



VIRTUAL REALITY: A NEW APPROACH FOR VIRTUAL OFFICE

Duc Minh Le Nguyen

Thammasat University, Thailand

This is visible to all of us that the world is suffering from many crises which were mainly caused by human acts. Frankly, come to think about it, the core cause is human mass consumption; we have been exploiting natural resources to serve our daily activities. Organizations in the world already started to have more concerns on protecting the environment, and one of the practices is telecommuting. Though telecommuting brings benefits to employers, employees, the economy and even the environment in many ways, it has the biggest disadvantage which is low interaction with fellow workers as well as “out of sight, out of mind” and this is a great concern of every employer toward telecommuting. The author has an idea that would use virtual reality (VR) technology to create a real virtual office to eliminate the mentioned disadvantage of telecommuting. The author sees virtual-reality office as the first step to integrate VR into our system which will be beneficial to many kinds of businesses. This research is done by using traditional quantitative research method; and the goal is to explain why we should take VR more serious in order to improve the existing world system.

Keywords: Virtual office, Telecommuting, Teleworking, Virtual organization, Virtual reality.

Introduction

Nowadays, the world has developed faster than most of us have ever imagined; scientists and researchers reveal lots of ground-breaking findings and technologies almost every day. Technology has always been seen as a tool to speed up the working process, to make things more effective and efficient; but, it has gone far ahead from the human development, in the sense of machine workers (robots) being better than human workers can be argued in different aspects. Many firms have been and will be replacing human workers with machines to be more productive and convenient (Frey and Osborne, 2013; Lewis, 2014), people are merging technology into their life with the same reason. We created machines to serve us, but many scientists have gone too far trying to humanize them as much as they can, e.g. a reasoning computer, Watson, developed by IBM (Ferrucci, et al., 2010). Ironically, we have grown the fear of being taken over by or relying so much on the machines that we started to discuss about technology management issue and how to get back the real meaning of life. However, the advancement in technology developing results in major changes in society and environment, which make it harder for us to identify the good and bad. Whether it is an ugly truth or not, we have done many wrong-doings in this world and now we are trying to sew what was ripped; but in order to fix them permanently, we might have to stop what we are doing and that could just collapse the whole system. Though the world has tried many ways to solve the problems/crises, in the author’s opinion, they do not simply disappear because the solutions cannot grasp the core issue of each matter. We see each problem as a separate matter instead of looking at them as a web of issues, and that is the reason why we often come up with specific solutions to solve each

individual problem making us oblivious of the fact that the problems are connected but our solutions are not. However, this study would like to propose a solution, one which can move the unnecessary objects of this world to another dimension in order to reduce our daily consumption which led us to the world issues. It is a technology developed many years ago and we are always amazed by this in, mostly, Sci-fi movies; and that is virtual reality.

Background

Virtual reality (VR) has existed for quite a long period and it has been utilized in different areas of life and career activities, such as on-line gaming, social networking (Messinger, Stroulia, Lyons, Bone, Niu, Smirnov and Perelgut, 2009), therapy (Powers, Briceno, Gresham, Jourlesa, Emmelkamp and Smits, 2013), training (Haase, Termath & Martsch, 2013), teaching (Sejzi, Aris and Yahya, 2009), tourism (Guttentag, 2010), and many more. Based on prior studies, VR is a product of information technology (Panteli and Dibben, 2001), it is a combination of virtual worlds, augmented reality (AR), and the internet (Kim, Lee & Kang, 2012), it lets users to interact with each other and virtual objects in VR environment (González, Santos, Vargas, Gutiérrez and Orihuela, 2013), and more importantly, it allows users to do things that they can't do in the real world (Haase et al., 2013). "Potential" is another word when scholars define VR (Wuanga, Chiang, Su and Wang, 2011; Panteli et al., 2001; Lianga and O'Grady, 2003; Sejzi et al., 2012; Cheng and Huang, 2012; Guttentag, 2009; Yoon et al., 2013); Sotto mentioned that the word "virtual" came from a Latin word, "virtus", meaning capacity or potential (as cited by in Panteli et al., 2001, p. 382). These studies are tremendously valuable for everyone to understand VR in a clear definition; however, VR still appears as a tool or an idea to seemingly change the way we live and work, they explained how much potential VR could be but they did not mention what it could substantially do to the world.

During 1980 to 1990, VR was released to public for entertainment purpose, but it didn't make a good impression on the participants. The reasons came from the lack of sufficient technology and low development which didn't allow the users to experience VR in the way it should be; many cases ended up with headaches or motion sickness (Johnson, B., 2014). In February 2013, Google introduced to the world their first wearable device, Google Glass, which allows users to use it as a smartphone strengthen by AR in their I/O event. On March 26th, 2014, Mark Zuckerberg, the founder of Facebook, announced on his personal Facebook profile that they have acquired Oculus VR, in his words, the leader of virtual reality technology, for 2 billion US dollars. Following Facebook, on July 8th, 2014, Samsung confirmed that they would bring a new VR headset to IFA 2014 which will be in September of the same year. With the participation from the three biggest giants of IT industry, VR is now having a stronger boost to public awareness than ever. Yet VR is still being treated as commercial use and companies want to embed more technology into human body. Whether we like it or not, that is a possible picture of the future; if we continue letting them tell us what to do or what to put on our bodies, we are choosing convenience over having self-control and self-awareness, and machines will be smarter than us, isn't it a very ironic view? Nevertheless, we should all remember that technology was created, first, to increase work productivity, then to enhance life quality – from cutting trees to gathering food and water. The author believes that what we can do is to limit the participation of technology into human lives and keep most of them inside the corporate world.

This is to say, in the author's point of view, VR is able to create a new era of the world which includes the changes in human interaction, technology usage, and more importantly, higher environment protection.

Research Questions

1. What are the applications and implications of VR in the world?
2. Can and should we (people and organizations) adapt VR into daily activities?

3. How can VR improve virtual office/teleworking experience?
4. What are the outcomes of VR integration?

Question 1 will be answered in Literature Review, question 2 will be answered in Findings & Data Analysis, and the last two questions will be answered in Discussion.

Assumptions and Objectives

The author sees VR or virtual technology is a trend of 2014 and in the following years. This study considers VR as an innovating technology to resolve major world issues in a long term; while in a short term, it is seen as a tool to create a more productive, better time and resources efficiency in working environment for offices as a first step of VR integration. Which means this study would like to argue that organizations can adapt VR into their systems to deliver a new working experience to their employees by adopting virtual office practice and the bigger idea of virtual organization. Virtual office allows employees to work wherever as long as they can accomplish their tasks (Hill, Ferris & Mårtinson, 2003); almost at the same level, teleworking also follows the concept that employees are not required to be in the office to do their tasks all week long; however, they are not entirely perfect to fit well into every organization. Additionally, Jeffrey et al. (2003) mentioned “It is difficult to distinguish between the virtual office and varieties of telecommuting because terminology differs from study to study.” (p.222-223); but, in this paper, the author is going to present a new idea for virtual workplace by combining VR technology with teleworking, virtual office and virtual organization. This study will be focused on reaching to understand modern working behaviors of people working in offices; by understanding this, the study will be able to show the readiness of modern society in adapting VR; other topics will be mildly elaborated further in the discussion.

Overview of the Research

With all the reasoning and arguments mentioned throughout this section, it is decided to have the study go under a search for a wide range of knowledge not only to understand VR from different perspectives but also to reveal the latent demands of having people working in virtual offices and integrating more services into the virtual world before final conclusion. Different views and applications of VR will be discussed in the literature review, it will provide a general idea of how VR has evolved with new technologies alongside with the changes in society, and it will also indicate the reasons why VR has not been applied widely in the world. Virtual organization, virtual office and telecommuting are the next subjects to be discussed in order to review the elements which could influence or impact on the participation of employees toward VR integration at workplace. This study will use Qualitative research as its main research method; but instead of having VR under the microscope; the research method will be used to understand working behaviors of modern society to see if we are ready for a new change which is to adopt VR. Furthermore, after the findings and the discussion, a concept of VR will be formed in order to support the main idea of this study; the author will explain why VR should be taken seriously and structure a picture of how VR could change the world at the end of this paper as a guideline for future studies.

Literature Review

In opinion of the author, an Asian perspective, VR is mostly popular among the experts in many fields as mentioned in Introduction, but not to standard people; the term “Virtual Reality” somewhat sounds like a fantasy to most of us, and we think it only exists in Sci-Fi movies or we have to spend quite a fortune to be a part of it. Frankly, we are already in it; the author would say that the word “Virtual” makes more sense for us to relate in our daily activities. This section will show how much we have entwined with VR,

how experts have developed VR to something that is beneficial for the whole society, and though many organizations are aware of this technology, they have been reluctant to bring it into their system.

The World is Flat

Borrowing the title from the book, *The World is Flat*, by Thomas L. Friedman; the study wants to state that the countries' borders were virtually removed with the help of the internet. A person can contact/see another person from the other side of the world via a chat-client application (e.g. Google Hangouts, Skype, etc.); this can be seen as a virtual communication medium. Mobility technology has been a great support to break "the tradition operating norms of time and space" (Panteli et al., 2001) with a rapid development. Panteli et al. (2001) stated, "...mobile telephony enables users to be part of the virtual world without being restricted in one static (e.g. office-based) place." (p.386); interpreting their statement, a mean of communication plays an important role in VR acceptance; we must find a proper approach to integrate VR into our current system.

The Internet

As taught in college, internet is simply described as a global system of interconnected computer networks. Nowadays, internet is one of the most important components of every business; it helps us to communicate with others easier in various ways and, more importantly, access to the world knowledge as a part of learning and developing. Up to today, there are more than 2.9bn internet users around the globe, which is approximately 40% of the world population (Internet Live Stats). The internet was first operated under the name ARPANET on 1969 with a speed of 50 Kbps (Kilobits per second) circuits (Eha, B. P., 2013; McNutt, C., 2013); and today, the most common internet speed is at the range of 12 – 15 Mbps (Megabits per second), however, in theory, some can reach to 40 Mbps (Gigatown Nelson). Fitzek, F. (2014), a professor at Aalborg University stated that Internet communication via computer, mobile phone or satellite can be many times faster and more secure by using mathematical equations which are coded in their developed software. There is no doubt that the internet speed is constantly growing to meet with new demands, the connectivity of virtual world.

Augmented Reality (AR)

AR is, basically, a technology which allows users to interact with virtual contents in the real world and it is more commercial to consumers than VR because of the applications run on smartphones, for example Layar, a smartphone application, can show information about a building by pointing the phone's camera to the building and the information will be displayed on the phone's screen; AR is also used in video games and the military (McKalin, V., 2014; Bonsor, K., 2014). This technology is potential with rapid growth of mobility technology, smartphones in particular.

Virtual Worlds

Cited from Messinger et al. (2009):

"Virtual worlds, where thousands of people can interact simultaneously within the same simulated three-dimensional space, represent a frontier in social computing with critical implications for business, education, social sciences, technological sciences, and our society at large. Members participate in virtual worlds through their avatars which are graphical representations of themselves."

One of the most popular virtual worlds is Second Life released to public on 2003 and it had about one million regular users (Linden Lab, 2013) in 2013. Most of virtual worlds are categorized as MMORPGs (Massively Multi-player Online Role Playing Games), e.g. World of Warcraft; which means

those virtual worlds do not connect to each other because they were developed on different platforms and technologies. But, what if they were all connected and united into one virtual world as same as the existence of the internet? How would it be like?

Oculus Rift (OR)

It is originally a Kickstarter, a crowd funding community, project in 2012 which was successfully funded with around 2.4 million USD and their goal was only for 250,000 USD (Oculus Rift, 2012). That is to show how much the people are looking forward to the future of VR. OR was introduced as a new VR headset which will allow you to “step in” your games with an immerse experience as you explore the virtual worlds in a whole new different level. According to Oculus website, the current listed price for OR Development Kit 2 is 350 USD; and everyone is expecting the commercial version to be cheaper. The original idea of OR was merely focused to gaming industry; but as this paper mentioned earlier, Facebook acquired this with a vision for home entertainment, education, etc. Being a lead in VR technology, Oculus is well aware of the bad effects in using VR headset, and the major one is nausea or motion sickness. Forsyth (2013), a game developer of OR, explained that this is not an easy task to fix; it will require many efforts in testing and research to be able to minimize the motion sickness to the users. However, at the end of 2013, Oculus mentioned that their latest OR prototype was reported with no motion sickness by users (Rougeau, 2013). The future of OR is bright and it is difficult to say how much they could do in the final phase of the development; nonetheless, this technology will change many things in the world.

How Did We Form Virtual Communities?

Messinger et al. (2009) argued that online gaming and social networking are main contributors to the advancement of VR nowadays (p.205) and that also includes users’ participation.

