VIRTUAL OFFICING TRENDS
IN THE PRACTICE OF LANDSCAPE ARCHITECTURE

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ABSTRACT

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This research examines trends in virtual officing in project-based organizations such as landscape architecture firms. Virtual officing is the process of employees conducting business full-time in designated places other than a central office. Of particular interest is the development of communications technology to allow these new business models to grow and prosper. A survey was distributed by the American Society of Landscape Architects to landscape architecture member firms, with questions focusing on their business practices and virtual officing trends. It was found that virtual officing usage is on the rise in landscape architecture firms. Trends in hiring also were positively affected by the presence of virtual officing, showing a correlation between this new business model and the overall strength of a firm.

Keywords: virtual officing, landscape architecture business, network-centric organization, project-based organization

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CHAPTER ONE

INTRODUCTION

This research involves an exploratory study that examines trends in business models of project-based organizations such as architecture and landscape architecture firms. Of particular interest is how communications technology is used to conduct business under conditions whereby employees are dispersed to geographically different places other than a central office. Having separate offices, digital technology is used to handle corporate business, resulting in a reduced hierarchical structure within these firms as a part of their business plan. This allows employees to set their own problem-solving methods, standards of performance, and professional network configurations. Without the existence of digital technology, this organizational type would be more difficult to accomplish. Network-centric organizations such as these, in theory, should allow firms to deal with clients and employees in time-saving ways not possible when using pen and ink, and traditional communication methods and services.

This study investigates this supposition by reviewing the evolution of office practice in architecture and landscape architecture over the past 150 years. While comparatively little research detailing the professional practice of landscape architecture exists, the study considers the organizational patterns of exemplary firms along an evolutionary timeline. Data from the study suggests that uniquely skilled practitioners with vastly different methods of problem solving make landscape architects and architects well-suited to take advantage of new digital technology in the workplace.

The occurrence and expansion of virtual officing in the broad discussion of the business of design firms is the topic of this study. This study analyzes virtual officing in

terms of: 1) its occurrence in landscape architecture firms; 2) its utilization of new types of communications methods, especially among different age groups; and 3) its impact on the hierarchy of a firm, especially relating to seniority levels.

CHAPTER TWO
LITERATURE REVIEW

Project-Based Organizations

Landscape architecture and architecture firms fall under the category of project-based organizations. This means that they focus on projects, with each project requiring different resources, methods, and timelines. In project-based organizations, instead of a definite production line, product and production methods change with each individual project (Artto and Kujala 2008). The typical product of an architecture/landscape architecture firm is a design or analysis of a unique object, building, or space of some kind. The actual product can range from a written document (i.e., a plan) to construction drawings, to oversight of the built object, building, or space. These products are typically provided to a variety of different clients such as a developer, a homeowner, or a public entity such as a city, county, state or agency. Their product is based upon the client needs, the surrounding communities' needs, the environment's needs, and the existing sites' needs. This unique type of business requires an emphasis on team work and communication. Employees within the firm and contracted workers from outside the firm must work together in a timely fashion to complete the project as a team, regardless of location and other project commitments. This collaboration between parties is critical, as a vast majority of successful projects are completed by diverse teams of creative individuals (Kelley 2001). However, teams are inherently more difficult to manage. According to Gordon (2005), in today's global economy, the worldwide location of projects and increasingly shortened timeframes create difficulties for team projects that involve great distances, as they commonly do. This requires communication methods that transcend traditional face-to-face meetings

and phone calls, to expanded computer-based venues such as e-mails and video conferences. These venues are somewhat new, and their effect on business models of firms is a relatively unexplored topic.

Virtual Officing/Telework

According to Bailey and Kurland (1999), there are four types of virtual officing or telework. **Home-based telecommuting** is working from home. The **satellite office** allows employees to "work both outside the home and away from the conventional workplace." The **neighborhood work center** is similar to a satellite office but instead houses employees from multiple companies. **Mobile-work** is the ability to work from any location, made easier by communications technology such as computers and smart phones. Furthermore, virtual officing also provides an opportunity for increased worker productivity (Verespej 2001), a relatively distraction-free environment, more worker autonomy, and reduced commuting times.

Virtual officing is not without its challenges. It does not allow managers to oversee their employees on a first-hand basis, which can create confusion, especially when teamwork is a critical aspect of project-based organizations. The mentoring of entry-level employees also is negatively affected by the decrease in personal time and contact that comes from virtual officing. However, communication has been shown to be improved overall using virtual officing based upon the perception of telecommuters. According to Martinez-Sanchez (2008), this is likely due to a commitment from the company to make virtual officing successful. Organizations have a tendency to put more attention and technical support into telecommuters, which benefits their

communication more when compared to traditional workers (Akkirman and Harris 2005; (Martinez-Sanchez 2008, 22). According to Bartel (2012), one of the challenges facing an employee in a virtual office is their commitment to and understanding of their organization's corporate structure. Another is the loss of collective memory that is stored in a group that works together. And lastly, there is a lost opportunity to build an *esprit de corps* within the firm when off on one's own in a virtual office (Bartel 2012; Wagner 2004). However, it has been shown that if the telecommuting worker receives support from his or her organization that is committed to virtual officing, he or she will have more commitment to the organization and are more satisfied when working longer hours than a traditional office worker (Akkirman and Harris 2005; Martinez-Sanchez 2008).

According to Smola & Sutton (2002), different generations respond to the effects of virtual officing with different levels of acceptance; this, in turn, affects the productivity of an office. Older generations are less likely to accept virtual officing as a legitimate expenditure of time and money. They are also less likely to use or understand the involved technology. However, as younger generations move into the workplace, the ability to utilize virtual officing increases with their technological know-how. Therefore, it is important to avoid discrimination based upon experience levels and propensity to use new technology. Older generations should not be discriminated against for their lack of technological understanding; their accumulated professional experience is invaluable as a business, mentoring, and problem-solving tool. Likewise, younger generations should not be discriminated against because their technological understanding is critical to the efficient firm production and the professional image of the firm. All generations need to

understand virtual officing and accept its legitimacy to allow it to be successful within a firm.

According to Twenge (2010), the currently new generation of workers, the Millenials, who were born between the late 1970's and the early 2000's, are known to have a better appreciation for a balance between life and work than previous analyzed generations. This fits in well with virtual officing due to its ability to reduce commuting times and allow for more autonomy (Bailey and Kurland 1999; Twenge 2010). The Millenial generation also desires more job security than past generations. Virtual officing can provide this by providing a greater variety of work options to employees. It also can alleviate the need to change companies when interested in moving to a different area as they can have the option to operate a virtual office for their current employer.

Newer generations such as Generation X and Generation Y also have flattened the hierarchical curve of organizations due to their increased knowledge of the available communication technologies (Twenge 2010). This mastery of communications technology began to initiate new methods of problem-solving, project development, and firm organization. It has the ability to move the firm from a hierarchical office structure to a network-centric structure. A network-centric structure is a flexible orientation of an organization, without a consistent hierarchy (Crawford et. al. 2009). According to Vogus & Sutcliffe (2001), the Law of Requisite Variety states that a concentration of power is not the ideal way to solve problems and deal with the reality of a more complex society. In businesses, this concentration of power typically takes the form of a rigid hierarchical structure, consisting of interns through designers, associates, principals and partners.

Rather, a network-centric structure makes sense when communications technology allows it to function better than in the past (Hasan 2008). A network centric structure is a constantly evolving form where the hierarchy is variable from project to project, with different levels of employees taking leadership roles in different projects. In this structure, all levels of employees are easily able to communicate with others, regardless of their stature or position. The communications technology that has been developed has liberated organizations from a set hierarchy and allowed their workers to communicate freely regardless of their seniority and/or position in the company or geographic location. According to Crawford et. al. (2009), a network-centric organization has been shown to work best when there are a distinct variety of age groups in leadership positions; this would happen under virtual officing when employees, regardless of age, are located outside of a central office. However, the organization must be able to anticipate change and needs to have a strong ability to adapt. This can be found in a design firm where adaptation is required with every new project (Hasan et. al. 2005). Because of the challenges and autonomy provided by virtual officing, network-centric organization is critical. It allows workers to handle their coordination and responsibility under their own principles instead of under a single set of corporate principles (Abrams 2009). In fact, network-centric organizations have been shown to be the most applicable to creative fields that are well adapted to cultural change (Hasan and Pousti 2006).

Future Effects of Virtual Officing

It has been postulated that virtual officing has the ability to improve productivity while decreasing overhead. It can flatten the corporate hierarchy, but at the same time

can make a manager's job more difficult (Twenge 2010; Akkirman and Harris 2005). Generational differences may also come into play in the overall success of virtual officing. According to Twenge (2010), communication technology works best in an organization which has a wide variety of generations and experience levels. However, as the technologies available at this point in time evolve, the possibilities of virtual officing and the network-centric organization are likely to continue to increase and influence the business practices of project-based organizations such as landscape architecture firms.

History of Design Firm Business Models

The business practices of design firms are generally influenced by a wide array of factors. These include, but are not limited to, knowledge and experience of the owners; trends in design, business and the market; and types of projects. However, one of the largest factors and most applicable to this study, is the available technology of the time period. For example, instantaneous communication beyond the office walls has become more commonplace and available in the workplace through improved digital technology and improved transportation methods. This has resulted in projects becoming more team-oriented. This means of using multiple members of a firm to coordinate a project and to work together to deliver the final product, was not always the case in the past.

