COMPARATIVE CPTED ANALYSIS OF RESIDENTIAL COMMUNITIES IN PANGYO AND YATAP TOWNS IN SOUTH KOREA

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To my family and friends

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CPTED is a fairly new approach in crime prevention in South Korea even though the effectiveness of the strategy has been approved and used in many different countries, such as UK, US, Canada, Australia, and Japan. Since both incidents and types of crime are increasingly exposed to the public through media, people's fear of crime and concerns about safety issues in their territories are growing. Therefore, South Korean residential communities, with assistance from the local governments and the police, are currently testing CPTED in many areas to investigate its effects.

Pangyo New Town was the first new town development in which CPTED has been applied from the planning stage, and they created their own "Crime Prevention Design Guideline" by modifying the existing regulations of the successful cases of UK, US, and Canada developing them to match South Korean culture. However, there is no clear support of the effectiveness and benefits of CPTED in Korea so far, based on the available data. This research could be a good start in finding out its benefits and effects.

In order to pursue this research, two different new towns were selected. Both towns have similar populations and characters, one that has adopted CPTED and the other that has not. Then, crime rates for these selected towns were collected and

compared to find out whether there is any evidence that adopting CPTED has positive effects in reducing crime incidents. In addition, qualitative analysis of the new town was performed with the “CPTED Audit Checklist” and the “CPTED Post-Audit Evaluation Worksheet” to learn how CPTED principles were applied and implemented in the new town development.

CHAPTER 1
INTRODUCTION

Problem Statement

Urban crime has been a big concern for a long period of time (GRHS, 2007) throughout the world and researchers and practitioners alike have sought many ways to prevent and reduce crime in cities. One of the intriguing ways to do that is by designing a city safely using methods such as CPTED (Crime Prevention Through Environmental Design) strategies. The term CPTED refers to a multi-disciplinary approach to deterring criminal behavior through environmental design (ICA, 2011), and it has been an important strategy in urban design since the 1970s. It has been used in various different fields such as urban planning, criminology, architecture, and building construction in an attempt to “design-out” crime in cities.

CPTED strategies have been used in the United Kingdom and United States since the 1970s. Developing and transitional countries in Asia, such as South Korea, are now beginning to adopt these ideas in urban designs and building environments in concert with the increasing rate of serious crime incidents. These incidents give South Korean cities a bad image and tend to affect urban economic values. While crime rates in South Korea are known to be very low compared to other countries, there is significant variation throughout the country. For example, pick-pocketing, purse snatching, assault, residential burglary, and residential crime occur more frequently in major metropolitan areas, such as Seoul, than elsewhere in Korea (Overseas Security Advisory Council, 2012).

As the population density in Korean urban society has increased in recent decades, so too have crime rates. This is evidenced by the official police crime statistics

for the past 3 decades (1976 ~ 2005) that demonstrate that Korean who live within urban spaces, where increasing numbers of people are living and working have become more vulnerable to crime (Park, 2010). In addition, with help from the influx of mass media outlets, Korean citizens recently have been exposed to various types of crime such as homicides, child kidnapping and sexual offences, which has caused people to be concerned about their safety in cities.

The government, police agencies, and other interested authorities are seeking solutions to control the growing number of crime incidents and mitigate the fear of crime experienced by citizens. One way to alleviate the increasing number of crime incidents is to predict them, if possible, and prevent them in advance. Therefore, in urban spaces in Korea, the concept of CPTED is being reexamined and applied as a tool for preventing crimes. Despite crime preventing efforts made in Korean urban areas, we have recognized the limitation of the police forces to manage the demand of the citizens. So, it is necessary to adopt crime prevention measures in environmental designs in order to satisfy the public's need, contribute to cities' safety, and eventually reduce the level of the fear of crime that is now growing among Korean citizens.

Research Objective

Since 1970s, many CPTED related studies were being done by researchers throughout countries like United States and United Kingdom, and CPTED is now considered one of the most advanced and effective methods, in some cases, in preventing crime within the living spaces. Due to the recent awareness of crime incidents in South Korea, CPTED is being adopted in the planning stage of new town developments which are spreading out rapidly in order to solve housing problems in the central area, like Seoul. Collaborating with the police, large areas like Seoul and

Gyeonggi province are making active movements to fight crimes by installing CCTVs, improving streetlights, and re-arranging the street trees for better observation.

However, most of the research and studies were mainly focused on explaining the current situations of CPTED applications in South Korea and were mostly informative contents about its principles. Unfortunately there are no research papers dealing with the effectiveness of CPTED strategies since its initial application in the newly developed towns. As such, it was difficult to predict the success and failure of adopting these strategies.

The central question of this thesis is, “Is CPTED effective in South Korea?” in terms of reducing the number of crime incidents in the city. Therefore, this thesis will provide evidence to address the effectiveness of adopting CPTED strategies in a Korean community by comparing the crime rates of five major crimes (murder, robbery, burglary, violence, and sexual violence) between two different towns, one of which has applied CPTED and the other which has not. ‘Pangyo New Town’ was chosen as the experimental town with CPTED applied and ‘Yatap Town’ as the comparable one without. The reasons for choosing these two towns for this thesis are because Pangyo is the first new town that was developed with CPTED considered from its planning stage, and Yatap, which was developed more than 20 years ago, is adjacent to Pangyo, has similar characteristics, has an equally sized population, and is considered to have high crime rates. By completing this research, the success and failure of current CPTED applications in Korean communities will be explored, which could eventually assist in developing these strategies into more effective and beneficial devices for preventing crime in Korea, as well as other countries around the world.

Brief Description of Two Towns

The two towns studied in this thesis were carefully selected by the author with assistance from Dr. Hyeonho Park, a director of Institute of Crime Science, and Gyeongseok Oh, a Lieutenant in the Gyeonggi Provincial Police Agency. Pangyo New Town was chosen as the experimental site without difficulty since it is the first town that has adopted CPTED. However, selecting a comparable site took us a great deal of time. Among many other proposed sites within South Korea, Yatap Town was suggested to be the most appropriate to compare to Pangyo New Town, due to Yatap's regional characteristics and high crime rates.

Pangyo New Town

Pangyo was approved for development in 2001 to solve the housing shortage problems in Gangnam (a district located in the South side of Seoul which is suffering from environmental and overpopulation problems) and central Bundang (a district located in Seongnam, Gyeonggi province, which was developed as a response to alleviating the excessive demand for apartments in the similarly affluent, but much older Gangnam). This town was developed into an eco-friendly city with the lowest population density among newly developed cities. It was designed with large green spaces and parks along its streams. Also, waste facilities, energy plants, and sewage treatment facilities in the community were built to maximize energy efficiency with the use of green technology. Construction of the town began in December 2003, and phase 1 and 2 were completed on December 2009 and December 2010, respectively (Korea Institute of Criminology, 2011). This town is divided into four different villages which are Pangyo-dong, Sampyung-dong, Baekhyun-dong, and Unjung-dong (a "-dong" is the lowest administrative unit of districts and of those cities which are not divided into wards

throughout Korea). As of 2011, the total population is 78,895 and the number of household is 25,949 (Figure 1-1).