Electronic gaming industry started with offline gaming which allowed two to four players playing together on one game console; remember when we asked our friends to come over the house to try a new game which we just bought? There was a demand of playing and competing with others in video games, and below are the technologies which Messinger et al. (2009) found for their study:

“LAN (Local Area Network) games provided another venue to play with groups of people and to experience large-scale social interaction through gaming. By 2004 large LAN parties were attended by 1200 people. As the Personal Computer (PC) and Internet technology grew at a rapid pace, so did the video game consoles' capabilities. Releases of the PlayStation 2 in 2000 and Microsoft Xbox in 2001 offered gamers the ability to connect to the Internet and to play against (and interact with) other gamers across the world.” (p.205)

As shown in table 1 below, we can easily picture how big the gaming community is, there is almost no difference in genders or age ranges between gamers. It is more than half of the total worldwide number of gamers participated to online gaming, and the population of the gaming world will consistently rise alongside with incremental technology development.

Table 1. Statistics of Gaming Industry 2013

1.2 Billion gamers world wide		
700,000 Million play online		
52% are male		48% are female
39% are from 36 years old to over	32% are from 18 to 35 years old	29% are under 18 years old

Ref: Performance PSU (2014)

Furthermore, players were given ability to create their own guild/team and add other players into their friends list inside online games. The community started to grow as people would like to get to know more about their team members, they also create online forums to help each other to solve issues which they encounter inside the games. Up to the latest gaming consoles, Wii, Xbox One and PlayStation 4, Nintendo, Microsoft and Sony have let gamers increase VR experience and participation at home by enhancing the connectivity and hardware, e.g. Kinect and PlayStation Camera. Many gamers are used to play/coordinate with other online gamers as a team; they communicate verbally via headset with microphone, or text chat with typing keyboard. Hence, it is certain to say that gaming not only opened a portal to virtual world for everyone but also connected them virtually.

However, Messinger et al. (2009) added that social networking brings more people to VR than gaming (p.206). They said:

“The essential features of social-networking web sites are that they provide a platform in which members can (a) easily create “profiles” with information about themselves, and (b) define their “trusted” circle of friends. The environments support the differentiation of public vs. private information on members' profiles, and authorize access to the private aspects of the members' profiles only to their circle of friends.” (p. 206)

Their definition of social networking does match with the foundation of the largest social network site in the world, Facebook. It has grown so much since they first started the site, and according to their latest report, they had 1.28 billion monthly active users at the end of March, 2014 (Facebook, 2014). Facebook is a virtual community which has become so attached to many people as their daily routine, users want to get connected and updated about their friends. But, its main communication is based on text and chat, they also provided video and voice call but they are not that popular to users; therefore, the “virtual” here stays at the meaning of connectivity but not the experiences. Not as popular as Facebook around the globe, Second Life (SL), a premier virtual world or perhaps the most important current virtual world (Messinger et al., 2009), offers a richer VR experiences to the users.

The freedom, which is offered to the end-users, in SL's virtual world is a key success for them. Users are allowed to go freely to many virtual places, create any object at their will; meet, make friends and hang out with them (p.209). Especially, SL created their own currency called Linden Dollars; this currency can be exchanged to US Dollars at a rate of 250 Linden dollars for approximately 1 US dollars (Kim et al., 2012). By having a currency within the virtual world, SL lets users to participate to economic activities (buying, selling and trading) which can result in real world incomes for them (Messinger et al., 2009, p.209). In fact, nowadays, many online games have their own virtual currency which can also be exchanged to real world currency, or people use real money to buy virtual items; that is when virtual world became a real deal to most of them. Speaking of virtual currency, there is one which is gaining high reputation all over the world, is Bit Coin. Many individuals and businesses have participated in using this virtual currency as an exchange medium. This is only general knowledge and this paper will not look into pros and cons list of this currency. Below figures are different social activities which took place in SL.



Ref: Hill (2011)

Figure 1. High school students attending college



Ref: Shuftan (2012)

Figure 2. The First 2012 Presidential Debate



Ref: Foden (2014)

Figure 3 Attending a meeting

Ref: Trapdoor (2012)

Figure 4. London Olympic games 2012

However, it does not only benefit to individual users, SL also provides a vast opportunity land for companies - to name a few, IBM, Microsoft, Reuters, Toyota, Honda - to operate and interact with their consumers and followers (p.209). They use SL for different purposes "... (a) a laboratory for market research, (b) a test market, (c) a large market for advertising, (d) a retailing center, and, (e) a way to generate traffic to e-Commerce sites on the internet." (p.210). They found that SL residents increase their "in-world" experience when firms practice their "real-world" strategies in SL (p.210). Surprisingly, religious groups also join SL for their activities; for example, Islam Online, a Muslim website, purchased a land in SL to allow their followers to perform the ceremony of Hajj in December 2007.

It is undeniable that social networking brings more users to the virtual world; not all of us like playing games, but we cannot live without socializing; and virtual communication makes it easier for people to communicate with others disregarding the distance between them.

What Has VR been Utilized for, Beside Online gAming and Social Networking?

From the study, Messinger et al. (2009) believed that there are five prominent classes of virtual worlds (p.207) as follows:

- Education-focused: Provides training for many areas including architecture and design, procedural skill development, language learning, and many more.
- Theme-based: Supports different types of communities to have their own space for members to discuss, socialize around their topic, and be able to access to its content.
- Community-specific: Limits to the community size of national or geographical region where their members shares the same norms and values.
- Children-focused: Has children and teenagers as target markets.
- Self-determined: Extending users' social and business activities.

Different class of virtual worlds defines a different purpose of use and how to approach their audiences and interests; VR can also be utilized in those prominent classes. Furthermore, the author finds those virtual worlds operating their systems as same as managing websites, and with VR being adopted, they can enhance the interaction experience between virtual users. To understand more about what VR can do and its potential benefits, the following parts will present several ideas/works which use VR in different industries to enhance life and businesses.

Education and Training

González et al. (2013) argued that virtual worlds are a better environment for users to interact than the traditional Information and Communication Technologies (ICTs) (p.331). They believed educational

institutions should find their way to adapt new advanced technology, especially VR, to re-new their systems just so learners can have more opportunities to learn and explore new knowledge (p.332). To be more specific, virtual worlds are able to change the current system from a teacher-centered to a learner-centered model of instruction; it will result in adapting learner-centered pedagogies which will boost active constructivist, and problem-based pedagogies (p.332). Also, virtual worlds can deliver a richer experience than other media; from their research, a student said that he had no problem with the practices in virtual worlds because he was able to complete them like in a real world (p.332). However, bringing the whole education system into virtual worlds right away is not seen as proficient as it sounds; education institutions should provide adequate facilities and knowledge to teachers and students to get used to virtual learning environment, and the first step is presenting to them a virtual university concept. Agreeing with this idea, Sejzi et al. (2012) believed virtual universities not only can provide a better learning experience but also improving the organization arrangements (p.565). It is noticeable that the world is changing quickly with new technologies, and it results in new social trends adapting to the new changes; people, nowadays, are more familiar with web-based learning and virtual learning than before (p.567). Their study shows that both lecturers and students would like to participate to online teaching and learning; the demand of having more flexibility in education system has grown rapidly since everyone can access to the internet almost anywhere now whether with their computers or handheld devices (p.576). Lecturers also find interacting with students easier when they are all inside the virtual learning communities (p.567). The rises of mobile technology and internet accessibility have made knowledge sharing much simpler than ever. Johnson listed out four factors which led to the new trends as follows (as cited in p.566):

- a) Economic changes with a reduction in budgets and financial resources.
- b) Societal trends and the increasing desire for convenient, mobile and flexible learning opportunities.
- c) Employability trends and the demand for flexible, multitasking employees who are computer literate.
- d) Computers are a stable asset in society, impacting upon every aspect of our personal and professional lives.

Acknowledging the new demand in education, scholars believe that this is the time to adapt virtual environment into the system to open virtual universities which will, according to Sejzi et al., “add significantly to the human capacity for creating new knowledge” (as cited in Sejzi et al., 2012, p.566). As well as providing the flexibility learning environment to teachers and students, virtual universities can also improve the management in the service delivery to students and support them to develop their knowledge and skills (p.567). In some way, virtual university could be seen as “virtual organization” (p.671); that means organizations can learn and apply this concept into their human resource development.

As presented above, we can see that the modern society has been opening up for virtual learning environment, and that can be seen as a good sign to implement VR technology into the educational system.

One practical example which universities can utilize VR technology to help fresh graduates is simulating a job interview scenario. The job interview simulation can give the students a ‘like-real’ experience as if they did attend to one; this can help them to reduce the anxiety when they are about to meet the interviewer(s) (Kwon et al., 2013). Studies were conducted to experiment if the job interview simulation using VR technology can indeed bring the same atmosphere of a real situation to the interviewees or not; and the results were profound. Kwon et al. (2013) discovered that the anxiety is not entirely induced by the graphical realism of the virtual interviewer but more by the thoughts of the participants being in a stressful situation. Another earlier study from Shelly et al. (2006) found that all the participants behaved (body movements) and communicated normally during the virtual job interview (p.333). By all means, the result from the studies stated that interviewees’ behavior and performance did not get any bad impact by being in the virtual environment; the author would like to interpret that in a

psychological way, our brain lets us see what we want to see. The job interview which was simulated by using VR technology creates a picture of a stressful scenario in the brain, and then it simply triggers all the senses from which we experienced or imagined before. At the end, it does not really matter whether you are in reality or virtual environment as long as VR technology can simulate us to have the same sensation.

Furthermore, virtual learning environment is not just beneficial to only educational institutions; organizations can receive great outcomes from using VR technology to train employees. One study was conducted to see how organizations can retain their expert knowledge or called as tacit knowledge which is obtained by employees who have resolved many complex issues during their daily tasks (Haase et al., 20013). This kind of knowledge is extremely valuable to any organization, the human resource department tries to come up with the strategies to investigate, document and transfer it within the organization; but most of the times, the employees who have this do not even know that they have this specific kind of knowledge and that makes it difficult to input them into the knowledge database of the organization (p.237). It would be a great loss for the organization if the expert retires from their position, the tacit knowledge will leave with them (p.237); that is why it is essential for every organization to preserve the expert knowledge. This study selected the field of maintenance of technical equipment to examine the benefits of using virtual learning environment to train the technicians; the authors chose this field because the insufficient availability and danger might come from the device, a good practical training is hard to be provided, it means that new technicians have to learn through on-the-job-trainings (p.237). They constructed a virtual reality 3D model of an operating mechanism with 360 projection system; by doing so, they created an interactive virtual learning environment in which the technicians can use mouse and keyboard to interact or observe how the mechanism works (p.239-240). Complex issues were too programmed to occur during the training, and the technicians have to decide which working steps to take in order to resolve the issue (p.241). The result of this study was found positive, the participated technicians, including young and experienced technicians, said this way of training providing them a good and deep understanding of the complex tasks and the behaviors of the devices (p. 244).

Tourism

Recently, traveling demand has been growing fast, people have started to travel to many places in the world more, and countries have opened new tourism locations to attract visitors. People travel for the purpose of enjoying a vacation or exploring new cultures (Zarzuela, Pernas, Calzón, Ortega & Rodríguez, 2013). Normally, before traveling, tourists tend to gather information of the destination through brochures (p.382); or if they are computer-literate, they can also go to the official websites, reviews, pictures and videos of the destination on the internet. Zarzuela et al. (2013) conducted a study to test a learning tool based on AR and VR technologies in promoting educational tourism, it's called 'Serious Games'. This game can offer users with various information from different aspects of a city (history, geography, sport or art and literature) (p. 383). The game was developed by integrating the Kinect device (from Microsoft) with Unity 3D (p.384) which means the system will capture the movements of the participants to control the virtual character inside the simulated environment. The test was completed with different topics and wide range of demographics. The responses from the participants were interesting; they said that the feeling of realism presence was high which made them feel like they were actually touring around the city as if they were there (p.388). This is a small example to re-emphasize that VR technology can change the way we learn, and by that, it can benefit to everything, including tourism. The following paragraph will present how far VR could do for tourism.