Prior to the Mid-19th Century, architecture firms were generally considered *ateliers*, with a single practitioner working alone and offering a personal service. An architect would handle contract negotiation, budgeting, design, construction

documentation, and in-field oversight by himself/herself. According to Balmori (1987), the business structure of a design firm was organized in a similar fashion to doctors and lawyers of the time. If a firm was slightly larger (for example up to ten employees) work would be separated between the partners of the firm with each partner handling separate projects with separate employees specifically assigned to that project assisting them. In this case, the partners would rarely work together on a single project.

However, the architecture firm of George B. Post, founded in 1860, began to change this model to something more in line with what is typical today. According to Weisman (1972), Post was trained in civil engineering around the time of the Civil War, and he came from a wealthy family with many strong connections to business and industrial leaders in the Northeast. He began his firm in New York City. He relied on personal connections that he could take advantage of through his upper-class background. Typical among architects of the time (Balmori 1987, 342). According to Balmori (1987), as the 19th century progressed, clients became more reliant on using financing to complete their projects. Because of this, they required greater speed throughout the process of design and construction to reduce the associated costs. In response, Post began working on multiple aspects of projects concurrently to save money and streamline the design process. As his firm grew, he began assigning different tasks among his employees, allowing them the opportunity to focus on the design of a particular aspect of a building. Previously, architects had handled all design themselves and had used employees as merely draftsmen. Post's innovation eventually led to increased specialization within the office, with each employee working on a single aspect of multiple concurrent projects. This practice was similar to the

methods being developed in industrial production in the same time period. Essentially, the office began to function as a production line of sorts. It was a great change to the methods of even 15 years earlier when projects were assigned to a specific designer who then carried out all pieces of a project from design conceptualization through construction. While Post "may not have been an architect of the first magnitude" (Weisman 1972, 200), his firm's business model led to a successful business operation of almost 40 years as a well-respected, productive office. This led the way for design to become a business enterprise, beyond the hobbies and ambitions of the studio and artist (Balmori 1987, 350-352).

In the late 19th century, the business models of design firms were still generally based around a single office, although now with with multiple employees, where most production and organization took place. Marketing was accomplished through word-of-mouth by wealthy businessmen. These wealthy clients also were much more likely to travel to visit their architect, typically to socialize or analyze their studio, employees and lifestyle. While every firm was different, it was typical for most to revolve around a single figurehead, as opposed to the firm and its work being the defining characteristic, as is more common in today's market. For example, while the founder of modern landscape architecture in the U.S., Frederick Law Olmsted, rarely worked with his other partners on projects and vice versa, the firm was still centered on his name, personality, and presence (Klaus 1997). According to Klaus (1997), Olmsted lived above his office, running the business as a "family affair". And while it stayed a family affair for over 100 years though his sons and grandsons, he began delegating much of his work to others. He commonly would conduct the initial site visit on his own to get to know the client and

the project first-hand. By meeting all clients personally, he was able to develop a personal relationship, critical to both word-of-mouth marketing and a successful project that meets the client's needs. Olmsted would group these visits into a week or two based on train schedules, leaving the final follow-up visit to a senior assistant. He would group his visits together, running himself across the country and back over the course of a couple weeks. This enabled him to minimize his overall travel time and spend more time in the office overseeing ongoing projects. The presence of Olmsted or his sons was constant when working with clients even as the firm grew. However, they were not always heavily involved in the design process. According to Stevenson (1977), while this method was still typical for the late 1800's, they were drastically ahead of their time in the usage of contracted outside professionals, which is still to this day a growing segment of the professional architecture and landscape architecture population. When Olmsted and Calvert Vaux worked together from 1857 to 1872 they would regularly hire professionals from outside the firm to complete a portion of their engineering and horticultural work (Klaus 1997; Martin 2011).

In the architecture firm of Richard Upjohn, founded in the early 1840's, an equally strong focus was put on the head of the firm as the figurehead. The other design employees each specialized in a small piece of the production process, also similar to Post. However, Upjohn put a large emphasis on mentoring and education, which was not commonly organized at that time. Before Upjohn, employees typically learned their craft by watching and listening. In his office, mentoring and education was thought-out and planned, with goals and specializations set for new employees. According to Hull (1993), Upjohn's office took a *production-line* approach to design, once the project

moved beyond the conceptual phase. Draftsmen, the employees who do most document production, worked on a multitude of projects, but all within their particular specialization. However, in the eyes of the public, his firm was seen as a family business with Richard himself as the leader and creative mastermind. And while his design influence was regional in its geographic scale due to the constraints of transportation, Upjohn's inspiration was worldly, which he drew from a large library of predominately European design books (Hull 1993, 297). This may also be where he developed his mentoring processes. Upjohn, a leader within the architecture profession in his time and a founder and President of the American Institute of Architects, was a strong advocate for the business side of architecture (Wheelwright 1939, 502). His contributions to architecture included corporate rights, consistent pay, fair competition (where many of the firm's projects were acquired) and an overall professionalization of the practice (Hull 1993, 292). He also was one of the first to use many of these now common office management styles. He also implemented an organizational pattern involving a hierarchy of students (as interns) that worked up through the hierarchy to the partners.

On the other end of the scale of professionalism is one of the most famous American architects in history, Frank Lloyd Wright. According to a tour of his property in Oak Park Illinois, (Boyer 2013), Wright's early career was marked by a studio attached to his home in Oak Park, similar to the layout of Frederick Law Olmsted. In the studio, draftsmen were located in a large open room on the first floor, with windows on three sides. Above them was the artist's workspace, with an opening in the middle of their area looking down upon the architects. Wright laid out the studio in this manner as his

early architectural theory believed that artists were the inspiration to architecture. His office was separate, down a hallway and split from the studio by the waiting room. According to Friedland and Zellman (2006), after his move to Taliesin, his new home in Wisconsin, he founded an educational fellowship. In this layout, architecture students paid him to work and learn under him, tending to the house and farm, and if they were lucky, occasionally drafting. In reality, Wright was in debt throughout most of his career and had little money to hire any employees. He therefore relied on these students and their payments to keep his office running as well as to produce his design work. At times, this led to the detriment of their constructed quality. He managed his apprentices tightly, directing their every waking moment and controlling their social lives. Wright also was a critical boss and teacher, rarely praising his students' designs (if he allowed them to attempt design at all). If they did, he required it to be under his own name, with no sign of whom the actual work was produced by, even if he never touched the project. And although Wright allowed moonlighting, in part because of his own experience with it while young, he still insisted that the designs be under his name, with violators being removed from his fellowship at Taliesin. While other architects of the period had managed to create successful businesses, Wright relied upon his creative genius to bring in work, and disregarded bills and clients alike, showing a lack of professionalism not apparent in the great beauty and popularity of his buildings.

By the 1950's, de-centralization of offices had begun, but the design process was still based upon the traditional model of the collaborative studio, such as Upjohn's and Post's firms. Design firms, such as Skidmore, Owings and Merrill (SOM), were growing larger and becoming more corporate, both in their business models and their final

products (Krinsky 1988, xi). SOM began as a four person partnership (with one being a silent partner), and two offices operating independently (Owings 1973, 69). By 1949, SOM had completely departed from the figurehead model of early years and many prior firms, and it became a seven person partnership to better spread the leadership and bring more funding into the firm (Krinsky 1988, 2, 13). This movement towards greater size and efficiency was made possible by a variety of technological advancements. The car and airplane enabled faster transportation to project sites around the world. Overnight mail, the telephone, and the fax machine had the effect of reducing distance on production capabilities. SOM had offices in New York, Chicago, and San Francisco. Their first satellite office in New York City opened as a requirement of a New York client to employ a local firm (Owings 1973, 71). However, each office typically operated independently, "with the architects acting much like doctors in a group practice" (Krinsky 1988, xiv). Occasionally, the offices would collaborate, but this was an uncommon occurrence, only taking place on the largest and most demanding projects, typically large scale planning tasks. The firm relied on their experts in a particular field to address a specific project, regardless of their proximity to the project (Adams 2006). On some occasions a studio in California would be working on a project on the East Coast because of their personnel's skill and experience in that type of project.

Sasaki, Walker and Associates, (later Sasaki Associates), is a multi-disciplinary firm located in Massachusetts and founded in 1953. It was revolutionary in the collaborative methods of project management that they introduced in the design firm (Simo 1997, 9). Hideo Sasaki, the founder, brought together landscape architects, architects, planners, construction managers, horticulturalists, and engineers under one

roof to maximize teamwork and efficiency. While most of the firm's work occurred in their Watertown, Massachusetts headquarters, larger projects were completed using temporary on-site offices for construction document production. This practice model eventually led to temporary offices on the West Coast partially and the formation of a second office in California, managed by Peter Walker (Simo 2001, 24). Sasaki even entertained the idea of moving the firm to a planned community along the coast of Maine to better integrate work with personal life while maintaining a delicate balance between the two, although this never came to fruition (Simo 2001, 21). When Hideo Sasaki retired in 1980, leadership of the firm was split between the heads of the four disciplines: landscape architecture, planning, architecture and engineering. This was an early model of network-centric organization, providing more flexibility and collaboration within the firm by dividing projects within a firm based on skill instead of experience. It also made collaboration between disciplines more organized and easily divided (Simo 1997, 10).