Yatap Town

Yatap is a neighborhood of Bundang district in the city of Seoungnam, Gyeonggi province developed almost 20 years ago. It is officially divided into Yatap 1-dong, Yatap 2-dong, and Yatap 3-dong. The merits of this town are its close vicinity to Seoul, convenience of public transportation, and quality of schools, which is the primary concern for parents. As of 2011, the total population is 71,521 and the number of household is 26,763 (Figure 1-3).

Detailed maps of South Korea, Gyeonggi Province, Seongnam City, and two towns are presented in Figure 1-5 through Figure 1-10.

The following chapter will provide descriptions of various literature reviewed by the author in order to understand the definitions of certain terms, and also to learn about the recent studies being conducted by other researchers related to CPTED in South Korea.

Pangyo New Town

Village	Nationality	2009				2010				2011			
		Household	Total Population	Male	Female	Household	Total Population	Male	Female	Household	Total Population	Male	Female
Pangyo-dong	Sungnam County	-	14,646	7,152	7,494	-	19,586	9,537	10,049	-	21,172	10,391	10,781
	Korean	5,051	14,533	7,068	7,465	6,574	19,520	9,505	10,015	6,967	20,996	10,307	10,689
	Foreiner	-	113	84	29	-	66	32	34	-	176	84	92
Sampyung-dong	Sungnam County	-	15,596	7,575	8,021	-	20,199	9,825	10,374	-	24,644	11,991	12,653
	Korean	5,098	15,547	7,552	7,995	6,425	20,109	9,766	10,343	7,773	24,501	11,931	12,570
	Foreiner	-	49	23	26	-	90	59	31	-	143	60	83
Baekhyun-dong	Sungnam County	-	4,165	2,082	2,083	-	10,578	5,242	5,336	-	14,332	7,134	7,198
	Korean	1,385	4,160	2,079	2,081	3,474	10,554	5,234	5,320	4,480	14,189	7,072	7,117
	Foreiner	-	5	3	2	-	24	8	16	-	143	62	81
Woonjoong-dong	Sungnam County	-	10,185	5,028	5,157	-	16,643	8,150	8,493	-	18,747	9,142	9,605
	Korean	3,928	10,047	4,984	5,063	6,099	16,477	8,104	8,373	6,729	18,462	9,050	9,412
	Foreiner	-	138	44	94	-	166	46	120	-	285	92	193
Total		15,462	44,592	21,837	22,755	22,572	67,006	32,754	34,252	25,949	78,895	38,658	40,237

Figure 1-1. Households and population data for Pangyo New Town(2009 ~ 2011).
(Source: Korean Statistical Information Service, http://kosis.kr)

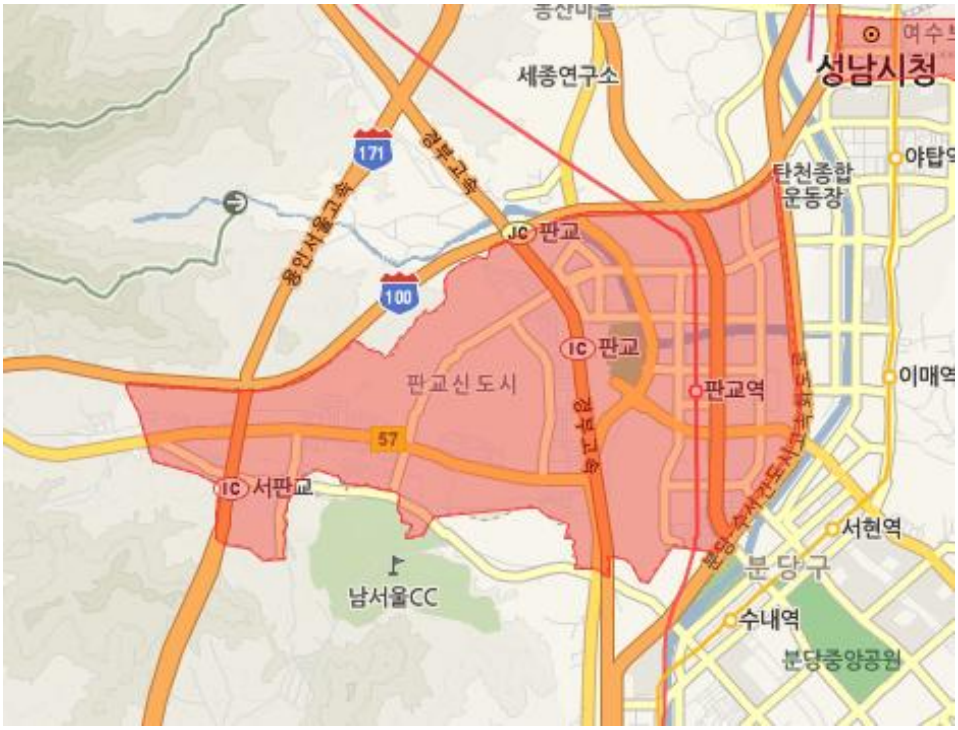

Figure 1-2. Map of Pangyo New Town. (Source: Gyeonggi Provincial Police Agency)

Yatap Town

Village	Nationality	2009				2010				2011			
		Household	Total Population	Male	Female	Household	Total Population	Male	Female	Household	Total Population	Male	Female
Yatap 1-dong	Sungnam County	-	19,759	9,712	10,047	-	19,582	9,651	9,931	-	19,420	9,589	9,831
	Korean	7,489	19,634	9,661	9,973	7,437	19,407	9,579	9,828	7,368	19,126	9,459	9,667
	Foreiner	-	125	51	74	-	175	72	103	-	294	130	164
Yatap 2-dong	Sungnam County	-	18,757	8,974	9,783	-	18,647	8,867	9,780	-	18,476	8,794	9,682
	Korean	6,510	18,678	8,935	9,743	6,511	18,606	8,847	9,759	6,401	18,403	8,760	9,643
	Foreiner	-	79	39	40	-	41	20	21	-	73	34	39
Yatap 3-dong	Sungnam County	-	34,514	17,206	17,308	-	34,158	17,012	17,146	-	33,625	16,685	16,940
	Korean	13,215	34,351	17,132	17,219	13,195	34,061	16,971	17,090	12,994	33,493	16,627	16,866
	Foreiner	-	163	74	89	-	97	41	56	-	132	58	74
Total		27,214	73,030	35,892	37,138	27,143	72,387	35,530	36,857	26,763	71,521	35,068	36,453

Figure 1-3. Households and population data for Yatap Town(2009 ~ 2011). (Source: Korean Statistical Information Service, http://kosis.kr)