In the recent years, many tourism organizations have taken a step forward to merge tourism with the internet by establishing themselves online; they call it e-Tourism (Guttentag, 2010). E-Tourism is an initial step to change the face of tourism sector with new technologies. However, many tourism researchers and professionals may not give enough attention to the new technologies which make them not be able to adopt and adapt to the new changes including VR technology; even though it has been used

with many purposes in tourism sector and it is certain to be more promising in the future (p.637). First, VR can help with the tourism planning and management in formulating tourism policy by offering a visual communication to everyone to review and discuss about the future plans; the communication can happen among the authorities, experts and even the citizen (p.641). One practical example is VR can create a simulation of tourism sites to let the site managers do experiments on the market to choose the right strategies for new policy implementation (p.641). Second, VR is a useful marketing and selling tool, it can be seen as a part of internet marketing (p.641). Previous studies, as mentioned earlier, showed that modern travelers would like to do small researches on different destinations for the next trip, and if they can walk around the desired destinations in the virtual environment, they could make a good decision (p.641). In order to fulfill the demand, many places have created “virtual tours” which regularly are panoramic photographs; it is understood that this is not VR technology (p.641), but it shows where the tourism sector will head to. We could believe that one day Google will introduce more VR-type technologies into their Google Maps. Tourism can also be promoted via virtual communities (e.g. SL) just as other online travel communities (e.g. forums, trip advisor) (p.641). Third, VR games (including hardware and software) can be operated in theme parks for entertainment purpose; theme parks tend to provide 3D or sometimes even 4D entertainment rooms for visitors to experience many scenarios (p.642) – going to the past, going to the future, playing with the dinosaurs, or being a part in your favorite Sci-fi movies, etc. Fourth, VR is, as discussed in the previous part, a useful teaching tool to educate students at any subject, including tourism, example was shown at the beginning of this part (p.642). Fifth, VR applications can help people to easily access to tourism destinations where they cannot visit due to circumstances (personal/financial problems, dangerous or exotic locations, etc.) (p.643). Last but not least, VR can help countries to display their heritage sites or artifacts which are not available for public while they are still able to preserve them (p.643); in the other hand, from the author’s perspective, the countries, who had to open exhibits of heritage artifacts to attract more visitors to generate more incomes for their countries or to share their unique culture to the others, can again have a good heritage preservation. To sum of, by simulating tourism attractions into a VR model/world, those are the benefits which are offered to both travelers and hosts. The benefits from having VR tourism are more than what were discussed; travelers won’t have to face any difficulty while traveling and the hosts can not only preserve the tourism attractions but also can protect the surrounding environment (p.644). However, that does not mean that people will not pack their backpacks and travel anymore, they appreciate the VR tourism but it is better to see the places in real physical form; many studies believe that VR tourism will increase the traveling desires to the real sites rather than just experiencing it at home, this can be seen as an effect of a marketing tool as mentioned earlier (p.644). To conclude this part, the author would like to state that if we look at this discussion from another point of view, we would be able to see VR technology as a future transportation mode, which does not involve many traveling expenses and damages, instead of tourism promoting kits; at the end, the simple idea of tourism is all about traveling to another location for different purposes.

Health Care

Regarding to the education and training section, VR technology surely can be used for doctors and nurses to practice medical procedures in virtual environment; but then, the author would like to discuss more about how VR has been applied to therapy treatment. Two recent studies were selected for the topic; one is about experimenting VR on children with Down Syndrome (DS) (Wuanga et al., 2011), and the other one is about the conversations between virtual avatars with people who have social anxiety disorder (Powers et al., 2013). Wuanga et al. (2011) stated that “children with DS are slower at both initiating and executing goal-directed movements compared to typically developing peers” (p.312). The study found out that the traditional therapies for DS children to be complicated, repetitive and not effective in keeping the children being active with the exercises (p.313). They believed that interactive VR could provide a better exercise environment, which is more flexible in controlling and manipulating the activities and scenarios, for the children (p.313). The study adopted 3D VR technology from Wii, a gaming console with wireless

controller that interacts with the player through a motion detection system and its avatar representation in the video was developed by Nintendo, to let the children participate the tasks and exercises in the gaming simulations; the exercises were mostly focused on sports to encourage the children to be more active (p.315). Similar to DS study, social anxiety disorder (SAD) study also found that traditional therapies have many limitations in interacting with their patients including the ones applied with internet to enhance the therapy quality (Powers et al., 2013). That study stated that VR was proven to be very useful for conducting exposure therapy; it helps the therapists to have a better control in manipulating the feared situations with the virtual avatar(s) in order to reduce the anxiety of the patient relating to social interaction and conversation (p.398-399). The experiment's VR hardware was VR Head Mounted Display and headphones with microphone, the software was a modification template from a video game Half Life 2, a first-person shooting game, and the participants were instructed by the facilitator who controlled the virtual avatar (facial expression and body movements) (p.400). At the end, the result showed the fear ratings of the VR conversation was high which confirmed that VR exposure therapy can improve the therapists' observation to help the patient to cope with SAD step by step in a good direction (p.401). Nevertheless, the applications of VR in health care industry will increase once people are aware of the services which utilize the usefulness from VR technology to deliver a better experience and quality to the patients.

To the extent, VR surely can bring significant benefits to many kinds of business or organization; education, tourism and health care are among the most important industries of every country and we have seen how much the system could grow by applying VR technologies to them. Those three industries were not only essential for every country but also for every organization; and that is the main reason why the author chose them to look into applications of VR in professional fields. Nonetheless, we should know where, when and how to do merging VR to the current system.

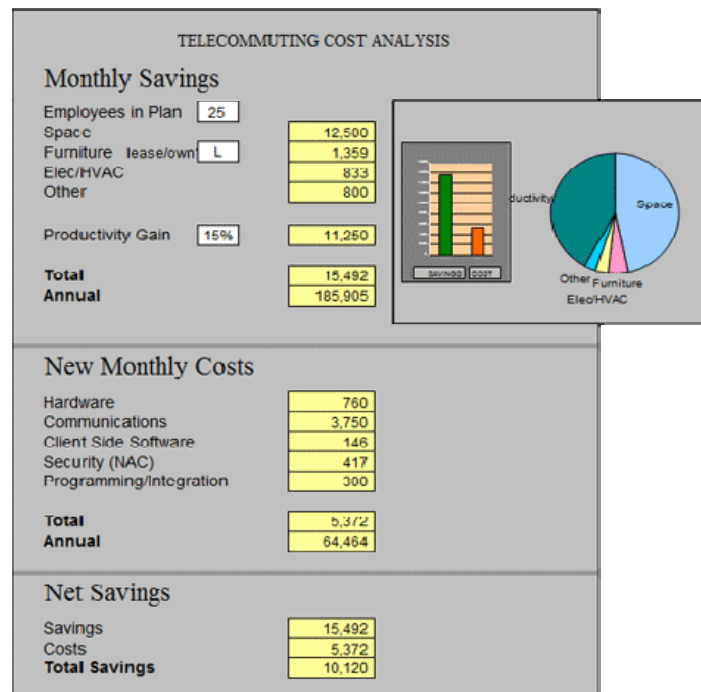
Perspectives on Telecommuting, Virtual Office and Virtual Organization

Over the years, the advancement in mobility and information technologies alongside with the rapid growth of the internet has been gradually shifting and evolving working behavior/process in many organizations to the point where more employees demand to have better work-family balance, and work flexibility while employers try to optimize operation costs to meet the organization goals, and create a pleasant working environment for their employees in order to retain them (Hill et al., 2013; Johnson, 2001). The effective practices which can satisfy both sides are often recognized as "telecommuting", "virtual office" or "virtual organization"; even though they are in different names, but after finished the review, the author has found them, to some degree, related to each other. Furthermore, Johnson (2001) agreed that telecommuting can only be accomplished by employees and it helps employers to reduce capital investment away from physical workplace. Hill et al. (2003) explained the complexity in distinguishing between telecommuting and virtual office as a result of different terminology used from study to study, they simplified them as "telework" (p.223). According to Nille (as cited in Hill et al., 2013, p.221), teleworking is "ANY form of substitution of information technologies (such as telecommunications and computers) for work-related travel; moving the work to the workers instead of moving the workers to work", and employees who do telecommuting, "Periodic work out of the principal office, one or more days per week either at home, client's site, or in a teleworking center", are called telecommuters. They argued that virtual office is a non-telecommuting form of teleworking where telecommuters are provided with portable equipment and authorization to do whatever to accomplish the job; it does not matter where their office is (p.222). The study found that, despite of the concerns of the supervisors in monitoring telecommuters' performance, teleworking was proved to be very effective in enhancing the job performance with maintaining customers and stakeholders' relationship, higher job motivation and satisfaction, higher chance to recruit quality employees without distance constraints, and more importantly, better work-family balance (p.223-224). They concluded their research by supporting Johnson's (2001) concept about telecommuting, organizations and employers can consider and adapt

teleworking programs to their system, but employees are the ones to find ways to accomplish objectives of work and personal/family life while working in virtual offices.

Sotto (1997, p.37-40) did extensive research on virtual organizations, and by his definition, virtual organization is a “double” of an organization in virtual world supported by information technologies. On the other hand, Larsen & McInerney (2003, p.445-447) found virtual organization is more like a network of virtual teams which have virtual members who work from different locations in the world; their main communications are done via e-mail, phone, or video conference, etc., and they might never see others face-to-face. Both definitions are different because the authors used different contexts to explain their research; however, they share the most important factor which is having telecommuters. Additionally, in order to build a virtual organization from virtual teams, each team must have a dedicated team leader who can build high level trust and cooperation among the virtual members to sustain a strong communication and complete assigned tasks (Larsen et al., 2013).

After reviewing different articles (Beauchamp, 2014; Lillie, 2001; and Russell, 2013), this study also confirmed on the common benefits of teleworking which are flexibility in workplace and time, higher productivity, time and cost saving (see Figure 5), lower carbon-footprints, etc. But as mentioned in the previous paragraph, teleworking has an issue with trust among virtual team members or telecommuters with office-based staff; and from those articles, there are many other issues when it comes to teleworking in team-working (see Table 2). Furthermore, the most common issues are all pointing to one simple thing and that is face-to-face communication. It does make sense in the context of telecommuters only communicating with others via the internet (e-mail, text chat, and video call) or telephone; but it raises a question “Is it face-to-face communication still necessary in this wireless technology era?”



Ref: Hardin (2011)

Figure 5. Telecommuting Cost Analysis at IT Business Edge

Table 2. Common issues of teleworking for employers and employees

Employer	Employee
New methods of management for telecommuters and non-telecommuters: <ul style="list-style-type: none"> • Communication • Supervising • Team work • Tracking time worked • Performance assessment 	<ul style="list-style-type: none"> • Lack of connectivity with fellow workers • Lack of connectivity to the company • Potential lack of direction • “Out of sight, out of mind” • Potentially being overworked

From the author’s point of view and understanding from the previous studies, when the three terms, “telecommuting”, “virtual office” and “virtual organization”, are put together, they might cause confusions to readers not to be able to see the connections between each of them; this study would rather describe them as the following: An organization can create their “double” identity, a virtual organization, in virtual world or internet which allows many employees to telecommute in their virtual offices, they can work independently or with other telecommuters in virtual teams to finish the jobs, all of these are possible by utilizing the advantages of mobility and information technologies. This description is going to lead to the new idea of combining VR with the three terms which will be elaborated more in discussion section.

What Are the Milestones of VR (or Virtual Worlds) that Make Organizations be Reluctant to Adapt?

According to Tom and Joey (2013), at the end of 2012, there was only 11% of organizations adopted virtual worlds into their system despite of the 70% of expectation for businesses. That high expectation was set by the potentials of virtual worlds in various ways, as mentioned before, recognized by the experts; but then, it fell short (p.772). First assumption, commonly, comes to our mind is high expensive cost (for both hardware and software) for organizations to set up their virtual sites in the virtual world (Monsserat et al., 2013); however, Tom and Joey extracted not only a set of completely different reasons but also remarkable ones from the study to explain why organizations did not show any interest in virtual worlds as they were expected to. At the beginning, they believed that virtual worlds are similar to the internet, there shouldn’t be any critical reason that it wouldn’t work out for organizations (p.774). What they found were:

“First, organizations are not adopting virtual worlds because other organizations are not doing so. Second, because respective competitors that have adopted virtual worlds are not benefiting or succeeding, organizations are not induced to adopt. Last, technological factors, such as perceived benefits and compatibility do not currently have a significant impact on an organization’s intent to adopt virtual worlds” (p.786).

In the author’s opinion, the main issue was not the disagreement between organizations that they didn’t join the virtual worlds together to create a network; the issue came from insufficient information and facilities provided to the customers to access to their virtual sites, or the existence of virtual worlds is still very limited to many people. Plus, different organizations aimed to use virtual worlds with different purposes to serve their customers, and that means they would face different issues while operating their virtual sites. For example, an organization would face trust, communication, structure issues if they want to create a virtual workplace (Larsen et al. 2002, p.450); a university would face policy, service package, technical skills of teachers and students, and teaching-method issues if they want to open a virtual learning environment (Sejzi et al., 2012, p.569); or if tourism associations intend to develop virtual

tourism, they would encounter conflicts with groups who depend their living on tourism, such as tour guides, restaurant owners, hotel employees, and souvenir vendors (Guttentag, 2010, p.647). In a deeper observation, VR is potentially to change the way we do things in this world, and that would absolutely run into oppositions from the current system's operators because this change might result in the loss of power and profit for many people; however, this insight relates to another topic which is not discussed in this paper.

It is the same as the internet; organizations must construct a system which can provide customers with VR facilities to allow customers to relate with their real activities in the virtual world. As Larsen et al. (2012) did for their research, we should educate students about VR technologies for the future of having them working in virtual working environment, and this could be an application of virtual universities. VR is a man-made product, therefore, not all aspects of the real world can be simulated into the virtual world; nonetheless, the author is certain that future development can certainly advance VR technologies to enhance the realism and capabilities of virtual world.

Methodology

As already been said in Introduction, the aim of the research is to understand modern society's working behavior in offices of service businesses. And from there, the findings will be able to show if the modern society is ready to adapt virtual office practice, and to conclude if VR technology can help to strengthen virtual office.