Currently, a transitional period is occurring between the traditional office-centric business model, and a network-centric model. A prime example of this transition is Eckbo, Dean, Austin, and Williams, (EDAW) and now a part of the larger AECOM, a multi-national design and planning firm. EDAW was formed in 1939 in San Francisco by Garrett Eckbo and Edward Williams. By 1969, the firm had grown to about 45 employees and was beginning to expand internationally. The firm's method of growth was to open smaller offices in a wide variety of locations where they had clients. Office staff relied on communications and transportation technology to connect the various offices for collaboration. This gave them greater production capability, improved client

relations, and better project oversight due to their proximity. They also would open and close offices based on project locations if they were no longer needed. EDAW continued to grow in both number of offices and number of employees, until it was one of the largest landscape architecture firms in the world. The firm never abandoned their concept of a large multi-national firm being a single cohesively marketed unit, similar to the model pioneered by SOM. However, it still did not take the steps to share a majority of work between offices, instead having most offices operate independent of each other (EDAW/AECOM 2009).

Landscape Architecture/Architecture Business Background

Landscape architecture and architecture firms are typically in the business of creating designs and producing plans for outdoor spaces and buildings of a wide variety of scales. They may also supervise construction and assist with the generation of funding for their projects. These services are needed to provide a completed project within an agreed upon budget and schedule. They also ensure that the build environment is safe, economical, environmentally-friendly, and contains aesthetically pleasing spaces for all to live and work. According to Jonassen (2011), these services can be described as providing a variety of different types of values, such *as iconic value, market value, transformational value, cultural value, environmental value, and urban value*. The sum of these values aims to benefit the client, the community, and the environment. Their size can run from a single-person firm to a large multi-national corporation with hundreds of employees. Landscape architects and architects are both required (as of 2013) to be licensed to practice their respective profession in all 50 states. The purpose of licensure is to provide a minimum level of competency within the

profession. This ensures that when a landscape architect or architect is hired, they have proven the ability to provide a project that encompasses all values listed above. Possible clients for landscape architects and architects include developers, private individuals, corporations, non-profits, government entities, and sister professions, such as engineers and planners. Public sector clients include the federal government, state government, and local governments at the county, township, and city level.

There are a wide variety of factors affecting the business models of today's landscape architecture and architecture firms. There are *social factors* such as the number and diversity of employees and the location and size of offices. These can affect client relations by determining the cultural understanding between office and client. They also can affect the amount and type of communications between office and client, such as digital communications versus face-to-face. In addition, they can affect the culture within a firm by determining the management styles (discussed later), inter-office relationships, and methods, quality, and consistency of communication between employees. However, a firm must be able to comprehend, embrace, and take full advantage of social and cultural differences within and outside an office to thrive in today's global business environment.

Another factor is the *state of the economy*, which affects the amount and type of work a firm can attract. A strong economy allows for the growth of a firm through an increase in projects, which can cause social changes within it. A weak economy can have the opposite effect, as low revenue can cause downsizing and limit the production capability. The amount of work a firm can attract under different economic states in turn affects its number of employees through its ability to provide work and competitive

compensation. One way to address the dynamics of the economy, firms also may change their marketing strategy and project types to better address different economic climates. This stabilizing the size of the firm while allowing for greater resiliency.

The *education* and mentoring of employees also is a large factor in the organization of a firm. Historically, architecture and landscape architecture firms consider young employees to be similar to apprentices, with a course of professional development beginning in computer drafting and graphics production and progressing to design, project management, and marketing. The number of employees within a firm at different levels of experience can affect the speed of production capabilities within a larger firm and require greater outside contracting of different aspects of a project in a smaller firm.

Lastly, the *management style* in the office has a large effect on the business model of the firm. According to Jonassen (2011), the culture of the firm as a whole is created by the leaders and owners in a top down approach. Their management style will directly affect all aspects of a firm, including creativity, productivity, and office culture. The use of autocratic style, where one individual is making all decisions, allows for the most control, but does not gain trust or inspire creativity in employees. A democratic style, when employees make decisions as a group, makes employees feel more involved and can better handle complex situations, but can slow down the decision making process. A participative style (a blend of autocratic and democratic scenarios) allows the manager to consult with employees, while he/she retaints the final decision-making. This style has positive and negative aspects. It keeps employees feeling involved, but it also may make them resent a final decision more if their opinion

does not align. A laissez-faire style, where a manager provides guidance but the team is free to complete the task however they see fit, helps to develop leaders and confidence, but can cause conflicts within the group if there is a struggle for control (Rensselaer Polytechnic Institute 2000).

The particular style of management that a firm employs often reflects a particular period of time. For instance, early firms, such as Upjohn, and Olmsted, used primarily autocratic styles of management. However, some firms, such as NBBJ, use a participative style. Each of these methods can be found within different current firms, and occasionally many are used within a single firm. However each style has varying effects on the projects, employees, and the organization of the firm.

Because of the recent economic downturn (2008 – 2011) and subsequent slow recovery, many firms are looking to enter new markets to make up for a decrease in overall available projects. This results in increased competitiveness within markets. To stay competitive, firms are likely to examine new methods to increase their efficiency. One method, virtual officing, as discussed earlier, allows firms to expand their geographical base and improve efficiency without incurring extraneous overhead costs.

As landscape architecture and architecture businesses have progressed into the 21st century, it has become necessary to become economically leaner to compete with firms whose goal is to provide an inexpensive service. Businesses have become more specialized due to increasingly complex projects and regulations. They also have become more reliant on contracted collaborators, who are more specialized and better suited to cope with complex projects. This results in the added benefit of decreased

employee related operating costs. Their reliance on others outside their geographic region has increased to ensure they are collaborating with individuals who are familiar with the culture and character of a region.

Improved production methods and communication technology has allowed fewer employees to accomplish more work, regardless of location. However, they also require more expertise due to the learning curve inherent in new, constantly developing technology. This has led to a higher degree of specialization and an increased reliance on others with separate specializations. These specializations have been integrated into the project on a "per-project basis" which (U.S. Small Business Administration 2013) reduces labor costs and liability, and provides increased hiring and firing flexibility. Until now, the technology to coordinate successfully with these specialists has been limited. While many firms have begun to realize and adapt to these technologies in contemporary society, it remains to be seen if most corporate entities will do the same. In fact, according to Jonassen (2006), the design and construction industry's productivity rate has not improved as quickly as other large industries. This might be a sign that new business models for design firms are needed to integrate projects in a digital manner (Jonassen, 2006, 2). An overall movement by other types of businesses into virtual officing makes it likely that project-oriented organizations are doing the same, although there are different challenges in their ability to adapt.

Therefore, this study examines trends in virtual officing in landscape architecture firms. It will attempt to explain the reasons behind the developments, and present a discussion on the positive and negative impacts virtual officing can have on businesses

and the personal lives of employees (Roger 2011; Michigan Small Business and Technology Development Center 2013).

CHAPTER THREE
HYPOTHESIS

This study aims to provide a base upon which further study of business models within architecture and landscape architecture firms can be explored. It also can serve as an introduction to virtual officing for managers, owners and principals that are interested in virtual officing as a part of their firm, or just in improving and refining their own business model. An understanding of the differences between project-based organizations and other, more highly-studied organizations, will permit better management and control of offices and projects. But first, it is important to understand trends in current business models.

A survey was developed and employed through the ASLA to begin to understand the trends in virtual officing in landscape architecture firms. The results were analyzed to provide a better understanding of the trends in virtual officing, and how they relate types of firms, locations, revenue, and hiring trends. The following hypotheses were developed to guide the study.

H01: Virtual officing has not increased in landscape architecture firms since 1997.

H1A: Virtual officing has steadily increased in landscape architecture firms from 1997 to 2012 and follows an exponential growth curve.

H02: There is no relationship between the occurrence of virtual officing and the regional location of a firm's projects.

H2A: Virtual Officing is more likely to be occurring in the Western U.S.

H03: There will be no correlation between the size of a firm and its likelihood to utilize virtual officing.

H3A: Smaller firms are more likely to utilize virtual officing than larger firms.

H04: There will be no correlation between the revenue of a firm and its likelihood to utilize virtual officing.

H4A: Firms with less revenue are more likely to utilize virtual officing, since smaller firms are likely to have less discretionary revenue.

H05: There will be no relationship between the likelihood of a firm to be hiring in the second quarter of 2013 under current economic conditions and its utilization of virtual officing.

H5A: Firms utilizing virtual officing are more likely to be hiring in the second quarter of 2013 than firms that are not utilizing virtual officing.

CHAPTER FOUR
METHODOLOGY

This study utilized an existing quarterly online survey of principals and owners of landscape architecture firms by the American Society of Landscape Architects (ASLA) called the Quarterly Business Indicator Survey. This survey asks about current business practices and the overall business climate of landscape architecture. It is intended to capture a probability sample of landscape architecture firms based in the United States. In the second quarter of 2012 (January 1, 2012 to March 31, 2012), the survey was focused on the economic state of landscape architecture and the past and current usage of virtual officing in landscape architecture firms. Data from that survey was used for this study as well as for ASLA's own research on landscape architecture practice.

Roughly 4,000 landscape architecture firms exist in the ASLA electronic database. All firms were polled via email, and 301 usable surveys were returned, a typical return rate (N=301; 7.5%). The layout of the virtual officing questions was confined by its placement within the greater ASLA survey: Therefore, the wording had to be clear and concise to individuals unfamiliar with the terminology of virtual officing. The general survey began with questions about the size of firms, their geographical scopes, hiring trends of the past year, and perceptions of the current state of the field of landscape architecture businesses. The questions relating to virtual officing followed immediately with questions relating to the use of virtual officing in the past and present. These questions were followed by an inquiry into specific methods and technology used in the practice of virtual officing. To begin the virtual officing portion of the survey, virtual officing was clearly and concisely defined as "employees who work full time from

a location other than a corporate office" (see Table 1). This definition was provided to avoid any misunderstandings with the questions that followed (Tables 1 and 2). SPSS, a statistical analysis software package, was used to generate frequencies and cross-tabulations of the survey data.