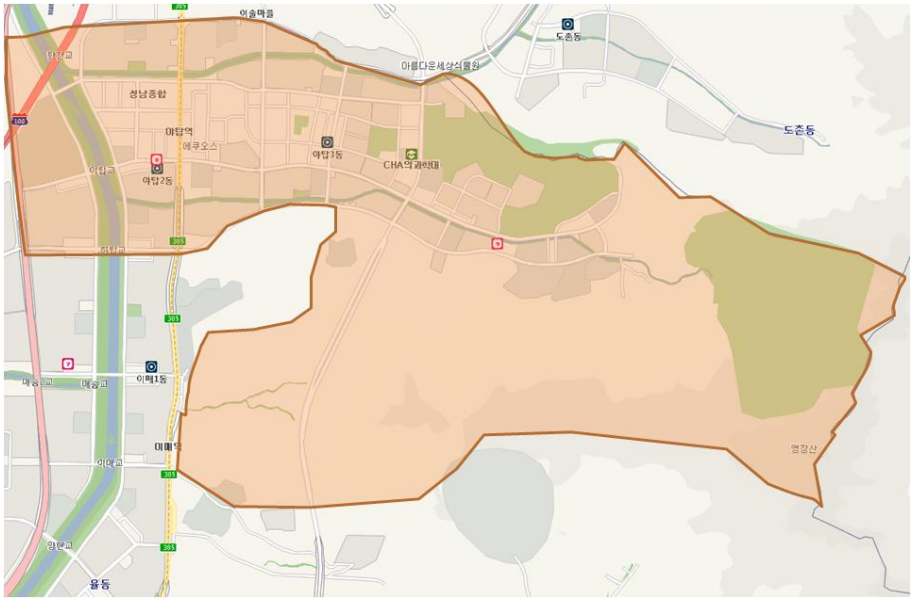

Figure 1-4. Map of Yatap Town. (Source: Gyeonggi Provincial Police Agency)

Figure 1-5. Map of Korea and Gyeonggi Province. (Source: Google Maps)

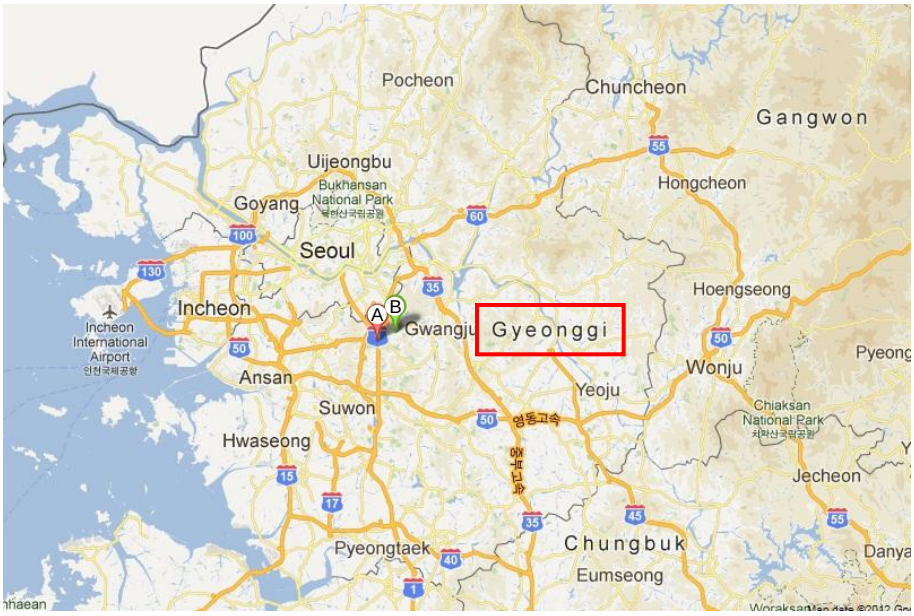

Figure 1-6. Pangyo New Town(A) and Yatap Town(B) within Gyeonggi Province. (Source: Google Maps)

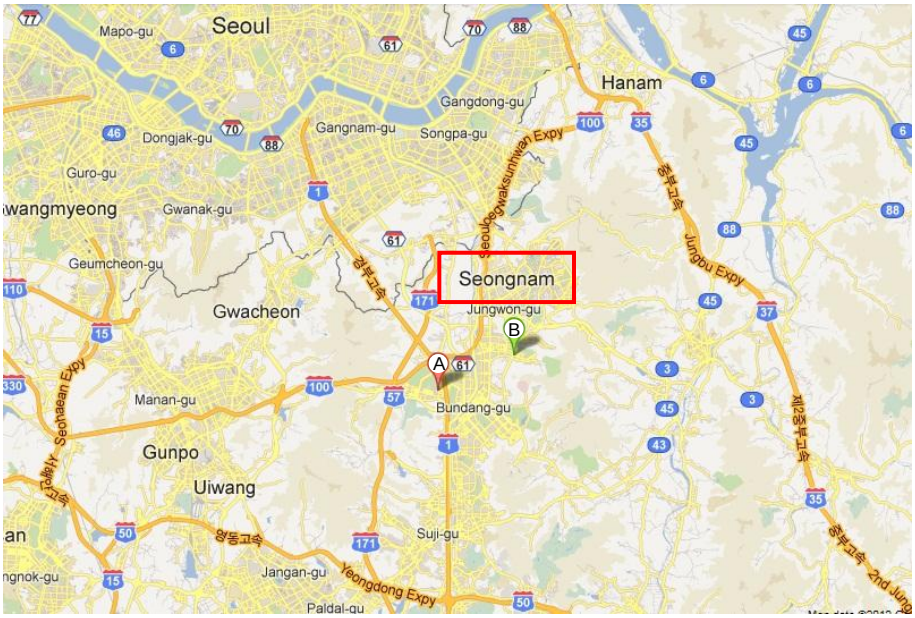

Figure 1-7. Pangyo New Town(A) and Yatap Town(B) within Seongnam City in Gyeonggi Province. (Source: Google Maps)

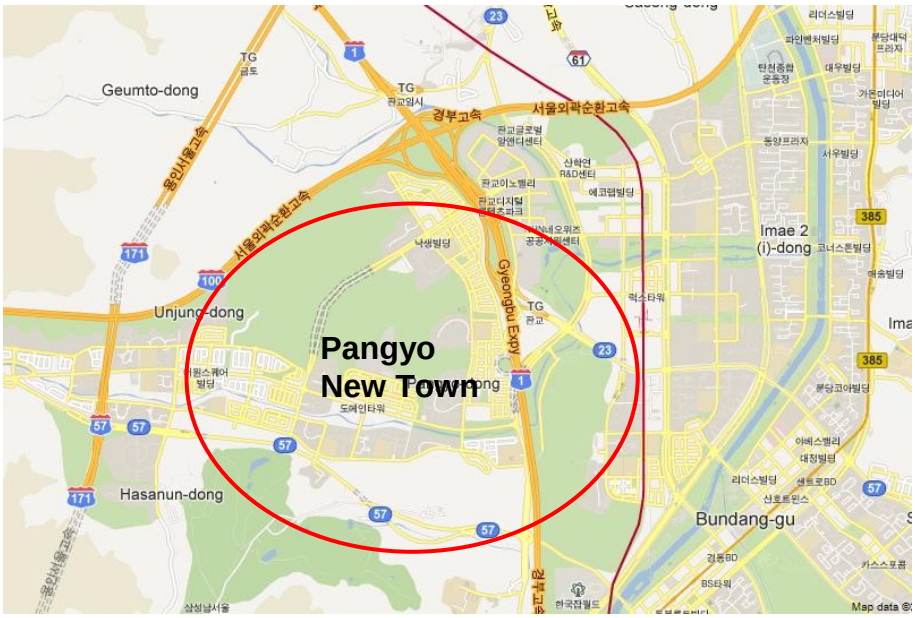

Figure 1-8. Map of Pangyo New Town. (Source: Google Maps)