The author would like to sketch down two conceptual frameworks based on his experience and knowledge about internal and external factors of every business, one is basic and one is extended. While the basic conceptual framework is used for Methodology and Data Analysis; the extended conceptual framework will be partially used in Discussion.

The basic conceptual framework (Figure 6) is practically a set of aspects which virtual office/telecommuting would most likely affect a company; and these aspects were interpreted by grouping the list of pros and cons of telecommuting from the articles (Beauchamp, 2014; Lillie, 2001; and Russell, 2013) reviewed in Literature Review. Every company follows triple-bottom-line framework to balance the three Ps: People, Planet, and Profit. And in order to achieve company's goal, the tasks must be carried about by the two main elements, employers and employees, of every business. The author understands that the structure of every company is built throughout a long history of management and it is not easy to change; however, the author sees telecommuting as a working style which can enforce the process of reaching the balance of the three Ps. By adapting virtual office into the system, the company's structure will definitely change. But this basic conceptual framework is only dedicated for the income generator department(s) which means it only concerns about those who bring income to the company. And for the other support departments (e.g. Human Resource department), they are not the main concern of this research. This framework is also meant to show that virtual office and physical office are not too different when it comes to daily operations.

As shown in Figure 6, the basic conceptual framework has three sets of employers' and employees' most concerns. There are concerns that are only for employers (right side) or employees (left side); and there are concerns that are for both (middle). Virtual office can have big impacts on those three sets, from employees' personal lives to employers' management styles. But again, this research is designed to understand modern working behaviors in offices to see if virtual office is suitable or not, and not to form a new management style for virtual offices. By stating that, the author would like to address that not all concerns are assessed equally. Each concern is described in Table 3.

On the other hand, the extended conceptual framework (Figure 7) is focused on the external parties who would be affected when many companies adopted virtual office into their system. In other words, they are the stakeholders including customers, governments and shareholders. Some aspects will be mentioned in Discussion, and some will not as it would be more than what this study is meant for. Briefly, shareholders are those who care about the well-being of the business which they invested in, customers

are those who expect to have good products and services to be delivered at their desires, and governments are those who keep the society and environment in order. Furthermore, this framework should be used for virtual office implementation phase to take all involved parties into account, which means it will not take an important part of this research as also stated earlier. However, one shareholder will be invited to share opinion regarding the impacts of virtual offices onto the businesses, people and society.

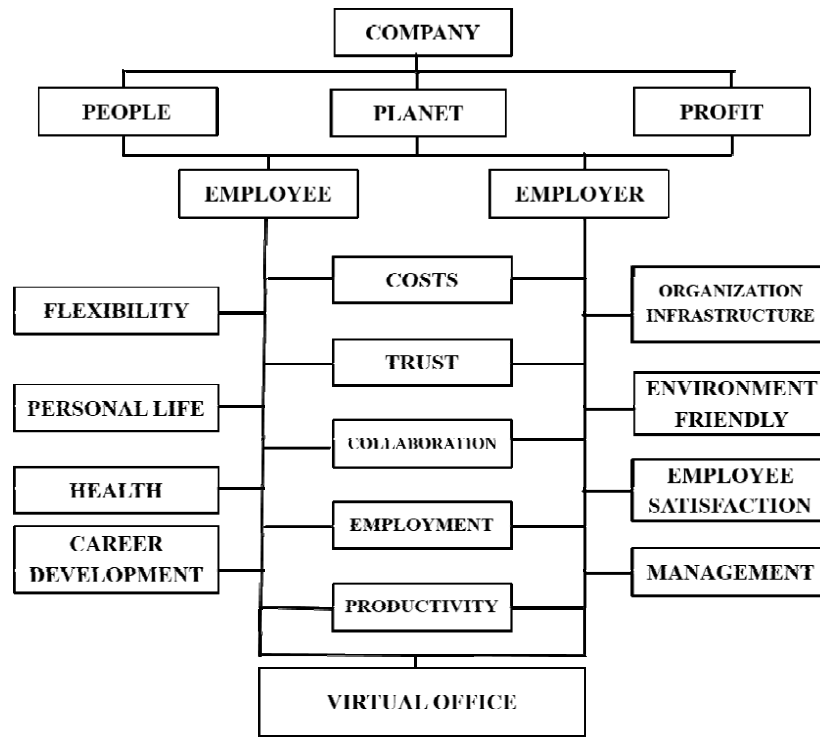


Figure 6. Basic Conceptual Framework

Table 3. Description of basic conceptual framework’s concerns

Flexibility	Working-time and working-place wise, meaning employees can choose wherever to work and allocate their time as long as they accomplish their assigned tasks.
Personal life	Time and energy for self, family and friends, meaning employees can have more time and energy after work for their personal lives as they don’t have to waste those on commuting.
Health	Health protection, meaning employees can sustain their health as they don’t have to interact with uncomfortable environment while commuting.
Career development	Working skills and changing jobs, meaning employees can have more time to develop their skills and look for a more suitable job without concerning on time and location.
Cost	Costs of traveling, operational, and basic needs, meaning employers will be able to reduce operational costs and employees will be able to save costs on commuting.
Trust	Peer-to-peer and manager-to-staff on daily tasks handling, meaning the trust on individuals in handling assigned tasks themselves.

Collaboration	How people communicate and work with each other, meaning about communication tools, the way employees and employers interact with each other to accomplish tasks.
Employment	Job loyalty and retaining employees, meaning employees would increase their loyalty to their companies because of a good working environment, while employers can manage turnover rate low.
Productivity	Efficiency and effectiveness, meaning how employees would do best in their performance if they were provided with a good working environment.
Organization infrastructure	Nature of the business, meaning how each company operates based on their own policies and their type of business.
Environment friendly	Energy and resources consumption, meaning employers should have a Corporate Social Responsibility mind to encourage employees in consuming energy and resources in the office.
Employee satisfaction	Good working environment and incentives, meaning employers also have to have incentive plans (bonus, promotion, health plan, extra activities, etc.) to keep employee satisfaction high besides creating a good working environment.
Management	Management style, meaning employers have to find a right way to manage employees based on their types of business and employees.

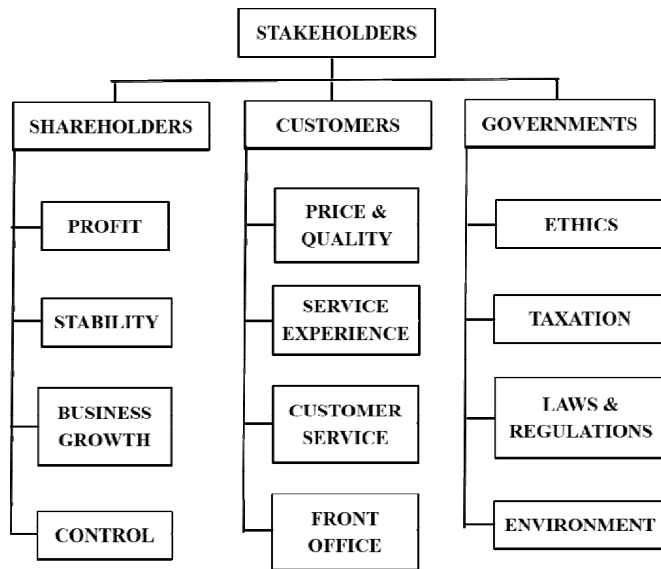


Figure 7. Extended Conceptual Framework

This research is an explanatory research and it will be using mainly qualitative research method to collect data. Additionally, the author would also prepare quantitative research method for those who can't attend to the interviews in order to reach the study's objectives.

Qualitative research method will be carried out with semi-structured open-ended interview with guide approach. The interview's duration is one hour, but it can be extended upon the willingness of the participant, and vice-versa as it could be very short. The interviews will be recorded by logs and sent to interviewees after edited for confirmation on the content of the interviews. For quantitative research method, it will be carried out with a detailed questionnaire with sixty-eight survey questions, also, with

guide approach to make sure that the participant(s) would have a same flow of thoughts with the ones attending to the interviews.

Target audiences are from service businesses located in Bangkok and Ho Chi Minh City below:

- Call center: one manager, one senior staff and one junior staff participate to interviews.
- IT solutions: three senior staffs participate to questionnaires.
- Accounting: one senior staff and one junior staff participate to interviews.
- University's administration office: one manager, one senior staff and one junior staff participate to interview

As mentioned earlier, the invited shareholder is a property owner who has an office leasing building located at one of the busy districts in Bangkok

Below is the guide approach for both qualitative and quantitative research methods. This guide approach will allow the participants to express themselves from their personal lives to their work lives. These data will reflect their behaviors which will show if virtual office is applicable or not.

1. Commuting time
2. Personal life
3. Environment and society awareness
4. Working behavior
5. Working experience with telecommuting
6. Self-opinions regarding work and telecommuting

After the data is collected, it will be analyzed by looking at meaningful patterns and themes to answer the research question.

As stated in Introduction, this session is aiming to answer the below research question:

- ❖ Can and should we (people and organizations) adapt VR into daily activities?

In other words, "Is virtual office/telecommuting a practical working style?" The findings on employees are expected to show that modern office staffs are ready and willing to work from home in order to have better productivity and personal lives. And the findings on employers are expected to show the limitations of knowledge and legacy working processes toward working from home. Furthermore, the author would also like to list out his expectations on collected data to reflect his own understanding about employers and employees regarding modern working behaviors and telecommuting.

- E.1. Employers do not take telecommuting into cost-savings plan.
- E.2. Employers do not think telecommuting as a suitable working style for their businesses.
- E.3. Employers think telecommuting's operational set-up is costly.
- E.4. Employers think telecommuting is not good for peer relationship at work.
- E.5. Employers think telecommuting is good for the environment and employees' personal lives.
- E.6. Employees do not use face-to-face communication as a main communication tool.
- E.7. Employees are not concerned about energy and resources consumption in their offices.
- E.8. Employees are not concerned about the condition of the environment in their cities.
- E.9. Employees think that they can work more efficiently and effectively if they were allowed to work at home.
- E.10. Employees weight their personal lives more than their jobs, even though they are happy with their jobs and co-workers.

Findings and Data Analysis

The research was carried out with interviews and questionnaires (for the three who couldn't attend to the interview), and it had twelve participants: three employers and nine employees who were selected from different service businesses (office leasing, accounting, administration office, IT solutions, and call

center). One employer who is from office leasing business was invited to share his thoughts on teleworking (No data about his office or management style was collected because his type of business is mainly managing facilities in the building and not human), and the author was also able to obtain a comment from one of his business partners.

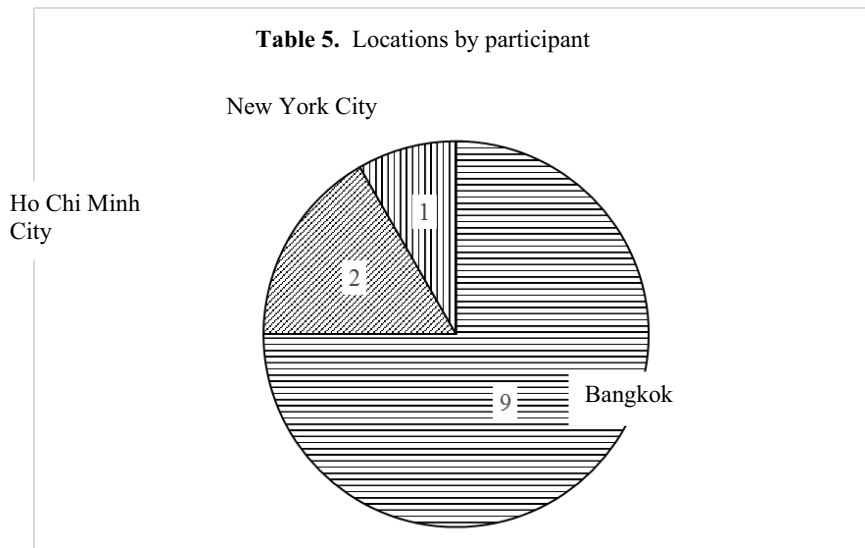
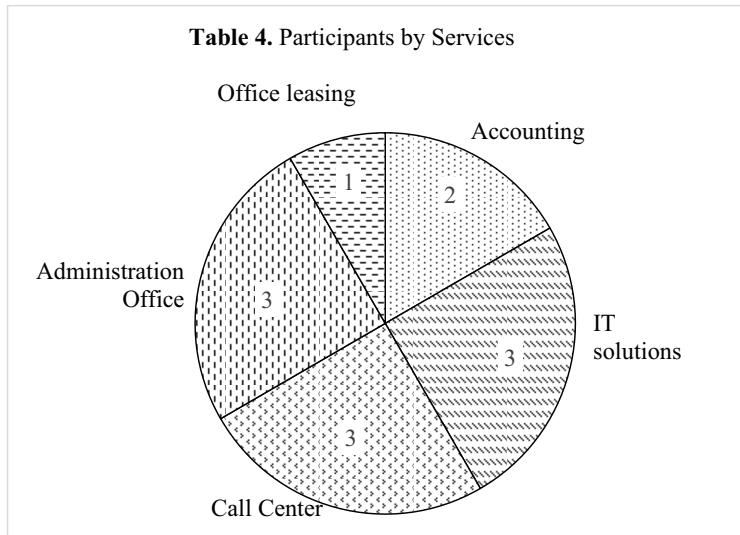
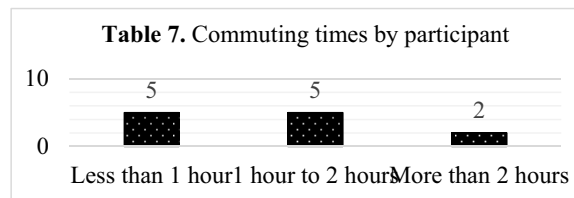


Table 6, as shown below, will give a brief job description of each job based on the participants' responses. The purpose of this table is to list all the main daily tasks to understand their working processes.