Because the ASLA Quarterly Business Indicator Survey was used, IRB (Michigan State University Institutional Review Board) clearance to collect the data was not involved in this study. The survey was digitally distributed by ASLA. The identity of all respondents was protected by assigning a random number to each response, with no mention of the respondent name or corporate affiliation. Five questions relating to virtual officing were developed by the author of this thesis, and 301 responses were gathered to each question as listed (Tables 1 and 2). Respondents supplied their answers by clicking on the appropriate responses in an online survey format.

Question	For each time period below, please indicate the number of employees who work or worked full time from a location other than one of your offices.						
Response Options	*Currently*	None	1 to 4	5 to 9	10 to 14	15 to 24	25 or more
	2007	None	1 to 4	5 to 9	10 to 14	15 to 24	25 or more
	2002	None	1 to 4	5 to 9	10 to 14	15 to 24	25 or more
	1997	None	1 to 4	5 to 9	10 to 14	15 to 24	25 or more

Table 1: Historical trends in virtual officing practices among landscape architecture firms, 1997 to 2012

Questions	What geographic location is the principal source of your client work?	How many employees does your firm have, including yourself?	What is the annual revenue for your firm?	Do you plan on hiring any employees in the second quarter of 2012?
Response Options	West	1	Less than $250,000	No
	Midwest	2 to 4	$250,000 -$1,000,000	Yes
	South	5 to 9	$1,000,000 - $3,000,000	
	Northeast	10 to 49	$3,000,000 - $5,000,000	
	International	50 to 100	$5,000,000 - $7,000,000	
		100 +	$7,000,000 - $19,000,000	
			$19,000,000 +	

Table 2: Follow-up questions relating to virtual officing to provide insight to workplace conditions

CHAPTER FIVE
RESULTS

Size of Firms

Data from the 301 usable surveys revealed that the highest percentage of firms (n = 94; 31.3%) have only a single employee, while the lowest percentage (n = 8; 2.7%) had between 50 and 100 employees. Twenty-eight percent (n = 84) of firms had two to four employees, 14.3% (n = 43) had 5 to 9 employees, 14.3% (n = 43) had 10 to 49 employees, and 9.3% (n = 28) had greater than 100 employees (Figure 1).

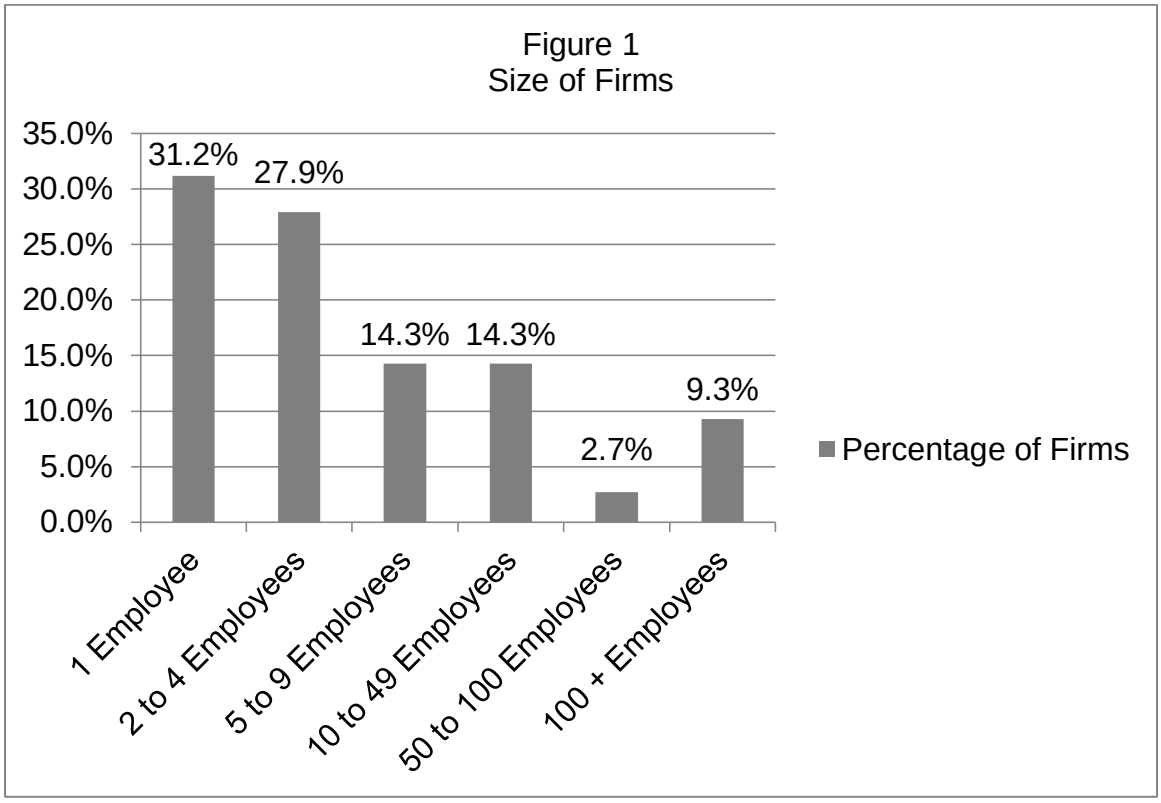

Figure 1: Sizes of landscape architecture firms completing the ASLA quarterly online survey, Spring 2012

Geographic Location of Firm's Projects

Landscape architecture projects in the sample are distributed throughout the country on the following regional basis: 32.0% (n = 86) West; 30.7% (n = 92) South; 20.7% (n = 62) Northeast; 15.3% (n = 46) Midwest; 1.3% (n = 4) International. These numbers are identified by firms picking a single region where the majority of their projects occur (Figure 2).

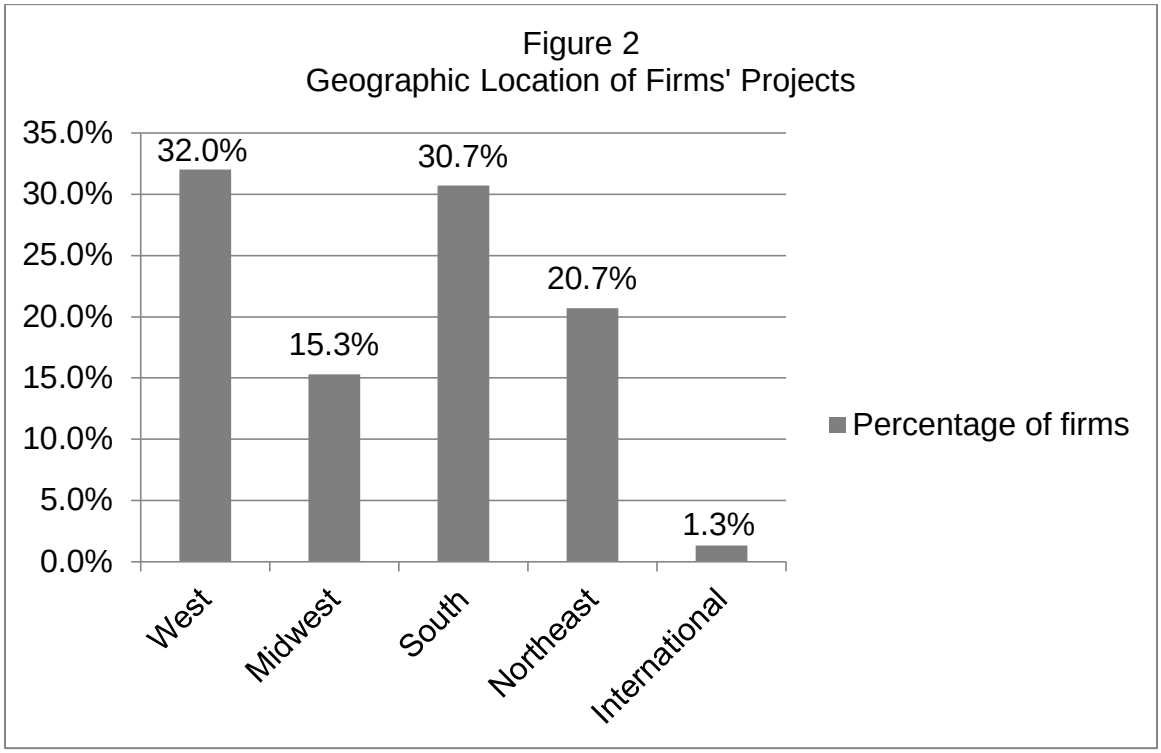

Figure 2: Principal geographic locations for landscape architecture projects, based on the ASLA quarterly online survey, Spring 2012

Firm Revenue

A majority of firms (46.1%; n = 136) had yearly revenue of less than $250,000 in 2011. This corresponds with the percentage of firms that have only a single employee. Twenty five percent (n = 75) had revenue between $250,000 and $1,000,000. Twelve percent (n = 35) had revenue between $1,000,000 and $3,000,000. Four percent (n = 11) had revenue between $3,000,000 and $5,000,000. Three and a half percent (n = 10) had revenue between $5,000,000 and $7,000,000. Four percent (n = 12) had revenue between $7,000,000 and $19,000,000. Lastly, 5.4% (n = 16) had revenue over $19,000,000 in 2011 (Figure 3).