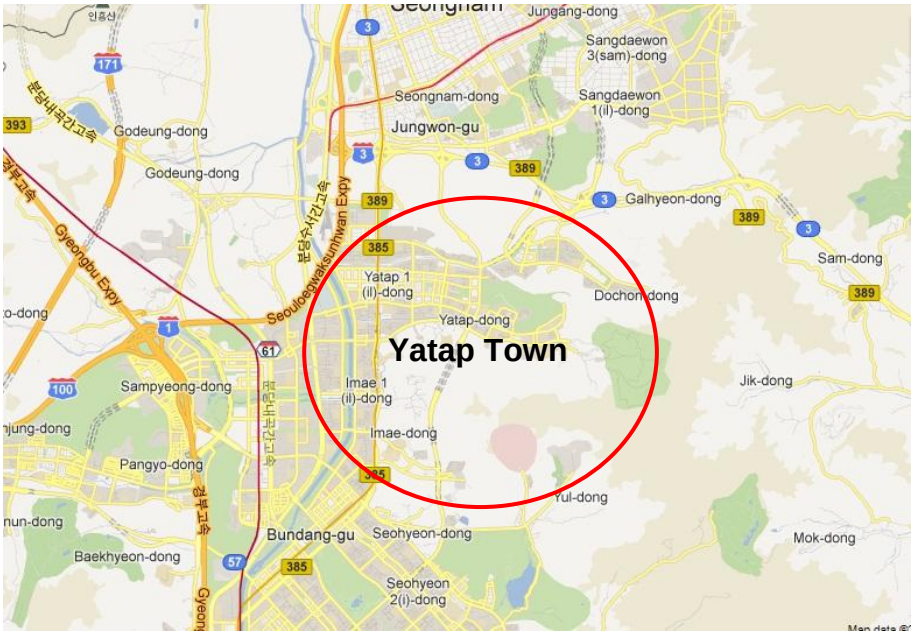

Figure 1-9. Map of Yatap Town. (Source: Google Maps)

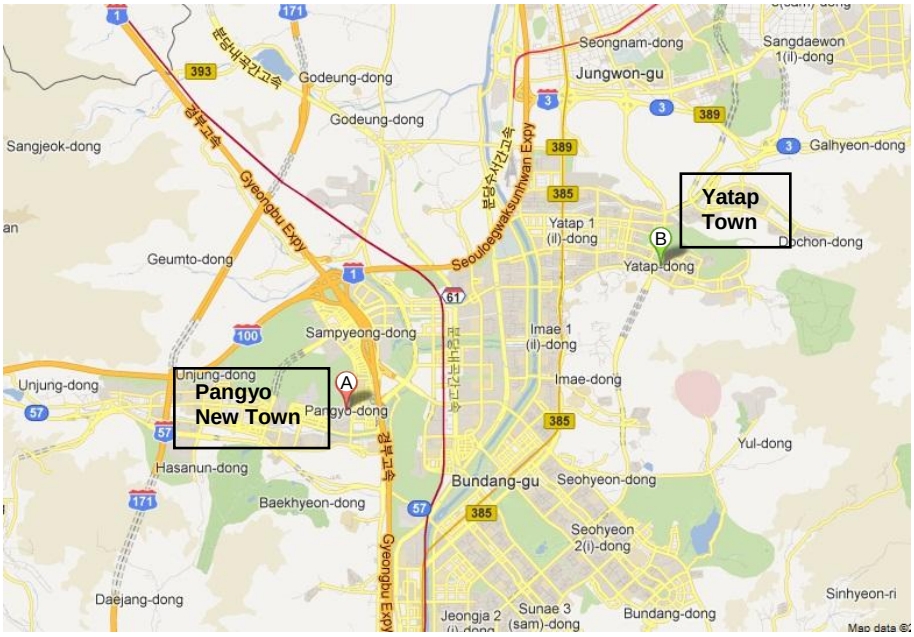

Figure 1-10. Map of Pangyo New Town(A) and Yatap Town(B) together to illustrate their proximity. (Source: Google Maps)

CHAPTER 2
LITERATURE REVIEW

This chapter provides an overview of the literature which will give a brief introduction to the field of CPTED with definitions of basic terms which are crucial in understanding the context of this thesis. Additionally, research papers dealing with Korean CPTED are reviewed to understand the recent interest and concern in Korea regarding CPTED. Importantly, a paper written by Rachel Armitage and Leanne Monchuk (2010) is also analyzed, since it is one of the few studies that have used a similar method to evaluate the effectiveness of CPTED in UK.

Definition of Terms

Place-based crime and terrorism prevention strategies include a variety of approaches by various scholars from diverse fields. C. Ray Jeffery (1971; 1976) introduced the concept Crime Prevention Through Environmental Design (CPTED), Oscar Newman (1972) discussed the Defensible Space principles, Ronald V. Clarke (1992) suggested the idea of Situational Crime Prevention, and Paul and Patricia Brantingham (1980) developed the Environmental Criminology approach. Each of the contributions shall be discussed in detail below.

Crime Prevention Through Environmental Design (CPTED)

CPTED asserts that “the proper design and effective use of the built environment can lead to a reduction in the fear and incidence of crime, and an improvement in the quality of life” (Crowe, 2000, p. 46). Also, it is described as a designing principle which analyzes the relationship between components of crime, such as victim, criminal, and place, in order to protect people from being the potential victims. Additionally, CPTED, along with situational crime prevention, seeks ways to reduce the opportunities of crime

by appropriately designing buildings and planning the cities which will consequently improve the quality of life (Choi, 2006).

It was originally coined and formulated by criminologist C. Ray Jeffery, but his initial contribution (1971) was heavily theoretical, based in stimulus/response and geared toward changes in criminology from a comprehensive physiology perspective (Schneider & Kitchen, 2007, p. 23). Although CPTED is recognized for its place-based strategies, it should not be considered as a unique and complete solution for crime prevention. However, when applied properly in an appropriate way to new development projects in the cities, it may help prevent or reduce the opportunity for crime incidents. Basically, CPTED is based on four elements: natural surveillance, natural access control, territorial reinforcement, and maintenance (Crowe, 1990; 2000).

Natural surveillance is a design concept directed primarily at keeping intruders under observation (General Guidelines for Designing Safer Communities, 2000). It aims to increase the visibility of the building and property by taking into account the proper placement and design of windows, lighting, and landscaping. When natural surveillance is used to its utmost, it can increase the potential to deter crime by making the offender's behavior more easily noticeable to residents, police, or anyone else nearby.

Natural surveillance is often referred to as 'eyes on the street'. Therefore, some new urbanist developers locate structures close to the street, with front porches and plenty of windows designed to allow ample visibility. The concept of 'eyes on the street' was strongly supported by Jane Jacobs, where she asserted: "A well used city street is apt to be a safe street. A deserted city street is apt to be unsafe (Jacobs, 1961, p. 23)." In the samples used in this research (Pangyo New Town), natural surveillance strategy

is being used in the location of the apartment buildings and windows which face the center of the complex, allowing for easy view from residents' homes.