Table 6. General information about the interviewees' daily tasks

Call center	<ul style="list-style-type: none"> • Coordinating with clients and providers • Coordinating with the head quarter office • Assisting clients' customers • Paper works
Accounting	<ul style="list-style-type: none"> • Communicating with clients • Working with ledgers • Working with taxes • Paper works
Administration office	<ul style="list-style-type: none"> • Coordinating with instructors, other departments and external contacts • Assisting students • Managing bachelor and master courses • Paper works
IT solutions	<ul style="list-style-type: none"> • Monitoring and maintaining client's system • Coordinating with different international teams • Enhancing client's system • Resolving daily issues

The feedback was varied from only thirty minutes up to five hours of traveling to work and back home. (Table 7)



Among twelve participants, there were four people driving their own vehicles to work, two (employers) were from Bangkok and two were from Ho Chi Minh City; the rest used public transportation.

Regarding time saving on commuting time, all participants said they would like to reduce it as much as they could just so they could have more time for their personal life. For participants having long commuting time (more than one hour) daily, it was not only a matter of losing time, but also a matter of

health concern. Participants mentioned that they often got stress and road rage when they drive to work on their own cars as a consequence of heavy traffic congestion. Taking public transportation was a different story; two accountants said they had to bear with heat and uncomfortable experience in no-air-condition buses, and because of those tiring rides, they came home exhausted and it often took them around thirty minutes to one hour to recovery so they could proceed with their night activities. The two participants who had to travel more than two hours per day on the road were working in Bangkok and they lived with their family. To be more precise, one had to travel four hours every day and five hours for the other. At that moment, they didn't have any thought of moving to a place near their office nor changing their jobs to somewhere near their houses. In general, to all participants, they didn't see anything wrong with that as "This is life in big cities"; and spending one to two hours per day for commuting time was acceptable to them. In the point of view of this study, participants accepted long commuting time to have a stable income and career, even though, they would have less time for their personal lives but at the end, they did not want to spend all their time on their jobs.

The responses of the office leasing participant are not used in this part; because he was invited to share his opinions on the impacts of telecommuting to businesses, people and society as mentioned in Methodology.

The common communication tools were e-mail, telephone, Skype, Line, social-network, message delivery, and face-to-face communication. Message delivery, or messenger, was often used by accounting companies located in Bangkok; they used it to send and pick-up documents to and from their clients. Below is a list of communication tools sorted by the rate of daily using. (Table 8)

Table 8. Common communication tools

1	E-mail
2	Telephone
3	Face-to-face communication
4	Skype, Line and Facebook
5	Messenger

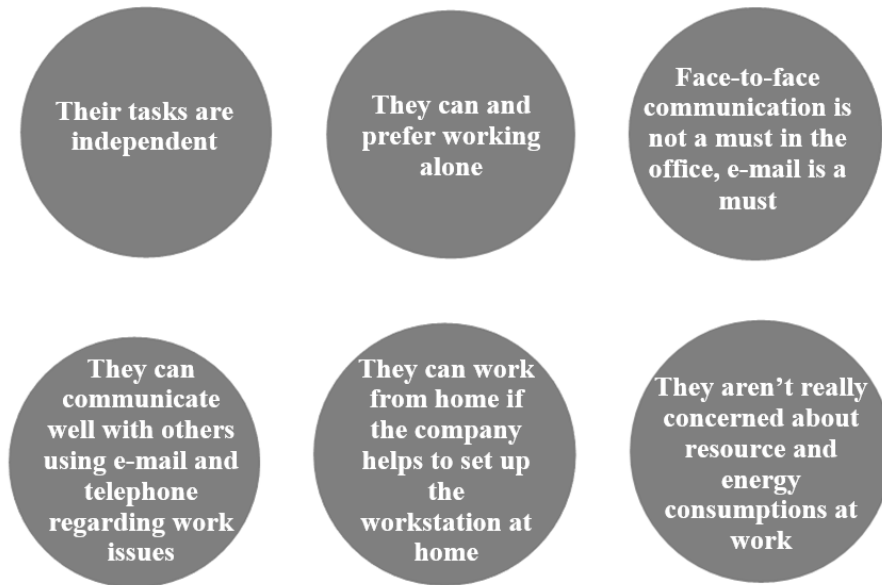
The two employers presented different management styles, different confidence on employees' credibility, and different minds toward changes at workplace. (Table 9)

Table 9. Employers' responses regarding their staff and management style

Employer 1	Employer 2
<ul style="list-style-type: none"> Used to work as a telecommuter in the past. Had a complete trust in employees in accomplishing tasks on their own. Didn't want employees to bury themselves with the piles of administrative tasks. Loved to have employees participating to other types of tasks to develop their professional skills, e.g. academic research. Offered a flexible working environment to employees, but the higher management did not like it and the nature of their jobs limited the flexibilities. 	<ul style="list-style-type: none"> Did not think that every staff can work independently because there were many junior staffs in the office. Expected employees to develop their communication skills by speaking with other staffs. Felt reluctant to any changes in the working process due to concerns over security policy and costs matter.

Based on the responses from the employees, there were six similarities in working behaviors observed. (Table 10)

Table 10. Employees’ responses regarding to working behaviors

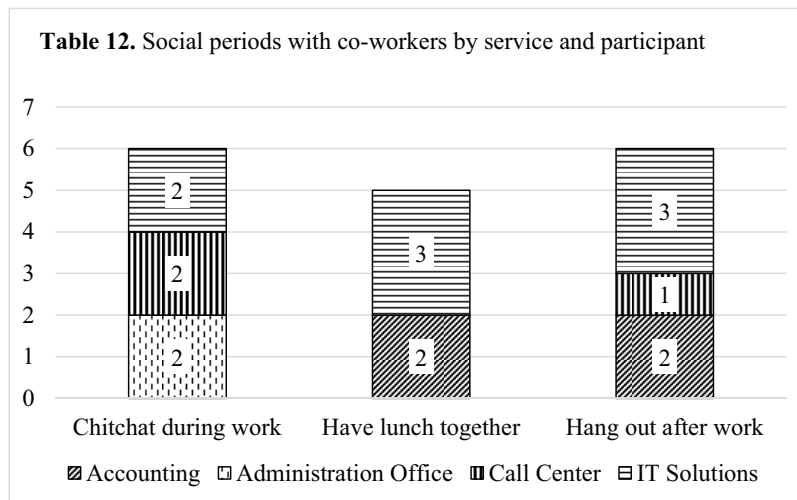


During the interviews, call center and accounting interviewees brought the author’s attention to their low confidence on other staffs in handling tasks independently. In the other hand, administration interviewees had a strong trust on others. And because this information came up during the interviews, it was not included in the questionnaires. (Table 11)

Table 11. Call center and accounting senior staffs’ responses regarding working independently

- | |
|--|
| <ul style="list-style-type: none"> • Many staffs were not disciplined enough to handle things on their own. • Many junior staffs did not know how to use technology (e.g. email) efficiently. • Junior staffs had little experience and needed more guidance from managers and senior staffs. |
|--|

The interviewees said that they socialized with co-workers during working hours, lunch break and after work, but not breakfast. Both accounting interviewees said that their managers did not like staff chitchatting during working. Call center and administration interviewees couldn’t all have lunch with co-workers because some staffs have to attend at the front desk for assisting students and instructors. IT interviewees participated to all three social periods; except one person preferred focusing on completing assigned tasks during working hours more than the others. (Table 12)



When it comes to traffic congestion, interviewees had many opinions on this matter regarding the outcomes. Besides causing pollution and heat, there were others that are listed in Table 13.

Table 13. Interviewees’ point of views regarding the outcomes of traffic congestion

- Losing time and money
- Causing pollution and heat
- Feeling uncomfortable
- Affecting health
- Building up stress and road rage

Below is what some participants said regarding their commuting experiences:

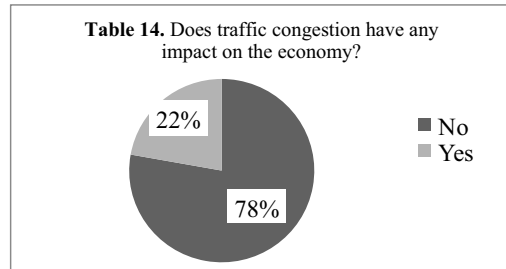
Senior accountant, “Well, it doesn’t let me get to my office fast, many vehicles are on the road generating too much heat, and especially that would make people start to sweat. I usually take the bus, and when the traffic jam happens, it is very bad, the bus is also full of people, so you could imagine the heat and the smell from other people just don’t make the trip any pleasant.”

Junior accountant, “Well, it is very hot and crowded here; I experience this everyday with the buses.”

Call center employer, “I like living in BKK but not the people. If you mean about the people, then we have too many people here in BKK, it’s so crowded. And I don’t like to say it, but to me, Thai people are quite selfish. I experience this every day when I take BTS to go to work, or when I try to cross the road, people with their cars just don’t care about others. I’ve visited some European countries and I felt much better there. Because the people are like that, it reflects on the way the drive on the road which leads to many traffic jams. And about the weather, it is very hot here.”

During the interviews, the participants were asked if there was any impact from traffic congestion on the economy to see whether they were aware of the economic situation in their country or not. Even though, this question was not directly related to the main study, but this research would like to glance of their world views for further study; because this’s been a big issue in Philippines as they are currently

losing billions in their currency per year due to traffic congestion (Citrinot, 2013; Remo, 2013). Seven out of nine interviewees responded that traffic congestion did not have any impact on the economy or they didn't know. For the other two interviewees, one said that it could have impacts on the incomes from the public transportation fares; and the other said that people lose time in traffic congestion and time is money, so people lose money. (Table 14)



Below are the comments of the participants on the environment of where they lived and worked. (Table 15)

Table 15. Interviewees' responses regarding the living environment of their cities

City	Bangkok	Ho Chi Minh City	New York City
Environment	<ul style="list-style-type: none"> • Crowded • Hot • Polluted • Fast lifestyle 	<ul style="list-style-type: none"> • Crowded • Mild polluted 	<ul style="list-style-type: none"> • Clean
Cause(s)	<ul style="list-style-type: none"> • More than half of Bangkok population is from other provinces • Insufficient public transportation services • Too many personal vehicles participating in the traffic • Government doesn't have any law about car owning for each citizen or household 	<ul style="list-style-type: none"> • Too many vehicles 	<ul style="list-style-type: none"> • Factories • Too many vehicles

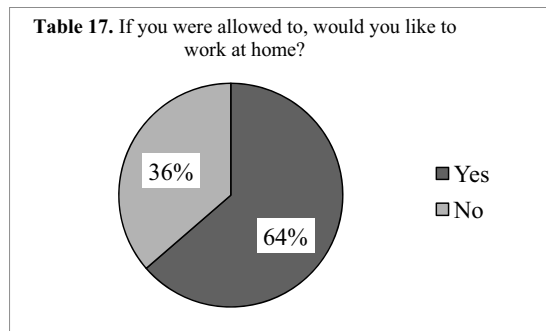
In general, the table below (Table 16) shows a list of benefits and concerns when the participants were asked for their opinions on working from home. "Productivity" is not mentioned here because the comments from participants who had experience on working from home were "Productivity is the same". Interestingly, participants, who didn't have experience on the matter, thought their productivity would increase because they could concentrate more at home.

Table 16. Interviewees’ comments regarding to working from home

Benefits	Concerns
<ul style="list-style-type: none"> • Save time and money • Flexible time and workspace • Reduce distractions at work • Reduce pollution • Less stress 	<ul style="list-style-type: none"> • Home-office set-up cost • Office equipment and supplies • Out-of-sight, out-of-mind • Low communication with co-workers

When the participants were asked if they would like to work from home, four out of eleven said that they wouldn’t do it. Two were from accounting, and one was from call center. Also, three of them happened to be the only female employees of the research. (Table 17)

Table 17. If you were allowed to, would you like to work at home?



And the next table (Table 18) will show the responses of the interviewees who didn’t like working from home regarding their reasons.

Table 18. Reasons of those who didn’t want to work from home

Thai people prefer working in traditional ways and don’t like to change; there are also physical contacts, e.g. shaking hands, patting on the others’ shoulders, giving comfort to others, and many more, not just only face-to-face communication.
“...work is work, you have to go to the office and work there, and not just in your house. You have to walk outside, get on the street, meet and hang out with co-workers at work...”
Enjoy hanging out with co-workers and dressing up to go to work.