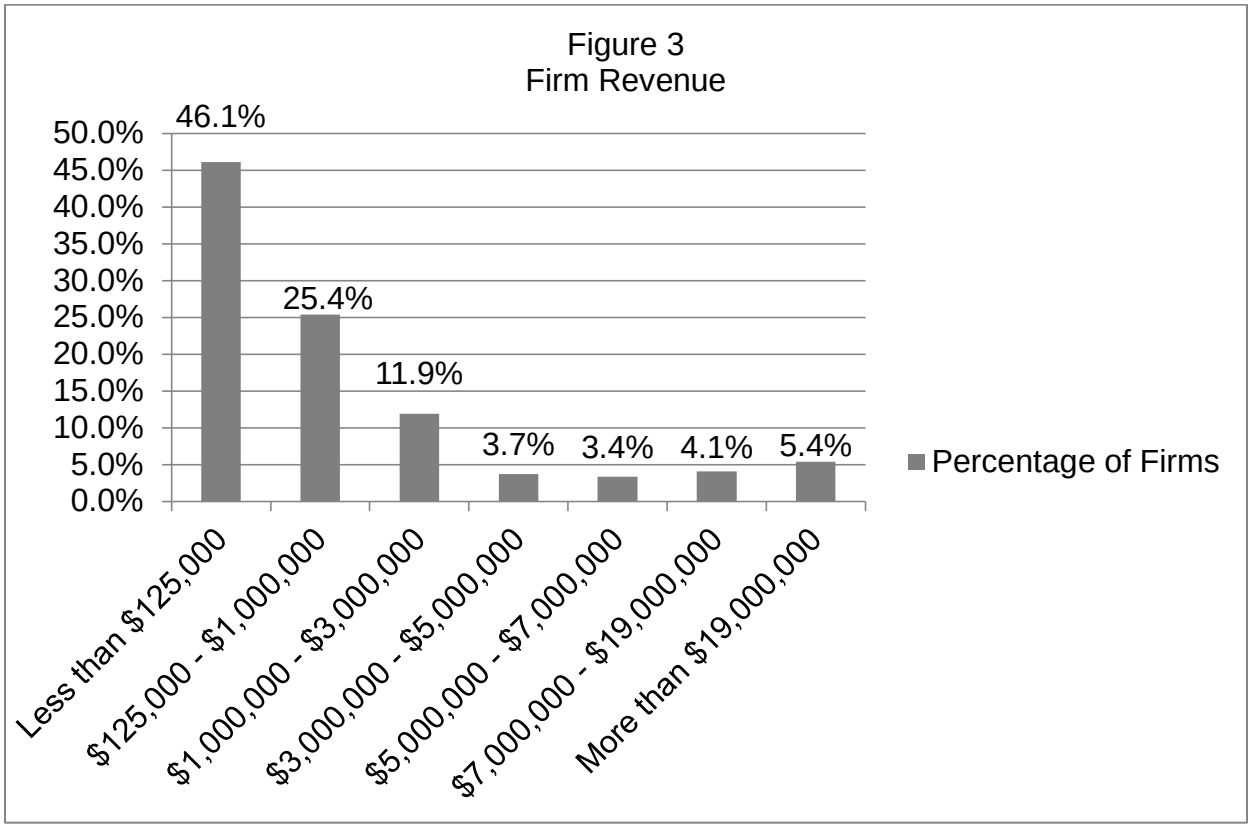

Figure 3: Revenue levels of landscape architecture firms, based on the ASLA quarterly online survey, Spring 2012

Hiring Trends

The percentage of landscape architecture firms that indicated that they would be hiring in the second quarter of 2012 was 29.7% (n = 88). The percentage that were not hiring was 70.3% (n = 208) (Figure 4).

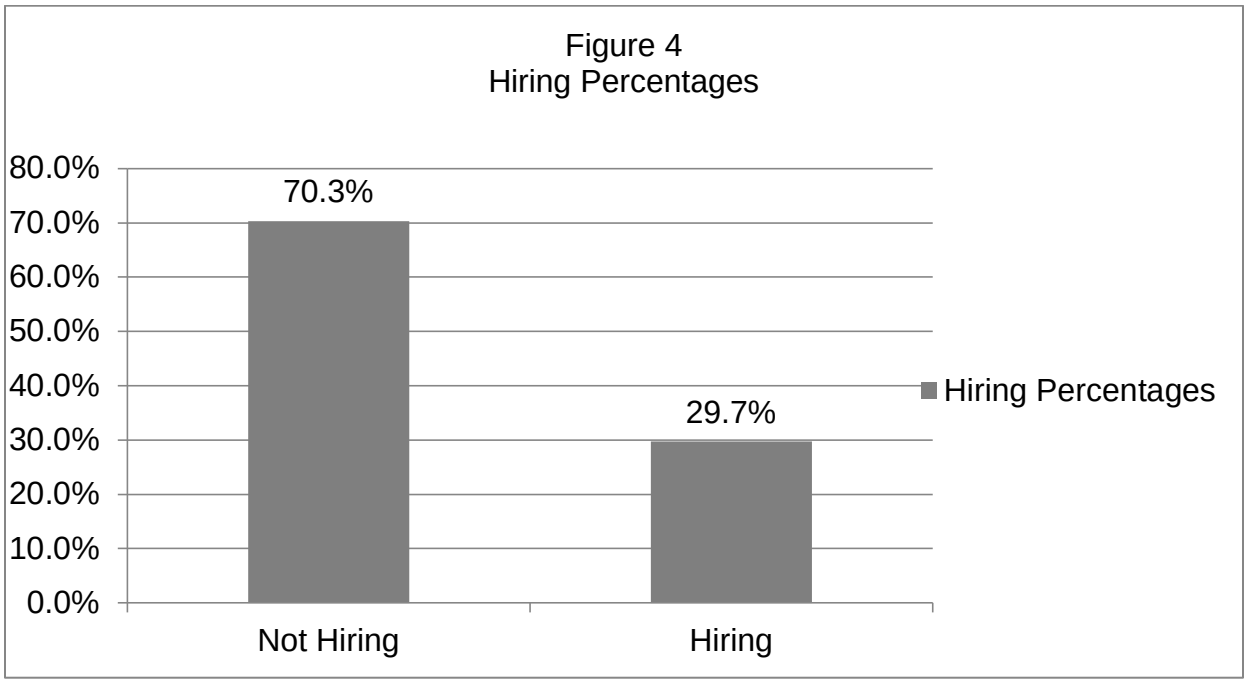

Figure 4: Hiring percentages of landscape architecture firms, based on the ASLA quarterly online survey, Spring 2012

Percentage of Firms Utilizing Virtual Officing

The percentage of firms utilizing virtual officing clearly has grown over the past 15 years. In 1997, 4.7% (n = 11; N = 236) of landscape architecture firms used virtual officing. In 2002, 12.2% (n = 30; N = 246) of firms used virtual officing. In 2007, that number had grown to 18.4% (n = 47; N = 255). Finally, in Spring, 2012, 25.2% (n = 76;

N = 285) of firms were utilizing virtual officing as a part of their business model. Therefore the null hypothesis H01 is rejected, and H1a is accepted (Figure 5).

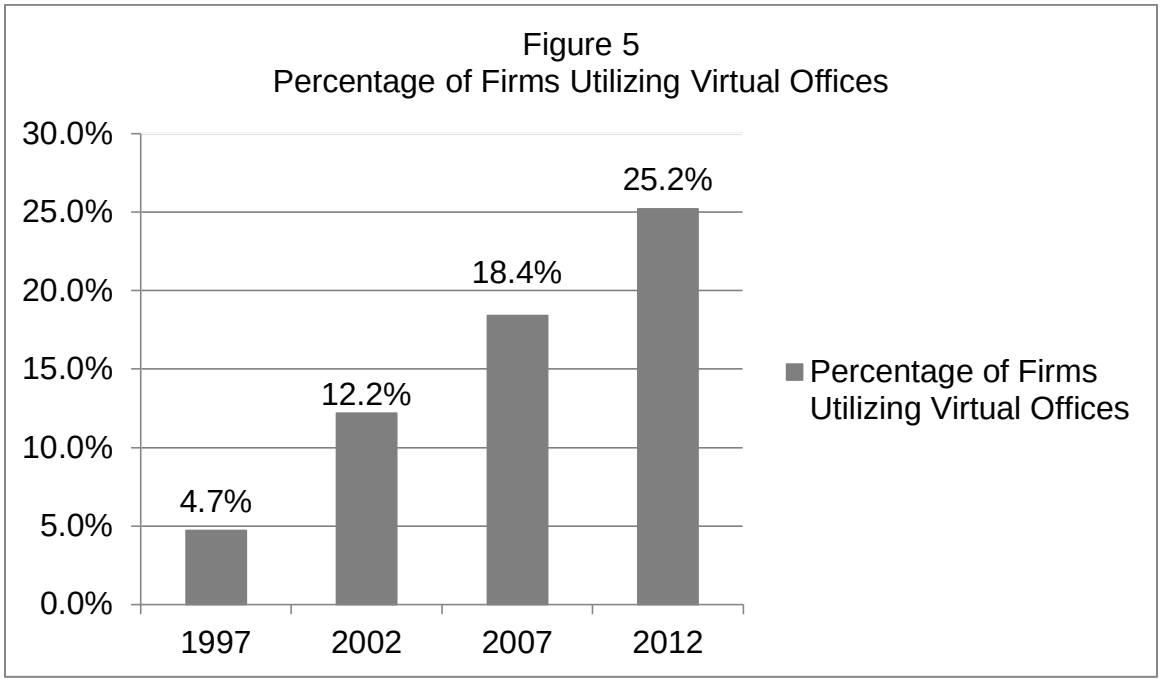

Figure 5: Percentage of firms utilizing virtual officing from 1997 to 2012, based on the ASLA quarterly online survey, Spring 2012

Cross Tabulation of the Business Indicator Survey

Data from the survey analyzing the general characteristics of the firms was further compared with the virtual officing data. Using SPSS, the cross-tabulations examined significant relationships between the firm size, the geographic location of projects, firm revenue, and the percentage of firms utilizing virtual officing.