Natural access control employs elements like doors, shrubs, fences, and gates to deny or delay access to a crime target, and to create a perception among offenders that there is a risk in selecting that target (General Guidelines for Designing Safer Communities, 2000). Fences around a neighborhood or trees planted in front of the houses are some examples of access control measures that can be easily noticed. Studies by Newman (1973; 1980, 1996) and other scholars (Poyner, 1983; Coleman, 1985; Poyner and Webb, 1991) have all mentioned a close relationship between design features and levels of crime, particularly those features that allowed unrestricted pedestrian movement through residential complexes which led to an increase in crime.

Researchers have also found that busier streets with some pedestrian movement have experienced reduced levels of recorded crime (Hillier and Shu, 2000). Newman (1996) indicated in his work a significant reduction in crime (54%) after the reconstruction of the Clason Point in the Bronx in New York City. The number of routes that went through the public housing complex was reduced, and the lighting and surface appearance of the buildings was improved in order to utilize the access control strategy.

In the apartment complexes used in current research (Pangyo New Town), short trees and shrubs in front of the buildings, and gated entrances were some of the noticeable access control strategies adopted.

Territorial reinforcement employs such design elements as sidewalks, landscaping, and porches to help distinguish between public and private areas and help users exhibit signs of "ownership" that send "hands off" messages to would-be offenders (General

Guidelines for Designing Safer Communities, 2000). In short, it is the design feature that expresses the ownership of the area. The examples of territoriality could include barriers such as fences and hedges, and sign boards. A more subtle expression might be a change in pavement color and material or an elevation change expressed by a step or two (Beeler, 2011). Some of the important signs of territoriality noticed in the sample complex used in this research (Pangyo New Town) were: large emblems at the entrance of the complex, tall trees surrounding the complex, and materials and colors of pavement inside the complex. These features gave the complex private atmosphere.

Additionally, people will take more interest in something they own or when they feel intrinsically involved. Therefore, the environment should be designed to clearly delineate public and private spaces by providing obvious defined entries, patios, balconies and terraces, as well as by using low walls, landscape and paving patterns to delineate ownership and responsibility. A study by Brown and Bentley (1993) showed how some burglars used territoriality to evaluate risk. This concept of territoriality was also supported by the findings from a study of fear of crime (Perkins and Taylor, 1996). Eliminating any unassigned spaces and ensuring all spaces have a clearly defined and designated purpose, are routinely cared-for and monitored is also a component of territoriality.

Maintenance allows for the continued use of a space for its intended purpose. If a place is properly maintained and managed, it is more likely to send a message that someone cares about safety and welfare in adjacent structures, both residential and nonresidential, and on existing premises by demonstrating minimum requirements and acceptable standards. However, it is the owners', operators' and occupants'

responsibility to keep their area well maintained (General Guidelines for Designing Safer Communities, 2000). Maintenance is the last and critical principle which supports the other strategies mentioned above. A residential complex that looks unclean and disorganized indicates lack of control and care by the residents and authorities.

'Broken Windows' theory could be applied in this section of the principle. This theory suggests that if neighborhoods or cities do not fix broken windows and graffiti, the environment will continue to descend into crime, chaos, and violence. The theory implies that the more a city becomes ruined and decayed, the more vulnerable it will become to crime. Promoting a positive image and routinely maintaining the built environment supports the idea that the physical environment continues to function effectively and transmits positive signals to all users (Cozens, Saville, & Hillier, 2005).

Defensible Space

In the United States defensible space evolved primarily from an architectural context, but was influenced by planning critics such as Jane Jacobs (1961) and by social and behavioral scientists Elizabeth Wood (1961, 1967), Schlomo Angel (1967, 1968), Edward Hall (1959) and Robert Sommer (1969) among others (Schneider and Kitchen, 2002). Despite these influences from various scholars, the concept of defensible space was introduced and used by an architect and city planner, Oscar Newman, reflecting his ideas about crime prevention and neighborhood safety. In his first book on this topic, *Defensible Space* (1972), he pointed out that crime rates were higher in high-rise apartment buildings (multi-family housing) than in lower types of housing complexes (single-family housing). This was due to residents' behavior of being negligent on the responsibility of their living spaces and shifting their duties to other people.

Newman continued to describe social control, crime prevention, and public health in relation to community design. Newman argues: “Defensible space is a model for residential environments which inhibits crime by creating the physical expression of a social fabric that defends itself” (1972, p. 3). He also asserted that natural surveillance, territoriality, and a sense of community make it easier to identify strangers (1972, p. 3). The basic principles of Newman’s defensible space are similar to the CPTED principles since they both deal with crime preventing strategies in the living spaces.

The first principle is territoriality, which is defined as “the capacity of the physical environment to create perceived zones of territorial influence” (1972, p. 51), as we discussed previously. This could be understood as the residents’ desire to have a sense of the ownership which is expressed by using particular design features of the buildings or houses.

The second principle is natural surveillance, which is defined as “the capacity of the physical environment to provide surveillance opportunities for residents and their agents” (1972, p. 78). This means that the appropriate design and location of the windows and entrances will likely allow residents and guests to watch and observe movement of intruders within their neighborhood.

The third principle is boundary definition, which correlates with territoriality. It means having clear division and boundaries to identify private and public spaces. It incorporates the use of symbolic and real access control mechanisms as design elements to impede the movements of offenders and to help alert residents to their presence, all of which are said to facilitate territorial impulses and behavior (Schneider and Kitchen, 2002).

The final principle Newman focused on is the image and milieu of sites and structures. Newman's concern with environmental signs of incivility (such as graffiti and vandalism) anticipated the 'broken windows' theory of Wilson and Kelling (1982) and also laid down the predicate for what was to become a later CPTED corollary: *Maintenance* (Schneider and Kitchen, 2002). The ideas and principles generated by defensible space theory are fundamental notions in designing safer spaces. If the above mentioned principles exist together and are considered while designing an area, this would likely be an efficient way of expressing and adapting place-based crime prevention strategies, including CPTED.

Situational Crime Prevention

Another model for preventing crime is Situational Crime Prevention, developed by Ronald V. Clarke. The concept is based on opportunity models, and seeks to reduce crime by focusing on very specific crimes and circumstances (Schneider and Kitchen, 2002). It departs radically from most criminology in its orientation (Clarke, 1980; Clarke and Mayhew, 1980). It is basically focused on reducing the opportunity for crime incidents by changing the environments as a means of controlling criminal behavior.

Like other place-based strategies, it seeks ways to prevent the occurrence of crime instead of detecting and punishing offenders. Also, it seeks not to eliminate criminal or delinquent tendencies through the improvement of society or its institutions, but merely to make criminal action less attractive to offenders (Clarke, 1997).

Clarke's situational crime prevention theory came out of the British Home Office's crime prevention efforts in 1960s and 1970s. It is crucial to note that this theory was not developed by itself; rather it stems from the ideas of defensible space and CPTED (Schneider and Kitchen, 2002). As mentioned in Schneider and Kitchen (2002),

“Situational crime prevention is a fundamentally ‘tactical’ approach in that it is place and time specific” (p. 104). This crime prevention theory is seen by many to be effective in reducing crime incidents since it forestalls opportunities for crime before offenders reach the target and commit crimes.