The interviewee who had business in office leasing did not see working from home as a threat to his business; because, according to him, there are many other types of service that require face-to-face communication, e.g. customer service center, and that could never disappear. The business and the neighborhood around the building could encounter some difficulties if his clients decided to adopt

working from home practice, but as an entrepreneur, he was positive that he could find more opportunities. But, that was his opinion based on business mind, he said otherwise when he spoke about the society and the environment. He said that telecommuting would bring more benefits to people as it will help to save time, cost and maintain good health. When less people leave their houses to go to their offices, there will be less vehicles participating into the traffic, and that will certainly reduce the pollution. And his partner also shared the same thought.

At this point, the collected data can answer one part of the research question which is: The people were ready and willing to work from home if they were allowed. People were familiar and prefer wireless communication and that would make things easy to change in the working process. Though, they said that they liked their job and co-workers, they would still prefer to spend more time with their families and friends. Interestingly, some said their offices were like their second homes to them because they spent most of their time there, but they would trade-off the activities in the offices to telecommuting because they will gain more benefits for their personal lives.

While the employers, who presented the management of their organizations, acknowledged the benefits from telecommuting on employees' personal lives and the environment, they were reluctant to agree with it in a business context. There were many reasons for that (operational set-up cost, changes in management style, training courses, etc.), but their main concern was "Is virtual office/telecommuting really compatible with my type of business?" The lack of knowledge and the risks of adapting a big change to organization's infrastructure are stopping them from going further with teleworking.

Overall, the result does not reflect that teleworking will definitely increase the productivity, but rather than that, telecommuting could improve employees' personal lives. And VR could help to strengthen the working environment at home; more details will be presented in Discussion.

This part will show if the author's expectations on the research were accurate or not.

- E.1. Employers do not take telecommuting into cost-savings plan: The employers did not agree that telecommuting is suitable for their type of business so they didn't take it into their considerations. **Correct**
- E.2. Employers do not think telecommuting as a suitable working style for their businesses: Their businesses required employees to be at their desks to assist customers either face-to-face or via the internet, so they didn't think telecommuting suitable for them. **Correct**
- E.3. Employers think telecommuting's operational set-up is costly: One employer said they had low budget to do any innovation, and the other said the operational cost would increase if they have to provide office equipment to all employees' house. **Correct**
- E.4. Employers think telecommuting is not good for peer relationship at work: The employees said peer relationship would be affected if everyone worked at home, and they would like the employees to communicate with each other to improve their communication skills which will benefit for their jobs. **Correct**
- E.5. Employers think telecommuting is good for the environment and employees' personal lives: They accepted that telecommuting would help employees to save time and money; and that would benefit the environment as fewer vehicles are used on the road. **Correct**
- E.6. Employees do not use face-to-face communication as a main communication tool: Already shown in Table 7. **Correct**
- E.7. Employees are not concerned about energy and resources consumption in their offices: They were not concerned about offices' consumptions, but some did try to reduce the use of printing papers. **Correct**
- E.8. Employees are not concerned about the condition of the environment in their cities: Some were and some were not. **Incorrect**
- E.9. Employees think that they can work more efficiently and effectively if they were allowed to work at home: As mentioned earlier, this was not applied to all participants, though, majority thought so. **Incorrect**

E.10. Employees weight their personal lives more than their jobs, even though they are happy with their jobs and co-workers: They did want to have more time for their family and friends than for their jobs. **Correct**

Below are other interesting findings which the author composed from the collected data:

- i. Many accounting companies in Bangkok are adapting cloud computing which allows employees to work remotely. Senior accountant, "...in BKK, accounting companies have been moving to 'cloud', so it makes thing easier to connect to the data from anywhere." Junior accountant, "... we have adapted cloud technology that is why I said one of my tasks is inputting data in to the database."
- ii. If employers worked or had experience as a telecommuter in the past, it's more likely that they would try to offer a flexible working environment for employees. Administration office's manager, "... I really liked being a telecommuter... I don't really mind how they do the work and where they do the work, as long as they can accomplish the assigned tasks, I am happy. I am more with the result-oriented, but the higher management might not like it. I prefer to have a productive employee than the one who sits in the office all day and do nothing."
- iii. If employers had complete trust on every single employee with handling assigned tasks on their own, it's more likely that they would try to offer a flexible working environment for employees. Employers preferred to have employees been able to work independently than relying on others. Administration office's manager, "... I have a very high trust in my staff. They can work independently well and they can also cooperate well with each other."
- iv. If employers did not promote eco-working environment to employees, it's more likely that employees would not have any concern on the efficiency of consuming resources and energy in the office. This was observed by participants' responses on printing paper consumption.
- v. Besides, the reason of using e-mail as a required communicating tool, employees said it's more convenient that way, and they didn't feel that they were annoying or bothering others comparing to phone calls. But if it was an urgent matter, they would prefer phone calls or face-to-face communication. Administration office's senior staff #1, "...I find it less annoying with communicating via e-mail, because I think calling to them is giving them more pressure; so with e-mail, they can find their time to reply to me."
- vi. Employees said that most of their assigned tasks were simple and repetitive once you are familiar with the process. They believed that they could accomplish the tasks in a short time if they could work alone, and the communication happened over the internet or phone calls. Junior accountant, "... I believe that if I can have a quiet place to concentrate, I could finish the task which takes me a week to do in within 1 to 2 hours..."
- vii. Employees were not confident with junior staffs, mostly fresh graduates, handling tasks. Besides, the reason of junior staffs being new to the job, they also lacked of skills using office equipment (e.g. e-mail) and discipline. This could be interpreted as an outcome from college education.
- viii. Administration employees said that bachelor students did not have a habit of communicating via e-mail, though, most of them owned a smart handheld device which allows them to check e-mail anywhere. The bachelor students preferred using social networks, e.g. Facebook and Line. The reason might be a low rate of e-mail involvement in high school study works. Though many companies are using social networks for internal communication, due to security issues, most of them restrict usage of social networks at workplace.
- ix. Employees did not worry much about their health, nor the environment when they were stuck in traffic jams; their main concern was time. That was also the answer of the interviewees to fast lifestyle in cities. Participants didn't mention health as an impact from traffic congestion in the first place, and it seemed the junior accountant had an allergy because of the pollution but she was not aware of that "... After one week working here, my face began to have some pox, I had to go to see a doctor and had medications. From then, now I always wear mask when I go to work."

- x. Not one of the participants mentioned the bad effects from big buildings to the environment; to them, big buildings were places to escape the heat and pollution.

Discussion

The analyzed data results met the objectives and purposes of this research which are to understand the modern society in the aspects of working behaviors in offices of service businesses, morality of office workers toward the surrounding environment, and especially, the needs and readiness of people and businesses for a new change in the current legacy system, virtual office. It is valid to speak of high compatibility between virtual office and modern office workers, but there are still many concerns regarding the effectiveness and efficiency which can be perfected by utilizing VR. The following paragraphs will demonstrate how the study perceives the modern society and how VR can make a change in the way we work.

Employment is a fundamental requirement for every citizen to have a life security for themselves and their families, then to support the economy. It does support us in monetary way, but does it really give us the balance in our daily lives? There is a perception of life having three stages which every one of us has to go through: Young, adult and old; and each stage has the same three attributes that are: Time, money and energy. In each stage, most of us can only have two out of three attributes available, and it goes like this: When we are young, we have time and energy but no money; when we are adult, we have money and energy but no time; and when we are old, we have time and money but no energy. It is reasonable to agree with the young and old stages; because when we are young, our parents should guide us to know how to spend money so we won't become spoiled children; and when we are old, our deteriorating physical and mental health are stopping us from going anywhere or doing anything. At the adult stage, we should have more spare time to appreciate our lives and everything around us, but our jobs are consuming time (including commuting time) out of our lives and leaving us timeless. However, nowadays, you can find many real life cases that do not fall into that perception, and people would tell you "It's all about how you'd manage your life to make the best out of it no matter how old you are". Is it true or is it not?

Life in cities often comes with the term "fast", is it really a characteristic of a modern society? At least in Bangkok, it is. Fast services or express services grew numbers along with a fast lifestyle in the city; they exist to serve customers who do not have enough time to spare, and people use those services for convenience to save time and effort. It was interesting that one interviewee said that most of Bangkok citizens did not have enough quiet time to sit down and think about their lives and the world. They were too busy with all the distractions and temptations of work and media, so they chose to follow whatever trends that fit to their likes. And when they realized what's wrong in their lives, they would like to enjoy a slow lifestyle which many people would prefer to do at the countryside during weekends to escape the glamorous lights of Bangkok.

In the interviews, there were two people working in BKK, who both started their normal working days at 5am, they both had the same working hours, but their commuting times were different. The guy took around 6 hours and a half, including freshening up and taking buses to go to the office and go back home, while the girl took around 3 hours. Obviously, the girl had more time to relax after work and a good 8-hour sleep than the guy, but she wished to have more time because she also had to do house chores, and she had almost no time to watch TV reality shows before going to sleep at 9pm. In the other hand, the guy had no problem with his commuting time, nor having a very little time for him to do anything that he liked, and it had been more than 4 years for him, though he said that he would like to have more free time to look for a girlfriend. Their comments with other interviewees about their jobs and life in the city were the same: "The system hasn't changed lately and this is the way of living in a big city, I think it is normal." Nevertheless, they all valued personal life more than their jobs. It is ironic to say this, but jobs are supposed to help us live, though having a job leaves us less time to live. People valued their family and friends more than their jobs and co-workers, though, some of them saw their offices as

their second homes, they still wanted to have more time for their personal life. But with our current system, why do we have to spend so much time on our jobs? (Figure 8)

But job does not only leave us timeless, but it also has impacts on the living environment in urban cities. Pollution (air, water, light, etc.) is a product of the modern society where people consume more and think less about the consequences. The study took Bangkok for an example, though, the city has many modes for public transportation, such as mass transit (BTS), metro (MRT) and bus (BRT) systems, it is still experiencing traffic congestion because millions of people drive their own cars to go to work. This has been going on for years, and the government came up with many solutions (increasing road capacity, build more BTS and MRT routes, etc.); what they are trying to do is to just keep on increasing demands and not reducing. When the demands are increased, we would consume more natural resources (outside and inside your office) day after day with no recognition of what we are leading to. Have you ever questioned yourself how your doings would affect the Earth?

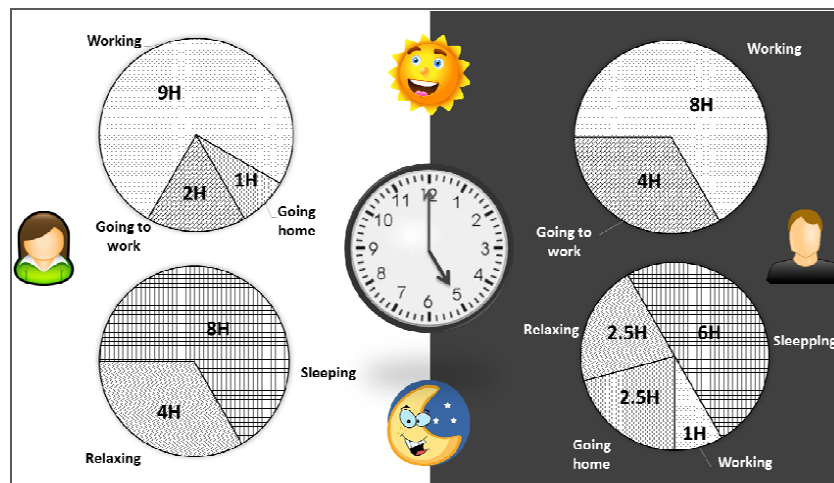


Figure 8. A normal working day of two people

However, this is not the fault of anyone, this is the fault of the system which was built long ago, and it has been corrupted in many ways. It turned people into what it's called "workhorses" so they wouldn't think much about what is going on around them, they are like a line of ants. Anyone who has stepped outside of that line, mostly would start blaming this and that; but they should understand that it is no one's fault, not even the governments' who always try to maintain the ant line steady. There is a root cause for every wrong-doing; consumerism is the tip of the iceberg, and the main cause is job. Many people would think "It can't be, there are millions of people out there without jobs.", but from the author's reasoning, "It can be."

First, jobs created the fast lifestyle in urban cities. Second, jobs maintain a high rate of traffic congestion, which causes stress and road rage to drivers, pollutes the air, and wastes time and petroleum. Last, jobs consume huge number of resources and energy; resources are office equipment, energy is electricity, and buildings produce more heat to the environment. All three reasons are all connected to each other as cause and effect, and the outcome is workhorses with low awareness on the environment. But this reasoning does not try to dispute the meaning of jobs but to point out that we should try to change the working style which we have been familiar with for ages. The new working style should consume less time from you and less resources, and this study suggests 'Virtual Office with VR' as a solution.