The size of firms and the percentage of firms utilizing virtual officing

The survey indicates that 21.8% (n = 19) of one-person firms, 32.9% (n = 27) of firms with two to four employees, 21.4% (n = 9) of firms with five to nine employees, 31.0% (n = 13) of firms with 10 to 49 employees, 0% (n = 0) of firms with 50 to 100 employee, and 32% (n = 8) of firms with over 100 employees are using virtual officing. When cross-tabulated, a p-value of 0.288 is produced, showing no significant correlation between the size of firm and their usage of virtual officing. Therefore, the null hypothesis H02 is accepted, and H2a is rejected (Figure 6).

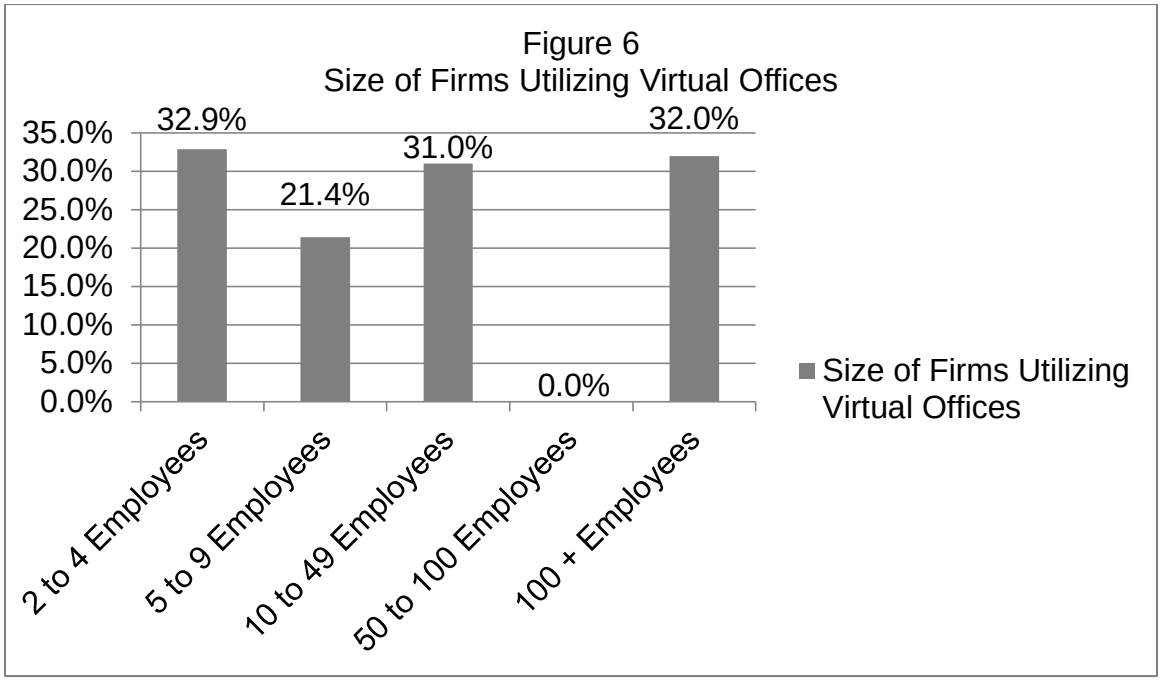

Figure 6: Size of firms utilizing virtual officing, based on the ASLA quarterly online survey, Spring 2012

The Location of Projects and the Percentage of Firms Utilizing Virtual Officing

(Figure 7) The survey indicates that 30.0% (n = 27) of firms who have projects occurring in the Western U.S. are utilizing virtual officing; 26.7% (n = 12) of firms who

have projects occurring in the Midwest are utilizing virtual officing; 25% (n = 22) of firms who have projects in the South are utilizing virtual officing; 25.9% (n = 15) of firms with projects in the Northeast are utilizing virtual officing. 0% (n = 0) of the firms who have projects occurring internationally are utilizing virtual officing. When cross-tabulated, a p-value of 0.783 is produced, showing no significant correlation between the location of a firm's projects and the percentage of firms utilizing virtual offices. Therefore, the null hypothesis H03 is accepted and the testable hypothesis H3a is rejected. No region of the country is dominating in virtual officing projects/products at this point in time.

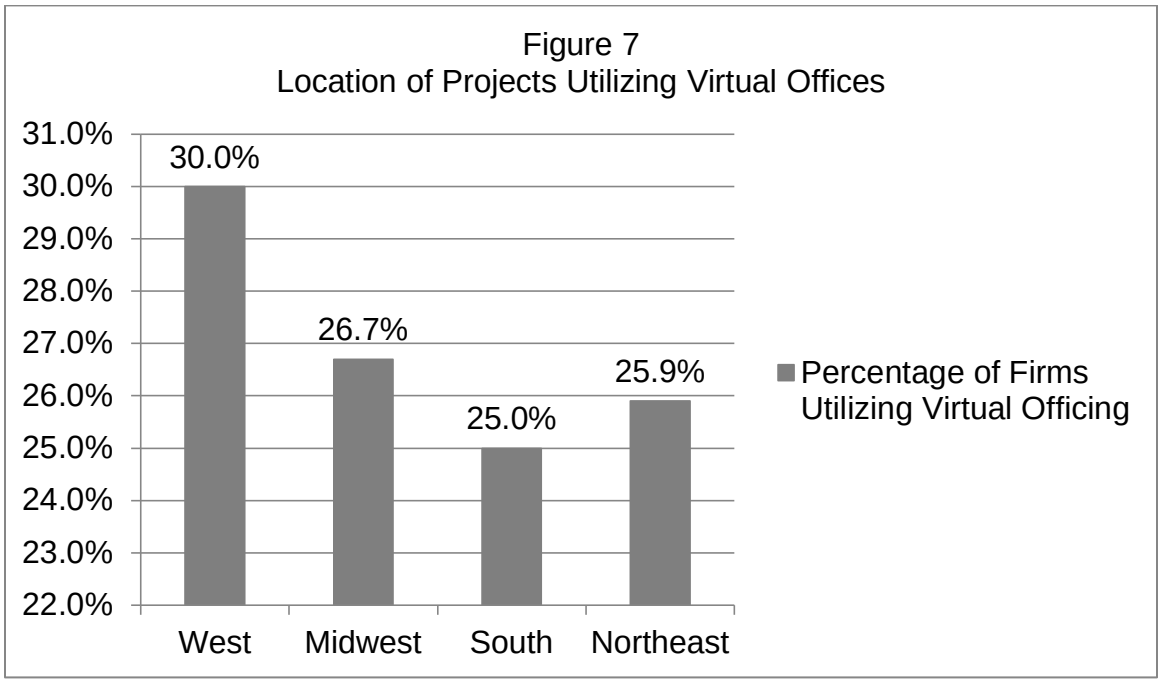

Figure 7: Location of projects utilizing virtual officing firms, as based on the ASLA quarterly online survey, Spring 2012

Firm Revenue and the Percentage of Firms Utilizing Virtual Officing

(Figure 8) The survey results indicate that 28.9% (n = 27) of firms that state an income of less than $250,000 are utilizing virtual officing; 35.6% (n = 26) of firms that state an income of between $250,000 and $1,000,000 are utilizing virtual officing; 38.2% (n = 13) of firms that state an income of between $1,000,000 and $3,000,000 are utilizing virtual officing; 27.3% (n = 3) of firms that state an income of between $3,000,000 and $5,000,000 are utilizing virtual officing; 11.1% (n = 1) of firms that state an income of between $5,000,000 and $7,000,000 are utilizing virtual officing; 20.0% (n = 2) of firms that state an income of between $7,000,000 and $19,000,000 are utilizing virtual officing; 14.3% (n = 2) of firms that state an income of over $19,000,000 are utilizing virtual officing. When cross-tabulated, a p-value of 0.119 is produced, showing no significant correlation between a firm's stated income and the percentage of firms utilizing virtual officing. Therefore, the null hypothesis H04 is accepted and the testable hypothesis H4a is rejected at this point in time.