Clarke (1997) published a matrix of ‘sixteen opportunity-reducing techniques’ by modifying the original version of twelve techniques developed in 1993 by adding the category of ‘removing the excuses for crime’. However, in response to Wortley’s (2001) critique of situational crime prevention, Cornish and Clarke (2003) expanded the techniques further to twenty-five by including the category ‘reducing provocation’ and published a matrix of ‘twenty-five techniques of situational crime prevention’ (Table 2-1). This matrix includes five situational crime prevention strategies with twenty-five techniques (five techniques in each strategy). For each technique listed in Table 2-1, examples are given to provide easier understanding of the intervention techniques.

Local government authorities are most likely to impact crime through the use of the situational crime prevention techniques due to the importance of local knowledge of local community situations. Given these factors, the Department of Attorney General and Justice of New South Wales (2011) stated that the focus of local crime prevention should be overwhelmingly on situational crime prevention activities.

Environmental Criminology

Environmental criminology is the final term that shall be discussed to introduce the development of modern place-based crime prevention theory. This theory incorporates both defensible space and CPTED principles. However, environmental criminology differs slightly from other concepts in that it is more concentrated on the geographical elements of the crime, including paths and patterns, rather than on design elements of

crime in places (Schneider and Kitchen, 2002). This theory focuses on the environmental or contextual factors that can influence criminal activity, and these include spatial aspects such as geography, time, law, offender, and target or victim (Brantingham and Brantingham, 1981).

Environmental criminology starts “with an analysis of the location of crimes” (Brantingham and Brantingham, 1981, p. 19). In dealing with the crime, the Brantinghams tend to reject the sociological determinism by asking their most fundamental questions in terms of ‘where’ instead of ‘who’ (Schneider and Kitchen, 2002). This does not mean they neglect the importance of sociological reasons when describing criminal behavior. Instead, they would use these reasons as the supportive elements of the location data, rather than considering them as the primary elements. By combining the location information with the movement patterns, environmental criminology seeks to determine patterns of crime as related to the environments in which it occurs (Brantingham and Brantingham, 1981). That is why environmental criminology is seen by many to be the foundation of GIS crime mapping approaches.

Crime in South Korea

The crime rate in South Korea is considered low compared to other countries. According to official data (Figure 2-1), Korea is known to be one of the safest countries in which to live. As you can clearly see from the graph in Figure 2-1, Korea’s crime rate is extremely low compared to other countries. Because of the existing data like this, as well as public announcements made internationally that Korea is a safe country, people outside Korea would not be aware of significant safety issues it is facing.

The Seoul Metropolitan Police Agency announced (2011) that the number of crime incident has been increasing every year by a large amount. In 2008 there were 28,000 cases (per population of 100,000) of burglary, but in 2010 this number jumped to 49,410 cases. This data express the importance of considering crime prevention measures.

Other data published by the Supreme Prosecutor's Office Korea (2011) show that a number of crime incidents are occurring in residential communities (Figure 2-2). This means that living environments for the citizens, which are presumed to be safe and sound, are not being protected properly. In addition to this, the main targets for the criminal offenders are changing from single family housings to high-story apartment complexes which are the most common type of housing in Korea. Therefore, residents' concern about safety issues is growing and will not go down unless there is clear evidence of security within their communities.

CPTED Related Studies in South Korea

Cases of CPTED successfully reducing crime incidents in the United States and United Kingdom have led to many other countries to becoming interested in the crime prevention strategies. Since the beginning of the 1990s, although considered to have low crime rates compared to other countries, South Korea sponsored research to understand CPTED principles properly and seek the most efficient way to adopt it. Recently, the local governments and the authorities have started to adopt crime prevention strategies in the cities by carefully studying the problems of crime in Korean cities and adapting existing principles to effectively apply to the Korean context.

The author divided CPTED related studies conducted by researchers in South Korea into several categories by their topics in order to more easily describe existing studies. The categories are: crime space, crime environment, fear of crime, crime

prevention policy, safety concerns in residential complexes, evaluating locations of residents' fear of crime within their neighborhood, and CCTV application.

For the studies related to crime space, Y. K. Choi and I. Kang (1993) have analyzed the correlation between the fear of crime and its occurring location in residential complexes by evaluating the quality of lighting systems and other spatial elements that impact crime within the living spaces. This study concludes that not only does crime itself fosters fear, but also the surrounding environment is responsible for people's fear of crime. Another study categorized the places of crime occurrence, and speculated that physical environmental factors were responsible for crime incidents (Y. Choi, 2000).

Research related to crime environment was studied by K. Lee (1997), which evaluated the living environments of Korean residential complexes and found a relationship with the criminals' behavior. Fear of crime was studied and investigated by several researchers. Y. Lee (2008), Y. Lee and H. Baek (2008), and H. Lee, J. Park, & M. Ha (2009). This research evaluated people's degree of fear of crime within their residential communities and created an index for planning and designing safe environments for neighborhoods. Also, women's fear of crime at specific areas, such as underground parking lots, was evaluated in order to develop safe spatial planning strategies with appropriate CPTED applications (Y. Choi and H. Lim, 2005; J. Park, 2009).

For studies related to crime prevention policy, C. Pyo (2003) and H. Park (2003) have made efforts to systematize CPTED as a policy in the development of the cities, based on the ideas from criminology and public policy. Also, E. Lee, S. Kang, & K. Lee

(2008) researched ways to develop standardized CPTED that could be applied in the district unit plans by analyzing existing CPTED guidelines and crime prevention laws.

For research related to residential complex safety, the environment of the exterior space of the residential complexes and outdoor activities of residents were both studied to find out how the design elements of the exterior space and outdoor activities impact criminal offenders' behavior (S. Kang and K. Lee, 2004; Y. Lee, 2008; K. Sung, I. Park, & H. Kim, 2009). This research concludes that both physical site designs of the exterior area of the complex and residents' lively outdoor activities affect the behavior of criminal offenders. To explore the locations of residents' fear of crime within communities, Y. Choi and H. Lim (2005) have studied the residents' response of their crime experiences and where they feel the most fear within their neighborhood. They tried to find out whether there was a correlation between fear of crime within the community and actual crime incidents. The residents responded that underground parking lot and dark isolated areas were the most fearful places within their neighborhood. However, the number of residents who actually experienced crime in those places was low.

Lastly, to study about the effectiveness of CCTV cameras in reducing crime, S. Kang (2009) evaluated the effectiveness of CCTV cameras in the residential complexes by investigating residents' awareness of CPTED strategies and how they felt about safety after cameras were being installed throughout the community. This study concludes that most residents are aware of CCTV cameras now and they feel safer than when there were no cameras installed.

In addition to these studies being conducted, H. Park (2010) published a paper titled "Designing Out Crime in South Korea: Qualitative Analysis of Contemporary

CPTED-Related Issues." This paper explores the route taken by South Korea in the last 18 years to develop an environmental approach to crime prevention, and furthermore illustrates the growing interest and investment in CPTED by private enterprises and public policy makers, as well as discusses the challenges that architects, police and researchers face resulting from a series of local trials. This paper concludes that CPTED applications have worked out effectively in South Korea so far in a way of developing livable and humane cities, even though at this stage the scientific evidence is not sufficient to satisfy all the stakeholders. Therefore, it is crucial to conduct further experiments and action research to clearly validate the efficacy of CPTED to satisfy all stakeholders, not just in terms of preventing crime, but also cost effective in both short and long term (H. Park, 2010).