The idea of virtual office is to allow employees to have their workplace in different locations as described in literature review; but there is more to it in the purpose of eco-friendly as it can reduce carbon-footprints, time spending on the road, resources and energy consumption. When this topic was discussed earlier, virtual office together with telecommuting, always encountered a big issue with face-to-face communication which lowered relationship and trust at work among employees and employers. However, the research showed otherwise; face-to-face communication is not a primary medium of communication in offices, and trust doesn't become an issue only when you work at home, it's always been there. Most of the interviewees would like to work in a quiet environment in order to boost their productivity; however, the study showed that those who worked as telecommuter said their productivity stayed the same, and no one mentioned about productivity reduction. Therefore, it is not really what previous studies stating about virtual office and teleworking's issues, they were simply facts; the main issue is a home working environment which did not offer a real working experience to telecommuters and that interfered with the relationship between home and office. With modern technology, this study would like to suggest 'Virtual Reality' as a solution for virtual offices.

As described in literature review, virtual reality is a potential technology which can be applied to many fields; it has been used in education, training, entertainment, health care, tourism purposes, but not in offices. The idea of applying virtual reality into virtual office does not require users to wear a headset, which can be troublesome for long-hour working, and it makes users look robotic. Virtual working environment is what this idea is all about, because it is not what our eyes receive but what our brain perceives; virtual reality is proposed to be used to project a real-life experience to users in a limited space. This can be called "a virtual room" at this moment; by default, the room has a moving sensor to read movements of head and body, a sound system, a rotating projector, a desk, a chair and a computer set as shown in the below figure.

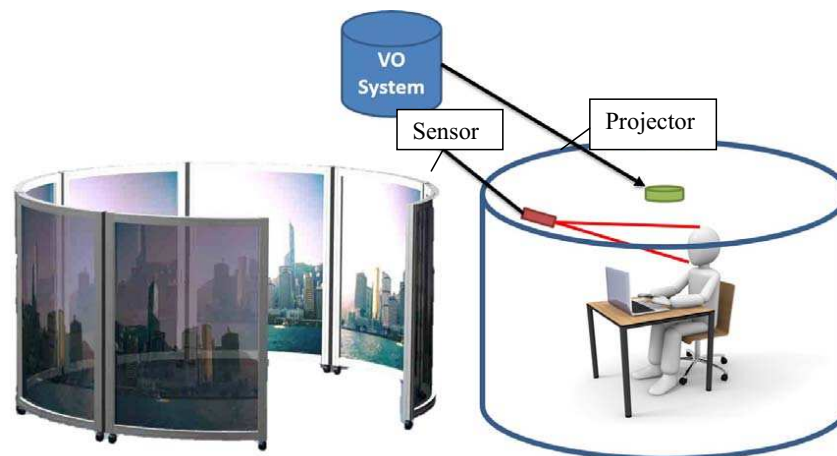


Figure 9. A virtual room

The rectangular is the sensor which reads user's head movements (left and right) and facial expressions; the data will be transferred to Virtual Office (VO) System to control the vision range of user's avatar in virtual world. Then, the vision range of user's avatar will be sent back to the projector (the cylinder in Figure 9), and what the avatar sees will be projected on the wall in front; if the head turns, the projector will rotate to shift the vision range. What the avatar sees is a virtual office where other users'

avatar are also in; everyone can see, hear and talk to each other. The voice in distance will be simulated by the sound system based on calculating the voice level (dB) to determine how far the voice can reach; this is a simple design as an example. The VO system is a virtual world where companies can create their office buildings and have them hosted just like websites. That means companies have to pay hosting and administration fees; all office buildings will be connected to each other as a virtual network, and that will make it easy to travel from one building to another. One important factor to keep the virtual world real is to have real facial expressions of users naturally, and not programmed by developers; the sensor will calibrate user's face to do face recognition procedure when the system is boot up, and the facial expressions will be projected on the avatar's face. If one user wants to talk to another, they will have to stand up and walk to that person by a mini thread mill (the author would prefer to have something like a walking pad, 'thread mill' is being used because it is easier to picture with) installed on the floor right under the chair (the desk and chair will be moved outside or to the back). If one user wants to speak to their client in another building, they don't have to walk all the way there; what they need to do is to enter a virtual portal which will teleport them to their client's building. The sensor can move 360 degree and so can the projector. The purpose of this idea is to provide users a real feeling of being in their offices with co-workers at home. Furthermore, this room is only operated for working purpose, which means it will not allow over-time hours (exception will need manager's approval), and it is owned by no one. Each working person will be provided with the room when they start their first job by the organization who administrates the VO system, and there is only one room provided to every person for their whole working life. The room then will be rented by the company whom the user works for, they will have to initialize the connection between the room and their virtual office building, and they will be responsible for maintaining the room. What the user can do to the room is replacing the desk and chair, but to change the computer set, they will need authorization from their company. However, please be reminded that this is only a preliminary idea at an early stage by the author solely, and it is hoped to have more people joining to develop it to perfection. The author sees it as not a difficult or high advance idea, and at the current state of our technology including the high speed of internet, we can easily achieve it. The author understands that it cannot be applied to every job, so it is best to fit with offices which can easily be found in any city. For any concern on the high speed internet connection, the author had already mentioned how it will change in Literature Review. Furthermore, regarding the requirements of hardware for the computers in order to let users operate VO smoothly, the author does not think this is a big issue as the computers do not handle the projection of the VO's virtual environment. We can set up a station for a number of registered users in one location and that station will do data streaming of the virtual environment. Each station will have a graphic platform which will be used to generate a VO suited for each user of its network; and since the network will act as intranet, speed of data streaming wouldn't be a problem. The stations also have all registered companies' data (location, structure of the building, and design) and character's traits (body figure, clothes, etc.) of users to have a good simulation for the virtual world. Nonetheless, this concept may sound that it needs a lot of works, but in fact, we already have all the resources that we need including hardware and software available. The virtual world's graphic platform can be based on any good popular MMORPGs which already have astounding 3D virtual worlds developed. In other words, what we need to do now is to put all the pieces together for a one united virtual world.

Interestingly, the idea does not only stop at solving issues of virtual office and telecommuting, but also changing the world. When the idea is applied widely, people would gain their time back and they can have a slow lifestyle right in their cities. But there is more, companies would stop consuming resources, energy and capital (work space) as much as before, employees would also realize that they don't have to consume like before; the consumption rate would be reduced, and less natural resources would be exploited, or the spare goods could be shared to unfortunate places. When people don't have to move to big cities to work in big buildings, they can remain living at their home provinces and the economies in provinces would be more balanced than the current situation. The author understands that not everyone can have enough space at home to set up the virtual room, therefore teleworking centers can be set up in many locations; since companies wouldn't need physical offices anymore, office leasing buildings could

turn themselves into teleworking centers, but it would be better if the high buildings are demolished to return space back to the environment. Furthermore, universities would have to train students how to work in a virtual environment with skills and knowledge; in which case, the universities would also need to adopt virtual reality and turn themselves into virtual universities where everyone can attend without moving to a specific location. But virtual reality should not be implemented to basic education because the children and teenagers need to learn how to interact with the others and the world, so we have to reduce their usage with virtual interaction. Hospitals can also adapt this but it needs to be assessed thoroughly. Tourism can surely adapt virtual reality to reduce damages from tourists on the tourist points' community and environment, things would be more sustainable when we stop harvesting everything for benefits and using culture sharing as an excuse. Then governments would see that their systems need to change and they would be adopting virtual reality into the system and renovating it. Things would definitely change when this idea is fully integrated into our system, some jobs are going to be dismissed, but others would be opened up, the system would change from society's hierarchy to law and regulations. But at that state, greed would be minimized and the world would be reverted back to balance with harmony, and lives on Earth will be sustained one more time.

Overall, at the current state, this concept would work best with services which have their daily tasks done by mainly using computers and phones. Among participated services, this study can say that IT solutions, call center, and accounting services are able to adopt this concept into their system. For administration office, they could and they should for the sake of their staffs; but this would only be possible if instructors, other departments, and students were more efficiently in communicating via digital tools (e-mail, phone, etc.) Furthermore, since accounting service is able to acquire this, the study can also say that financial firms are in the same category. For other types of businesses, it is very common to have front-office and back-office operating on a daily basis. However, the front-office would take time to be fully changed, and that does not apply for back-office as they do not encounter face-to-face communication daily. Only when VO system is integrated deeply into our system in a sense of personal use (every person can use it and they don't have to be employed), then the front-office can be migrated to virtual world, though, many services are using virtual assistants to do customer services nowadays. Another reason why office personnel is suitable for virtual office is their computer literacy, because they are able to work well with modern technology including hardware and software, and this was proven with the research data.

Limitations

This research was heavily influenced by Causal-Layered Analysis (CLA) and All Quadrants, All Levels (AQAL) frameworks which could show a complete picture of the situation, and it was studied following that direction; but due to time, human power and financial constraints, the author couldn't get approval to pursue any further. And because of those constraints, the research couldn't have a bigger number of participants to produce a more concrete and versatile result, though, the collected data reflected correctly what the author wanted. The types of businesses were a small number which can't really represent the whole market. This research couldn't show any statistical data of the environment because that is not the focus of this study. The research data was strong in Bangkok but not in other cities, and that created imbalance when comparing the data between those cities; it is for those constraints that the author had to work with the available resources. Genders could also be an important factor as all three female employees didn't want to work from home, but one female employer supported the idea; so, it could be another factor regarding to the employer's view versus employees'.

Suggestions

If anyone would like to take this study further, the author would like to suggest using CLA or AQAL framework to show a complete picture of what happened, what is going on and what will happen to the

world. The future studies would also describe how technology has done to human behaviors; even though, it may be clear to some people, but most of them do not see how it has affected human emotions. Studies should explain how mass media control human emotions by using technology. Furthermore, the future studies should also show how technology has been effecting the environment when it first came to the human race at the Stone Age until now. More types of businesses and cities should be taken into account to have a better observation which will help to determine which jobs are best to apply this idea to in the first stage of the integration. If it's possible, the author would also like to have comments from the governments regarding this idea because they could be a big support to make it feasible.

Conclusions

This study has been able to describe the uses of virtual reality and working behaviors of modern society, and pointed out that virtual office with virtual reality can certainly be applied to offices. With the help of virtual reality, virtual office and teleworking can now be perfected; the new form of working will help to reduce the rate of consumption in offices and personal lives. It will also help to reduce tiring commuting time on the road, and that would reduce pollution and not affect physical and mental health of commuters.

At the end, what is more important than lives on Earth? And as long as we still think about profits, nothing will change, unless we change the way of doing things around. If we lower the demands, things will drastically change in a positive direction.

Acknowledgements

I am grateful for the big support from Thammasat University in sponsoring this Master degree and providing useful knowledge repositories to access. I would also like to thank Mr. John Koldowski for introducing me to Causal Layered Analysis and All-Quadrant, All-Level frameworks which influenced the way I structured this study. And special thanks to Miss Yaniris Córdova González for being my personal editor, with her help in text and script editing, I am able to accomplish this.

References

1. A brief history of speed. In Giga Town Nelson. Retrieved on September 9, 2014, from <http://gigatownnelson.wordpress.com/a-brief-history-of-speed/>
2. Arenas, A., Aziz, B., Bicarregui, J., & Matthews, B. (2008). Managing conflicts of interest in virtual organisations. *Electronic Notes in Theoretical Computer Science*, 197, 46 – 56. DOI: 10.1016/j.entcs.2007.12.016
3. Beauchamp, P. (2014, May 20). Telecommuting: The Pros, Cons and Risks of Working from Home. *In Guard*. Retrieved from <http://www.inguard.com/blog/telecommuting-pros-cons-risks-working-from-home>
4. Bonsor, K. (2001, February 19). How augmented reality works. *How Stuff Works*. Retrieved from <http://computer.howstuffworks.com/augmented-reality.htm>
5. Borgers A., Brouwer M., Kunen, T., Jessurun, J., & Janssen, I. (2010). A virtual reality tool to measure shoppers' tenant mix preferences. *Computers, Environment and Urban Systems*, 34, 377 – 388. DOI: 0.1016/j.compenvurbsys.2010.04.002
6. Brundage, S. B., Graap, K., Gibbons, K. F., Ferrer, M., & Brooks, J. (2006). Frequency of stuttering during challenging and supportive virtual reality job interviews. *Journal of Fluency Disorders*, 31, 325 – 339. DOI: 10.1016/j.jfludis.2006.08.003