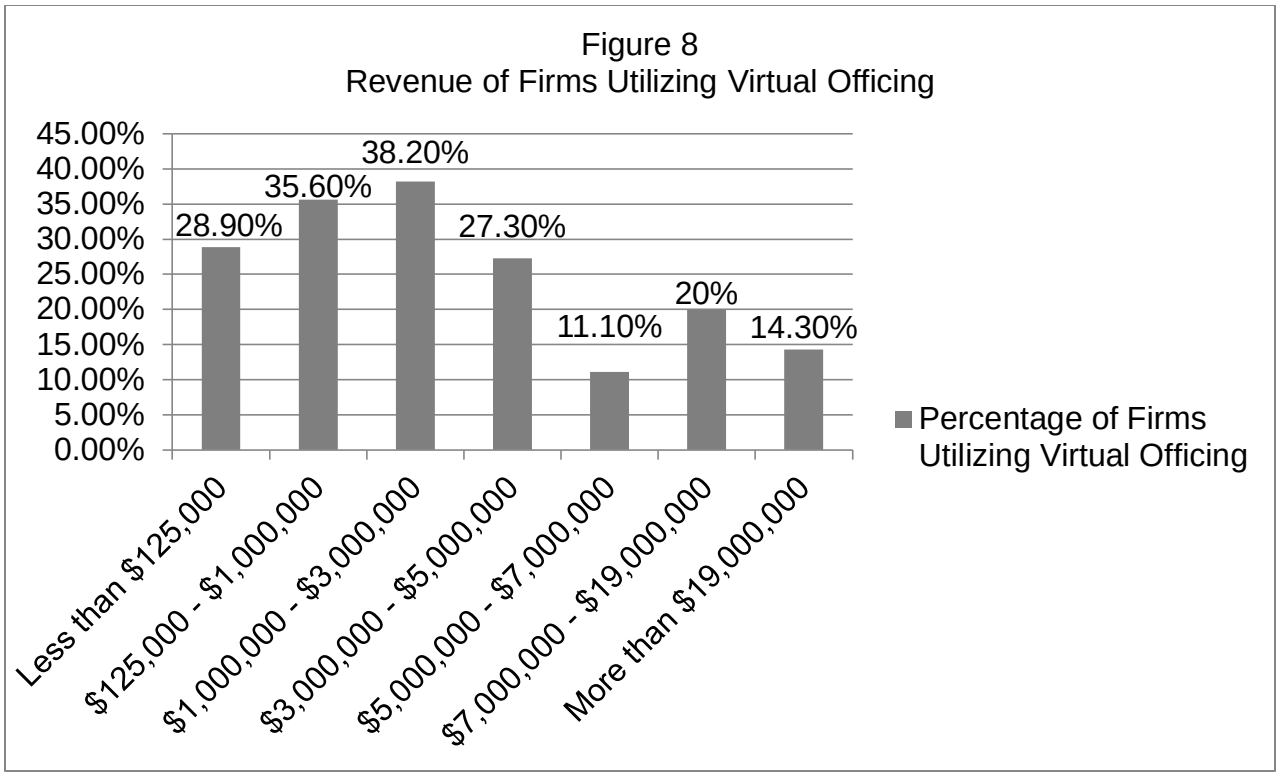

Figure 8: Revenue levels of firms utilizing virtual officing, based on the ASLA quarterly online survey, Spring 2012

Hiring Trends and the Percentage of Firms Utilizing Virtual Officing

(Figure 9) Less than a quarter (22.3%; n = 45) of firms that are not hiring are utilizing virtual officing, while over a third (36.3%; n = 29) of firms that are hiring are utilizing virtual officing. When cross-tabulated, a p-value of 0.016 is produced, showing a statistically significant correlation between whether a firm is hiring and whether it is using virtual officing as part of its business methods. Therefore, the null hypothesis H05 is rejected and the testable hypothesis H5a is accepted.

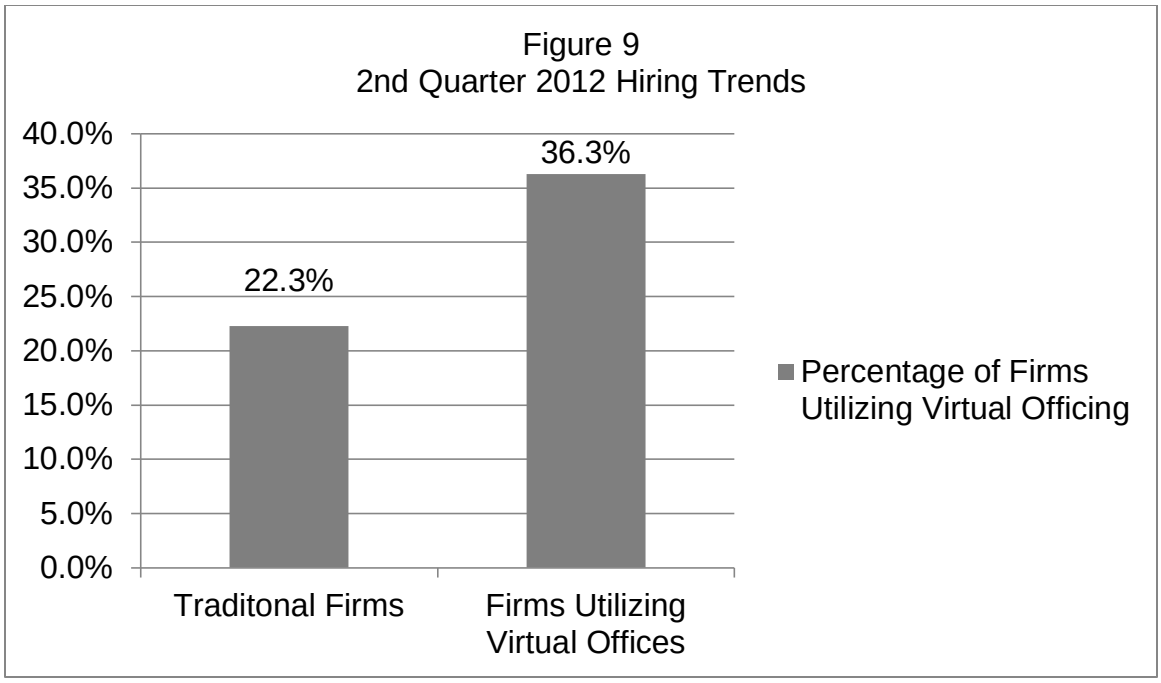

Figure 9: Hiring trends of firms utilizing virtual officing, based on ASLA quarterly online survey, Spring 2012

CHAPTER SIX
DISCUSSION

As communications technology has progressed over the past 150 years, business models have changed to take advantage of the new technology. For example, the telephone allowed firms to spread projects and offices across the country by enabling them to hold conversations regardless of location. The fax machine allowed separate offices to collaborate on projects through instantaneous document exchange. The internet has enabled firms and clients to transfer working computer files through email and cloud storage, and video conference through programs such as Skype. This has further sped up the collaborative design process regardless of location. It could be speculated that communications technology has allowed firms to spread geographically, judging by the responses of three U.S. firms who state that a majority of their work is international, although the small sample size may distort the results.

Firm sizes have changed dramatically in the same time period. In the mid-19th century, most firms were very small offices, typically one or two designers. By the mid-20th century, large firms had developed, such as SOM, with almost 1600 employees These firms were taking on a wide variety of project types and sizes. In the present day, many firms are opening offices on different continents. However, firms have recently begun decreasing in size, likely due to the current economic downturn. Another possible explanation is the ability for production to occur anywhere a computer can be placed and internet access can be found, allowing smaller firms to operate efficiently without the need for office overhead expenses.

The data indicates there is no correlation between virtual officing and firm revenue, the location of projects, or firm size at the point in time of the survey. However, planned hiring, which is a tell-tale sign of corporate strength, shows a strong statistical correlation. Since virtual officing is shown to positively link to hiring trends, one can speculate that virtual officing may be giving these firms a competitive edge, thus enabling them to hire more employees. Other benefits of virtual officing include: decreased overhead (due to the lack of office space); increased productivity (due to a reduction in office related distractions); and increased job satisfaction and work-life balance (due to better time management by the employee, more attention and support by the firm, and reduced or eliminated commuting times). All of these could contribute to the success of the firm, thereby improving its hiring outlook as shown in Figure 9.

The results of the cross-tabulation between virtual officing and number of employees indicate that almost 22% of one-person firms utilize some virtual officing. Since one-person firms do not have other employees, it could be construed that all one person firms are virtual offices, or at least operate with many virtual officing tendencies such as a particularly large reliance on new communications technologies and an ability to work from any location. The responses might be a misunderstanding of the difference between a virtual office and "working from home." Working from home is considered a virtual office by definition in the survey. Those 22% also may be interacting virtually with other disciplines and firms, therefore also meeting the listed definition of virtual officing. The increase in virtual officing of 11% between one person firms and two to four person firms is likely related to the ease of managing a small number of employees in a virtual office setting, due to the inherent flexibility. Although

results show that 0% of firms with 50 to 100 employees utilize virtual officing, it could be speculated that this is a disparity due to the small sample size of only six firms in that range. Overall, these results show that firms of all sizes are recognizing the practicality of virtual officing as a part of their business model.

The results of the cross-tabulation between project geography and virtual officing indicate that 30% of firms who have projects in the Western United States are utilizing virtual officing. This high number might be due to the digital technology industry in that region, such as Silicon Valley and Seattle. Meanwhile, 0% of firms who predominately work internationally are utilizing virtual officing. Again, it could be speculated that this result is due to the small sample size of only three firms who have projects primarily occurring outside the United States. However, it is common sense that more internationally-oriented firms would use virtual officing due to the long distances between office and project location so this may not be an accurate reflection.

Firms utilizing virtual officing are currently 11% more likely to be hiring than firms using a traditional office setting. If we consider a firm's ability to hire to be one of financial health, then this result could be construed to show the positive benefit that virtual officing can have on the overall financial health of landscape architecture firms. This positive benefit is possibly due to the improved productivity that can be a result of allowing employees to set their own methods, standards, and networks. Allowing employees these freedoms also improves their happiness, and therefore positive feelings towards their company. It also may be related to the larger market opportunities and corresponding projects that can develop when a firm is widely distributed geographically. The number is likely even more impressive when

considering that so many firms utilizing virtual officing are one-person firms; in many cases these same firms are not interested in growing due to the personnel management and increased paperwork required.

Virtual officing appears to be on the rise in landscape architecture, and likely in other project-based businesses. This is primarily due to three likely reasons. The first is the increase in technology that has been generated by devices such as the internet and our easy, inexpensive access to it. This technology eliminates the geographic limitations and reduces the turn-around time that affects a firm's performance. In the past, it took time to reach consensus over long distances even with the advent of the telephone. It also took time and effort to mail documents and drawings due to reproduction limitations and availability of copies, scanners, and delivery systems. The technology utilized by virtual officing eliminates many of these limiting factors for businesses.