As described above, many research papers and projects were being published and performed by various researchers in South Korea in order to prevent crime incidents that are growing every day. As a result of these efforts, recently South Korean cities are adopting CPTED in newly developing towns from the planning stage. However, there is no clear evidence on the performance of CPTED in reducing crime in Korean residential communities. This is probably because it has not been so long since its adoption. The author thinks that it is important to find out the success of these applications of CPTED during the initial period of progress, before they get on the wrong track. This thesis will help guide future applications of CPTED through evaluating its success by comparing the crime data between two towns. The idea for this method stems from a review of the following paper written by Armitage and Monchuk (2010).

Sustaining the Crime Reduction Impact of Designing Out Crime: Re-Evaluating Secured by Design (SBD) Housing in West Yorkshire

Armitage and Monchuk's paper, "Sustaining the Crime Reduction Impact of Designing Out Crime: Re-evaluating the Secured by Design Scheme 10 Years On" (2010) had a major impact on crime prevention research and practice. Not many researchers have actually done pre and post crime prevention evaluation, even in England. Only a few studies have evaluated its effect and success worldwide. There are four published articles that evaluate the effectiveness of the Secured by Design (SBD) strategies (Brown, 1999; Pascoe, 1999; Armitage, 2000; Teedon and Reid, 2009), and each study concludes that SBD is to some degree effective in reducing crime.

Secured by Design (SBD) is a term used in the United Kingdom in substitution for CPTED. It is similar to CPTED in that it aims to encourage housing developers to design out crime at the planning or conceptual stage. The scheme is managed by the Association of Chief Police Officers Crime Prevention Initiatives (ACPO CPI) while day-to-day delivery of the scheme is conducted by Architectural Liaison Officers (ALOs) or Crime Prevention Design Advisors (CPDAs) working for individual police forces throughout the United Kingdom (Armitage and Monchuk, 2010).

Armitage and Monchuk provide an evaluation of the effectiveness of SBD within West Yorkshire, England. The original study was conducted in West Yorkshire 10 years ago in 1999 by Rachel Armitage to find out the effect of SBD in the residential communities when it just started to be used. After 10 years, in 2009, a re-evaluation study was planned and conducted in order to replicate the original evaluation of SBD to establish whether SBD had improved, maintained its performance, or worked effectively

as a crime prevention measure. The original paper was conducted with three types of methods.

First, it compared 25 pairs of houses (25 SBD and 25 non-SBD developments) to see whether there was a significant difference in the crime rates within these pairs of houses using police recorded crime data. Second, it used a survey in the same 25 examples to ask residents about their personal experiences of crime, their fear of crime, and their perception of crime and disorder. This was done using face-to-face interviews. The final method of the original evaluation looked at whether SBD was improving as a standard - were houses built more recently performing better than older ones? (Armitage and Monchuk, 2010)

In order to re-evaluate the previous research, in an attempt to assess the long-term sustainability of crime reduction impacts of SBD, Armitage and Monchuk utilized several types of methods and data sets in this work. They used police-recorded crime data, self-reported crime (residents' surveys) and visual audits by the authors (Armitage and Monchuk, 2010).

The main purpose of using a variety of methods and data sets was to find: (1) whether SBD properties experience less crime than non-SBD properties, (2) whether residents living in SBD properties have lower levels of fear of crime than non-SBD counterparts, (3) whether SBD developments show less visual signs of disorder than non-SBD developments, and (4) whether SBD has maintained its effectiveness as a crime reduction measure (Monchuk and Armitage, 2010).

The results suggested that SBD performed effectively in reducing crime because the crime rates in SBD properties came out to be lower than that of non-SBD properties,

although the study focused only on the burglary rates. Self-reported surveys showed that twice as many non-SBD residents than SBD residents experienced a crime within the previous year. Also, for all crime categories, the proportion of SBD respondents experiencing the crime was lower in the SBD sample. Through the visual audits by the authors, they found out that SBD sample scored lower than non-SBD sample in the score sheet developed by the authors, in which lower score meant less crime. This result suggests that in relation to the 'disorder' factors measured by the visual audit, SBD performed better than non-SBD (Armitage and Monchuk, 2010).

The final conclusion for this study was; (1) to be complacent about the merits of any crime prevention measure is to ignore the evolving nature of crime, (2) SBD has continued to reduce crime and the fear of crime and SBD estates show less signs of visual disorder, and (3) the effectiveness of SBD developments built more recently has exceeded that shown in the original evaluation (Armitage and Monchuk, 2010).

After reviewing this article by Armitage and Monchuk (2010), the author understood the necessity of a comparative evaluation study, where CPTED is being utilized as a tool for preventing crime. This is because detecting the problems in the earlier stage would be helpful in amending principles and policies. Therefore, this thesis may provide valuable data for evaluating the current application of CPTED in the newly developed towns in South Korea. The following chapter will introduce the methodologies used by the author in acquiring necessary data and information to complete this thesis.

Increasing the efforts	Increasing the risks	Reduce the rewards	Reduce provocations	Remove the excuses
1. Harden targets	6. Extend guardianship	11. Conceal targets	16. Reduce frustration & stress	21. Set rules
Immobilizers in cars	Cocooning	Do not keep valuables in plain sight	Efficient queuing	Rental agreements
Anti-robbery screens	Neighborhood watch	Off-street parking	Soothing lighting	Hotel registration
Solid external doors with quality locks				
2. Control access to facilities	7. Assist natural surveillance	12. Remove targets	17. Avoid disputes	22. Post instructions
Alley-gating	Improved street lighting	Removable car radios	Reduce crowding in pubs	'No parking'
Entry phones/secure entries	Neighborhood watch hotlines	Pre-paid public phone cards	Fixed cab fares	'Private property'
3. Screen exits	8. Reduce anonymity	13. Identify property	18. Reduce emotional arousal	23. Alert conscience
Tickets needed	Taxi driver IDs	Property marking		Roadside speed display signs
Electronic tags for floor stock	'How's my driving?' signs	Vehicle licensing	Control violent pornography	'Shoplifting is stealing'
			Prohibit paedophiles working with children	
4. Deflect offenders	9. Utilize place managers	14. Disrupt markets	19. Neutralize peer pressure	24. Assist compliance
Street closures in red light district	Train employees to prevent crime	Checks on pawn brokers	Campaigns depicting what friends think of risk-taking behavior (e.g. Speeding & Drug campaign)	Litter bins
Separate toilets for women	Support whistle blowers	Licensed street vendors	"It's ok to say no"	Public lavatories
5. Control tools/weapons	10. Strengthen formal surveillance	15. Deny benefits	20. Discourage imitation	25. Control drugs/alcohol
Tougher beer glasses	Speed cameras	Ink merchandise tags	Rapid vandalism repair	Breathalyzers in pubs
Photo on credit cards	Security guards	Graffiti cleaning	V-chips in TVs	Alcohol-free events

Figure 2-1. Twenty-five techniques of situational crime prevention. (Source: Cornish and Clarke, 2003)