7. Cheng, Y., & Huang, R. (2012). Using virtual reality environment to improve joint attention associated with pervasive developmental disorder. *Research in Developmental Disabilities*, 33, 2141 – 2152. DOI: <http://dx.doi.org/10.1016/j.ridd.2012.05.023>
8. Citrinot, L. (2013, July 10). Traffic jam in Manila costs billions to Philippines' economy. *Travel Daily News Asia-Pacific*. Retrieved from <http://www.traveldailynews.asia/news/article/52816/traffic-jam-in-manila-costs>
9. Eha, B. P. (2013, September 25). *An accelerated history of internet speed* [Image]. Retrieved from <http://www.entrepreneur.com/article/228489/>
10. Esmailabadi, M. E. A. (2012). 3D virtual reality navigation by human's head movements using a generic webcam. *Procedia Technology*, 3, 121 – 131. DOI: 10.1016/j.protecy.2012.03.013
11. Facebook company info. In Facebook. Retrieved on July 16, 2014, from <http://newsroom.fb.com/company-info/>
12. Faryaab S. (2014, July 8). Exclusive: Samsung's virtual reality headset will be called Gear VR, launch at IFA 2014. *SamMobile*. Retrieved from <http://www.sammobile.com/2014/07/08/exclusive-samsungs-virtual-reality-headset-will-be-called-gear-vr-launch-at-ifa-2014/>
13. Ferrucci, D., Brown, E., Chu-Carroll, J., Fan, J., Gondek, D., Kalyanpur, A. A., Lally, A., Murdock, J. W., Nyberg, E., Prager, J., Schlaefel, N. & Welty, C. (2010). Building Watson: An overview of the DeepQA project. *Association for the Advancement of Artificial Intelligence (AAAI)*. Retrieved from AI magazine: <http://www.aaai.org/Magazine/Watson/watson.php>
14. Fitzek, F. (2014). Math Can Make the Internet 5-10 Times Faster. *Aalborg University*. Retrieved from <http://www.en.aau.dk/News+and+Events/News/math-can-make-the-internet-5-10-times-faster.cid102747>
15. Foden, C (2014, January 18). *We attend meetings. Some fall asleep like in RL meetings* [Image]. Retrieved from <http://community.secondlife.com/t5/General-Discussion-Forum/what-is-second-life/td-p/2441911/page/2>
16. Forsyth, T. (2013). VR sickness, the Rift, and how game developers can help. *Oculus's blog*. Retrieved from <http://www.oculusvr.com/blog/vr-sickness-the-rift-and-how-game-developers-can-help/>
17. Frey, C. B & Osborne, M. A. (2013). The future of employment: How susceptible are jobs to computerisation? [PDF document]. *University of Oxford*. Retrieved from Oxford Martin School's academic repository http://www.oxfordmartin.ox.ac.uk/downloads/academic/The_Future_of_Employment.pdf
18. Frey, C. B. & Osborne, M. A. (2013). The Future of Employment: How Susceptible Are Jobs to Computerisation? *Oxford Martin School Publication*. Retrieved from: <http://www.oxfordmartin.ox.ac.uk/publications/view/1314>
19. González, M. M. A., Santos, B. S. N., Vargas, A. R., Martín-Gutiérrez, J., & Orihuela, A. R. (2013). Virtual worlds. Opportunities and challenges in the 21st century. *Procedia Computer Science*, 25, 330 – 337. DOI: 10.1016/j.procs.2013.11.039
20. Google glass. n.d. In Wikipedia. Retrieved July 16, 2014, from http://en.wikipedia.org/wiki/Google_Glass
21. Guttentag, D. A. (2010). Virtual reality: Applications and implications for tourism. *Tourism Management*, 31, 637 – 651. DOI: 10.1016/j.tourman.2009.07.003
22. Haase, T., Termath, W., & Martsch, M. (2013). How to save expert knowledge for the organization: Methods for collecting and documenting expert knowledge using virtual reality based learning environments. *Procedia Computer Science*, 25, 236 – 246. DOI: 10.1016/j.procs.2013.11.029
23. Hardin, K. (2011, June 1). Podcast: Unified Communications Is Special. *IT Business Edge*. Retrieved from <http://www.itbusinessedge.com/cm/blogs/itdownloads/telecommuting-get-a-clear-picture-of-costs-benefits-requirements/?cs=48027>
24. Hill, E. J., Ferris, M., & Mårtinson, V. (2003). Does it matter where you work? A comparison of how three work venues (traditional office, virtual office, and home office) influence aspects of work and personal/family life. *Journal of Vocational Behavior*, 63, 220 – 241. DOI: 10.1016/S0001-8791(03)00042-3
25. Hill, J. (2011, January 18). *East Carolina University's Early College Second Life Program offers e-courses to K-12 students* [Image]. Retrieved from <http://www.edweek.org/ew/articles/2011/01/19/17secondlife.h30.html>

26. Internet users. In Internet Live Stats. Retrieved on September 9, 2014, from <http://www.internetlivestats.com/internet-users/>
27. Johnson, B. (2014). How the Oculus Rift works. *How Stuff Works*. Retrieved from <http://electronics.howstuffworks.com/oculus-rift.htm>
28. Johnson, N. J. (2001). *Telecommuting and virtual offices: Issues & Opportunities*. Hershey, [PA]: Idea Group Publishing.
29. Kim, C., Lee, S., & Kang, M. (2012). I became an attractive person in the virtual world: Users' identification with virtual communities and avatars. *Computers in Human Behavior*, 28, 1663 – 1669. DOI: <http://dx.doi.org/10.1016/j.chb.2012.04.004>
30. King, L. (2014, July 15). Google Smart Contact Lens Focuses On Healthcare Billions. *Forbes*. Retrieved from <http://www.forbes.com/sites/leoking/2014/07/15/google-smart-contact-lens-focuses-on-healthcare-billions/>
31. Kwon, J. H., Powell, J., & Chalmers, A. (2013). How level of realism influences anxiety in virtual reality environments for a job interview. *Int. J. Human-Computer Studies*, 71, 978 – 987. DOI: <http://dx.doi.org/10.1016/j.ijhcs.2013.07.003>
32. Larsen, K. R.T., & McInerney, C. R. (2002). Preparing to work in the virtual organization. *Information & Management*, 39, 445 – 446. DOI: 10.1016/S0378-7206(01)00108-2
33. Lewis, C (2014). Studies indicate robots could replace 80% of jobs. *Robot Economics*. Retrieved from <http://robotonomics.com/2014/04/16/study-indicates-robots-could-replace-80-of-jobs/>
34. Lianga, W. Y., & O'Grady, P. (2003). The internet and medical collaboration using virtual reality. *Computerized Medical Imaging and Graphics*, 27, 525 – 534. DOI: 10.1016/S0895-6111(03)00042-9
35. Lillie, J. V. (2001, August 1). Telecommuting Pros and Cons — From the Trenches. *Today's Engineer*. Retrieved from http://www.todaysengineer.org/archives/te_archives/aug01/te1.asp
36. Linden Lab (2013, June 20). *Infographic: 10 Years of Second Life* [Image]. Retrieved from <http://www.lindenlab.com/releases/infographic-10-years-of-second-life>
37. McKalin, V. (2014, April 6). Augmented reality vs. virtual reality: What are the differences and similarities? *Tech Times*. Retrieved from <http://www.techtimes.com/articles/5078/20140406/augmented-reality-vs-virtual-reality-what-are-the-differences-and-similarities.htm>
38. McNutt, C. (2013, May 14). A brief history of the evolution of high speed internet. *High Speed Geek*. Retrieved from <http://highspeedgeek.com/history-high-speed-internet/>
39. Messinger, P. R., Stroulia, E., Lyons, K., Bone, M., Niu, R. H., Smirnov, K., & Perelgut, S. (2009). Virtual worlds – past, present, and future: New directions in social computing. *Decision Support Systems*, 47, 204 – 228. DOI: 10.1016/j.dss.2009.02.014
40. Nijholt, A. (2004). Where computer disappear, virtual humans appear. *Computers & Graphics*, 28, 467 – 476. DOI: 10.1016/j.cag.2004.04.002
41. Nikolaou, T., Skias, I., Kolokotsa, D., & Stavrakakis, G. (2009). Virtual building dataset for energy and indoor thermal comfort benchmarking of office buildings in Greece. *Energy and Building*, 41, 1409 – 1416. DOI: 10.1016/j.enbuild.2009.08.011
42. Oculus Rift (2012) Retrieved from Kickstarter <https://www.kickstarter.com/projects/1523379957/oculus-rift-step-into-the-game>
43. Orland, B., Ram, N., Lang, D., Houser, K., Kling, N., & Coccia, M. (2014). Saving energy in an office environment: A serious game intervention. *Energy and Buildings*, 74, 43 – 52. DOI: <http://dx.doi.org/10.1016/j.enbuild.2014.01.036>
44. Panteli, N., & Dibben, M. R. (2001). Revisiting the nature of virtual organizations: Reflections on mobile communication systems. *Futures*, 33, 379 – 391. DOI: 10.1016/S0016-3287(00)00081-1
45. Performance PSU (2014, June 28). *2014 Facts: Statistics and Facts about Gaming Industry* [Image]. Retrieved from <http://www.performancepsu.com/gaming/statistics-facts-gaming-industry-infographic/>
46. PlayStation 4. n.d. In Wikipedia. Retrieved on July 16, 2014, from http://en.wikipedia.org/wiki/PlayStation_4

47. Powers, M. B., Briceno, N. F., Gresham, R., Jouriles, E. N., Emmelkamp, P. M.G., & Smits, J. A.J. (2013). Do conversations with virtual avatars increase feelings of social anxiety? *Journal of Anxiety Disorders*, 27, 398 – 403. DOI: <http://dx.doi.org/10.1016/j.janxdis.2013.03.003>
48. Remo, M. V. (2013, July 6). 'Traffic costs P2.4B daily'. *Philippine Daily Inquirer*. Retrieved from <http://business.inquirer.net/130649/traffic-costs-p2-4b-daily>
49. Rougeau, M. (2013). Next version of Oculus Rift will leave motion sickness at the virtual door. *TechRadar*. Retrieved from <http://www.techradar.com/news/gaming/consoles/the-new-oculus-rift-reportedly-won-t-make-people-sick-1207927>
50. Russel, J. E. A. (2013, March 24). Career Coach: The Pros and Cons of Telecommuting. *The Washington Post*. Retrieved from http://www.washingtonpost.com/business/capitalbusiness/career-coach-the-pros-and-cons-of-telecommuting/2013/03/22/fee86bfa-9196-11e2-bdea-e32ad90da239_story.html
51. Second Life. n.d. In Wikipedia. Retrieved on September 11, 2014, from http://en.wikipedia.org/wiki/Second_Life
52. Sejzi, A. A., Aris, B., & Yahya, N. (2012). The phenomenon of virtual university in new age: Trends and Changes. *Procedia – Social and Behavioral Sciences*, 56, 565 – 572. DOI: 10.1016/j.sbspro.2012.09.689
53. Shaev, Y. (2013). Virtual reality: The effects and phenomenon of sign. *Procedia – Social and Behavioral Sciences*, 92, 860 – 862. DOI: 10.1016/j.sbspro.2013.08.766
54. Shafizadeh, K. R., Mokhtarian, P. L., Niemeier, D. A. & Salomon, I. (2000). The Costs and Benefits of Telecommuting: A Review and Evaluation of Micro-Scale Studies and Promotional Literature. *Institute of Transportation Studies – University of California, Davis*. Retrieved from: http://www.its.ucdavis.edu/research/publications/publication-detail/?pub_id=1757
55. Shuftan, B. (2012, October 4). *The First 2012 Presidential Debate in Second Life* [Image]. Retrieved from <http://slnewsrevents.blogspot.com/2012/10/the-first-2012-presidential-debate-in.html>
56. Sotro, R. (1997). The virtual organization. *Accounting Management and Information Technology*, 7, 37 – 51. DOI: 10.1016/S0959-8022(97)00003-9
57. Tohidi, H., & Jabbari, M. M. (2012). The important of virtual organization. *Procedia Technology*, 1, 551 – 555. DOI: 10.1016/j.protcy.2012.02.120.
58. Trapdoor, K (2012, July 27). *London 2012 Olympic games in Second Life* [Image]. Retrieved from <http://karasecondlife.blogspot.com/2012/07/london-2012-olympic-games-in-second-life.html>
59. Tsukayama, H. (2014, May 23). Samsung rumored to race Oculus and Sony to the virtual reality market. *The Washington Post*. Retrieved from <http://www.washingtonpost.com/blogs/the-switch/wp/2014/05/23/samsung-rumored-to-race-oculus-and-sony-to-the-virtual-reality-market/>
60. Wuanga, Y., Chiang, C., Su, C., & Wangb, C. (2011). Effectiveness of virtual reality using Wii gaming technology in children with Down Syndrome. *Research in Developmental Disabilities*, 32, 312 – 321. DOI: 10.1016/j.ridd.2010.10.002
61. Xbox One. n.d. In Wikipedia. Retrieved on July 16, 2014, from http://en.wikipedia.org/wiki/Xbox_One
62. Yoon, T. E., & George, J. F. (2013). Why aren't organizations adopting virtual worlds? *Computers in Human Behavior*, 29, 772 – 790. DOI: <http://dx.doi.org/10.1016/j.chb.2012.12.003>
63. Zarzuela, M. M., Pernas, F. J. D., Calzón, S. M., Ortega, D. G., & Rodríguez, M. A (2013). Educational tourism through a virtual reality platform. *Procedia Computer Science*, 25, 382 – 388. DOI: 10.1016/j.procs.2013.11.047
64. Zuckerberg, M. (2014, March 26). [Personal Facebook post]. Retrieved from <https://www.facebook.com/zuck/posts/10101319050523971>