CHARLOTTE, NC	1996
CANDLESTICK PARK	SAN FRANCISCO, CA	1969
EDWARD JONES DOME	ST. LOUIS, MO	1995
FED EX FIELD	WASHINGTON, D.C.	1997
FORD FIELD	DETROIT, MI	2002
GEORGIA DOME	ATLANTA, GA	1992
GIANTS STADIUM	EAST RUTHERFORD, NJ	1976
LAMBEAU FIELD	GREEN BAY, WI	2003
LINCOLN FINANCIAL FIELD	PHILADELPHIA, PA	2003
H.H. HUMPHREY METRODOME	MINNEAPOLIS, MN	1982
RAYMOND JAMES STADIUM	TAMPA BAY, FL	1998
QWEST FIELD	SEATTLE, WA	2002
SOLDIER FIELD	CHICAGO, IL	2002
UNIVERSITY OF PHOENIX STADIUM	TEMPE, AZ	2006
LOUISIANA SUPERDOME	NEW ORLEANS, LA	1975
TEXAS STADIUM	IRVING, TX	1971
NFL (American)	**Location**	**Year**
ALLTEL STADIUM	JACKSONVILLE, FL	1995
ARROWHEAD STADIUM	KANSAS CITY, MO	1972
CLEVELAND BROWNS STADIUM	CLEVELAND, OH	1999
GIANTS STADIUM	EAST RUTHERFORD, NJ	1976
GILLETTE STADIUM	FOXBORO, MA	2002
HEINZ FIELD	PITTSBURGH, PA	2001
INVESCO FIELD	DENVER, CO	2001
M&T BANK STADIUM	BALTIMORE, MD	1998
NETWORK ASSOCIATES COLISEUM	OAKLAND, CA	1996
PAUL BROWN STADIUM	CINCINNATI, OH	2000
DOLPHIN STADIUM	MIAMI, FL	1987
QUALCOMM STADIUM	SAN DIEGO, CA	1997
RCA DOME	INDIANAPOLIS, IN	1983
RALPH WILSON STADIUM	BUFFALO, NY	1999
RELIANT STADIUM	HOUSTON, TX	2002
LP FIELD	NASHVILLE, TN	1999

Table 1.4 (Current NFL Stadium List) shaded area recognizes those facilities built or enjoying a major structural renovation 1990 to present

Name	Location	Sport	Type of Facility	Surface Area in Acres
Tropicana Field	St. Petersburg, FL	Baseball	Dome	25.25
U.S. Cellular Field	Chicago	Baseball	Outdoor	29.8
Oriole Park at Camdem Yards	Baltimore	Baseball	Outdoor	23
Georgia Dome	Atlanta	Football	Dome	16.19
Jacobs Field	Cleveland	Baseball	Outdoor	12
Rangers Ballpark	Arlington, TX	Baseball	Outdoor	32.14
Alltel Stadium	Jacksonville, FL	Football	Outdoor	11
Coors Field	Denver	Baseball	Outdoor	44
Edward Jones Dome	St. Louis	Football	Dome	39.27
Bank of America Stadium	Charlotte, NC	Football	Outdoor	26
Fed Ex Field	Washington, D.C.	Football	Outdoor	39.03
Turner Field	Atlanta	Baseball	Outdoor	20
Chase Field	Phoenix, AZ	Baseball	Retractable Roof	21.9
M & T Bank Stadium	Baltimore	Football	Outdoor	36.73
Raymond James Stadium	Tampa, FL	Football	Outdoor	19.2
Cleveland Browns Stadium	Cleveland	Football	Outdoor	31
LP Field	Nashville, TN	Football	Outdoor	36.7
Safeco Field	Seattle	Baseball	Retractable Roof	19.59
Minute Maid Park	Houston	Baseball	Retractable Roof	25
Paul Brown Stadium	Cincinnati	Football	Outdoor	40
Comerica Park	Detroit	Baseball	Outdoor	31
AT & T Park	San Francisco	Baseball	Outdoor	12.8
Miller Park	Milwaukee	Baseball	Retractable Roof	27.54
PNC Park	Pittsburgh	Baseball	Outdoor	22.27
Heinz Field	Pittsburgh	Football	Outdoor	34.2
Invesco Field	Denver	Football	Outdoor	39
Gillette Stadium	Foxboro, MA	Football	Outdoor	17.3
Reliant Stadium	Houston	Football	Retractable Roof	39
Ford Field	Detroit	Football	Dome	25
Qwest Field	Seattle	Football	Outdoor	34.44
New Soldier Field	Chicago	Football	Outdoor	33
Great American Ballpark	Cincinnati	Baseball	Outdoor	22
Lambeau Field	Green Bay, WI	Football	Outdoor	38.92
Lincoln Financial Field	Philadelphia	Football	Outdoor	40
Citizens Bank Park	Philadelphia	Baseball	Outdoor	21
Petco Park	San Diego	Baseball	Outdoor	18
Average Acres Per New Construction				27.87

Table 1.5 Professional sport facility surface areas in acres.