The second factor involves the current economic climate. According to the quarterly ASLA Business Indicator Surveys, the 2008 recession caused many firms to downsize. In the years that followed, many firms stagnated. In 2006-2012, the profession was experiencing a slow recovery in employment. This period caused firms to find alternative methods to reduce costs in order to survive. The downsizing also caused the average size of landscape architecture firms to shrink while smaller firms became more numerous due in part to unemployed landscape architects forming their own small businesses or sole proprietorships, according to Blough et al. (2012). As these small businesses grow, they will likely be looking to spread geographically to

pursue clients in other locations, while still keeping their low office-related overhead. Virtual officing can provide that opportunity.

The third factor contributing to the growth of virtual officing is the creativity of design professionals. The design education system and the daily practice of creative problem-solving leads to thinking outside the box and foster an acceptance of change that goes beyond that of many other professions. Because of this, a movement towards increased technology and greater independence in the workplace is more likely to occur in design firms than in other more traditional types of businesses.

This is not to say that virtual officing is a solution to all challenges. It can lead to a disconnect between employees and their employer due to the lack of face-to-face communication. Mentoring becomes more difficult without having other employees nearby to rely upon for information and experience, and managers to directly oversee production methods and progress. Lastly, the design process is a great challenge in a virtual office. Collaboration and the constant flow of ideas can be difficult to imitate when not engaged in a face-to-face conversation. Phones, emails and even video conferences do not fully communicate intonation and body language. Virtual officing cannot be taken as a complete solution to the many problems of companies today, but can be one method to increase profit and improve the work/life balance of employees.

The author himself has over a year's experience working in a virtual office setting. During his time employed by a landscape architecture firm, he worked with two partners in the firm, located two and 14 hours away, respectively, by car. In this time many projects of a variety of scales were undertaken, each achieved using virtual officing almost exclusively.

Communication between workers was achieved through five different methods, utilizing two separate devices. Each method has its own positive and negative attributes, and each method was used to take advantage of their specific qualities.

The primary method of communication was the *telephone*, or smartphone. Through this the author communicated with his employers on a regular basis, anywhere from once a day to hourly. The main topics of conversation were detailed instructions, specific business-related affairs, and design process discussions. These were primarily conversations which needed more depth than could be provided by email or text. Conference calls also were used to hold conversations between all three members of the firm.

The next most common method of communication was *email*. This was used both on a computer, and on a smartphone, making it the most readily available of the different communication methods. Email was used to send files and images quickly, explain a topic thoughtfully and in depth, and exchange documents both inside and outside the firm. The strengths of email were numerous. The first is the ability to send a document that is then permanently recorded and can be viewed multiple times whenever needed. The second is the ability to communicate a logical and well-thought out comment without the impulsiveness and “on the spong” responses required by telephone. The third is the ability of the receiver of the email to view the message when he or she chooses, as opposed to a telephone call which must occupy the time of both parties concurrently. The main drawback to email was the lack of personal connection and the interpretation that was allowed through a lack of verbal or physical expression. Tones and expressions are easier to interpret through telephone and video

conferencing. However, email leaves the tone of the sender open to interpretation and speculation, which can create confusion and even occasional anxiety in the receiver if the message is misinterpreted.

A third method of communication was *video conferencing*. This was used to hold meetings between the author and two partners. In the author's case, a smartphone was used for the call, but computers were used by the two partners to take advantage of their larger screens. While utilized sparingly due to the possibility of technical difficulties and difficulties in corralling all three parties into availability at the same time, it was very effective at holding in-depth discussions and allowing all three parties to communicate with each other concurrently. The use of video conferencing was a rare occasion but was a useful tool in holding meetings and could be utilized effectively for group design discussion and decisions.

Another method of communication was *texting* using a smartphone or telephone. Texting allowed all parties to communicate quickly and discreetly when email was too long, and a phone call was either inappropriate due to the situation or depth of question, or simply inconvenient. This was used primarily to ask simple questions, or to alert a party to the fact that they were needed. They could then call on their own time in follow-up. It was quick, impersonal, and lacking detail, but was useful when a simple "yes or no" answer was needed.

Cloud storage also was used to communicate ideas visually. This last method of communication was not a direct method, but instead a way of transferring documents such as sketches, computer aided drawings, and written documents. This allowed

documents to be accessed from any location at any time, regardless of the device in use.

Because education is an important aspect in the employment of a young professional, the effects of virtual officing were particularly noticeable to the author. Before entering the position, the author expected that mentoring and education would likely be the most challenging aspect of virtual officing. Having little professional landscape architecture experience meant that the basics of a landscape architecture practice would need to be learned, on top of the differing methods in virtual officing and the intricacies and developments of a recently formed small business. And as expected, mentoring was a difficult but productive undertaking. A large portion of a young professional's development occurs through the questions asked of their more experienced fellow employees. This can take easily take place in a studio setting where they can be found a desk away, but in a virtual office it requires a more formal method of communication such as those listed above. This meant that many possible questions were not asked due to the difficulties in contacting a more knowledgeable worker. However, the author benefitted from this because of the forced resourcefulness required by self-sufficiency. When someone is not readily available to be asked, a virtual officing employee must look to other sources for information, such as acquaintances and references, both online and in hard copy. It forced the author to become self-reliant and self-sufficient in a manner that may not occur in an office so early in the career of a designer. In conclusion, while overall mentoring and education is less efficient and productive in a virtual office setting, in the author's case it had unintended benefits such as developing self-reliance and new methods for information gathering.

Organizational support has been shown through prior research to be critical to the success of a virtual office. In the author's case, this was shown to be accurate. Since both partners also were operating out of a virtual office setting, there was a deeper understanding of the effects of virtual officing on both the differing production methods and the psyche of a virtual officing employee. It was understood that each employee would set aside time to work whenever needed, regardless of day of the week or time of day, but that those particular times were flexible based upon each individual's schedule. Efficient and effective hardware that is critical to communication and self-reliant functioning were provided or already on-hand, such as a printer, scanner, smart phone, mobile workstation computer, and all needed production software. Due to our reliance on technology, the author's virtual officing experience would have likely been much less productive had these not been provided.

In conclusion, the author's experiences with virtual officing have been challenging, but educational. The potential benefits provided in the form of increased flexibility for employees' personal lives and the responsiveness to clients was readily apparent. However, from an employee's perspective it is likely better suited to self-sufficient individuals who can thrive working on their own, and who are past the stage in their career when they need detailed instructions to complete most common tasks. From a corporate perspective, it has potential as a component of the practice of landscape architecture today, and in the future for its ability to reduce overhead, expand the market base, and improve work/life balance if properly planned and managed.

Limitations

Because the topic of landscape architecture and architecture business models is a lightly-studied, proprietary topic, access to information on past business practices was limited. In addition, many currently operating firms are unlikely to publish their business models, for fear of a loss of competitive advantage in the future. In other cases, a lack of interest in the discussion may be the reason.

The analysis is based upon a survey distributed by the American Society of Landscape Architects. Because of the venue, the author was somewhat limited in his ability to develop the questions (In terms of research and desired quality of results). This circumstance may have resulted in some misunderstanding of the meaning of "virtual officing" and the likelihood of its use.

Suggestions for Future Research

There are additional questions and correlations that could be valuable and may be performed as a future study. These include analysis of other types of current business practices, a stronger look into past practice in architecture and landscape architecture firms and how it relates to technology of the time periods, and further analysis of the day-to-day communication within design firms. As this thesis is to be considered a base for future research of communications technology, and its effects on the business of architecture and landscape architecture, there are endless opportunities for future study.

CHAPTER SEVEN
CONCLUSION

Because of the evolving and easily accessible communications technology provided by wireless systems and the internet, business models must be constantly adapting to take advantage of these new advances. Based on the findings of this study, firms are utilizing virtual officing at an increased rate. It also has been shown that firms utilizing communications technologies are more likely to be hiring, which can be a sign of the overall health of a business. However, the benefits of virtual officing to employees of design firms have yet to be studied and are not fully understood. The same can be said of its impacts on the quality of the completed products. Prior research shows that while virtual officing is generally beneficial to most aspects of a business if performed correctly, it is not a singular solution to employee happiness, corporate flexibility and overhead costs. In summary, results of this study show that its use is increasing quickly and may be benefitting firms that are employing it, but virtual officing is best employed in a judicious, carefully analyzed manner to ensure that it fits the company, managers, co-workers, and the virtual officers themselves.

APPENDIX

Glossary of Terms

Business Models:	The methods and plans through which a business aims to exist, grow, and earn a profit
Communications Technology:	The application of knowledge and science that assists in the act of transmitting information, e.g., Electronic Mail (E-mail), Telephone, Text Message, Postal Mail, Telegraph)
Digital Technology:	The application of knowledge and science which transmits information in a digital form, e.g., Computers, Fax Machine, Cellular Phone)
Project-Based Organization:	An organization that attempts to achieve multiple objectives through the completion of distinctly different tasks, as opposed to attempting to maximize its excellence and efficiency at one particular task (Artto and Kujala 2008)
Network-Centric Organization:	An organization which attempts to increase its competitive advantage through the use of collaborative self-directed teams (Abrams 2009)

Traditional Office:	The administrative and production center of an enterprise located at a singular address
Virtual Office:	A workplace which exists outside of a traditional office. Workers do not normally commute to a traditional office in this situation, but instead are connected by communications technology, at a full-time telecommuting location
Telecommuting:	Services and products are created, transmitted, and/or revised from a location other than a traditional office, commonly using communications technology (U.S. Office of Personnel Management 2013)

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