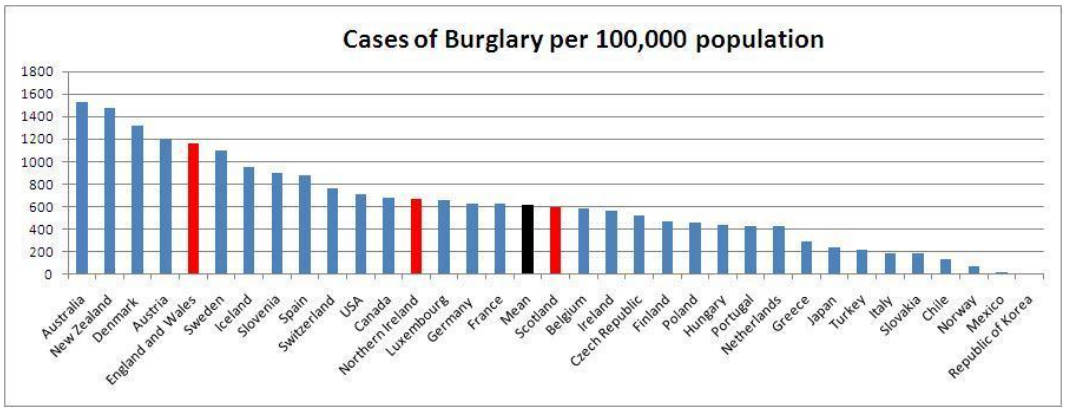

Figure 2-2. Cases of burglary per 100,000 population. (Source: The Institute for the Study of Civil Society, www.civitas.org.uk/crime/)

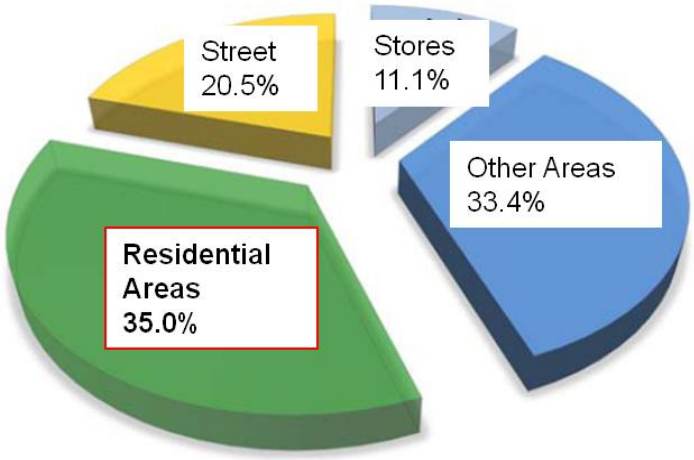

Figure 2-3. Proportion of burglary cases in the residential areas. (Source: Supreme Prosecutor's Office Korea, www.spo.go.kr)

CHAPTER 3
METHODOLOGY

In this chapter, we clarify the methods used to conduct the current research and describe how the research results were achieved. We utilized several types of both qualitative and quantitative methods. Visual audits and self-reported examination were completed by the author using a checklist and survey paper developed by the author. Also, police-recorded crime data for three consecutive years (2009 ~ 2011) were analyzed. The official police data were organized and provided by Officer Gyeongseok Oh, a Lieutenant in the Gyeonggi Provincial Police Agency.

In addition to these methods, short interviews were completed with Dr. Hyeonho Park, who has assisted the author throughout the thesis process, and police lieutenant Gyeongseok Oh, who helped the author collect necessary crime data, to get some ideas and thoughts from people who actually have experienced crime and dealt with CPTED in their jobs. The context of the interviews is provided in Appendix C. The author did field research in South Korea, specifically in Pangyo New Town and Yatap Town, to collect these data during the summer break.

Visual Audit

The visual audit took place at the selected residential communities within Pangyo New Town and Yatap Town. The selection of the communities for the visual audit was randomly picked from the list of communities drawn out from the real estate website (*Budongsan 114*, www.r114.co.kr). This makes the auditing process fair and reduces bias from any elements. The name of the two complexes selected in Pangyo New Town were “Humansia-Prugio” Apartment Complex in Pangyo-won Village Community No.3 and No.5 and two apartment complexes selected in Yatap Town were “Dongbu-Kolon”

Apartment Complex and “Hyundai” Apartment Complex in Jangmi Village Community No.1 and No.8. The visual audit took place over a 2-day period, with all four apartment complexes visited on the same day for approximately 8 hours (from 12 pm to 8 pm). On the first day, the author visited two apartment complexes in Pangyo New Town first and then finished at two apartment complexes in Yatap Town. The schedule for the second day was reversed, starting from Yatap and then finishing in Pangyo. The reason for changing the orders of the visit was to observe situations of the towns during both the day and night.

The definition of the visual audit in this thesis is a direct visit to each community by the author to observe the actual status of CPTED principles (natural surveillance, access control, territorial reinforcement, and maintenance) applied in the newly developed residential complexes. This allowed the author to achieve a personal impression of the security and compare the difference of the design elements utilized within the two towns. This method was performed by walking through each community at both day and night time, and observing both safety procedures, such as CCTVs and lighting fixtures, and dangerous factors, such as dark and unmanaged spaces. To conduct a visual audit, a checklist to examine CPTED principles was used. The checklist is provided at the Appendix section and this will be discussed in detail in the next section under self-reported examination.

Pictures were carefully taken by the author as the evidence of the audit. The visual audit was followed by a self-reported examination by the author. This includes checking CPTED principles in Pangyo New Town with a CPTED audit checklist developed by the author to determine whether it is efficiently used, and completing the CPTED post-audit

evaluation worksheet after the audit, also provided by the author. A sample of the checklist and worksheet are attached in the Appendix section for reference.

Self-Reported Examination

In addition to the visual audit of the site, the author conducted the self-reported examination during the visit to the communities. The examination was performed with two different evaluation papers. The first paper is the 'CPTED Audit Checklist', which allowed the author to examine applied CPTED principles within the residential complexes used in this research. This is a modified version of the checklist that has been used in the *CPTED Guidelines for Seoul New Town Development Plan*, developed by the City of Seoul and the National Police Agency. This was reformulated into a simpler version and adapted to this research. The modified version of the checklist is provided at the Appendix section.

This modified checklist (Appendix A) looks at ten different areas in the community and some CPTED principles that should be applied in that area to meet the Korean standard developed by Korean Agency for Technology and Standards (2008). For each category a score between 0 and 5 was awarded, 5 being the most positive and 0 being the most negative. Then at the end of each category, total scores were calculated and analyzed to learn whether CPTED principles were applied efficiently to fulfill the standard.

After examining the principles, the author completed the self survey paper 'CPTED Post-Audit Evaluation Worksheet' (Appendix B). This worksheet was also developed by the author to observe general impressions of the site. This worksheet is adopted from the *CPTED Guidelines for Queensland*, which was created by the Queensland government in Australia (2005) to use it in the evaluation of CPTED during a safety

audit. We modified and simplified this worksheet for the current research to be used after the visual audit of the site. The modified worksheet basically asks the observer about general impressions of the sites, how well each CPTED principles are applied, and for any suggestions for identified problems. There were no points scored for this worksheet, but each category was evaluated by a scale of poor, bad, fair, good, and excellent.

Analysis of Police-Recorded Crime Data

To judge the effectiveness of the CPTED strategy as a crime reducing measure in the residential complexes, police-recorded crime data was the most critical type of data analyzed. The author hypothesized that if the crime rates for the CPTED towns and non-CPTED towns differ significantly, this will be a good indicator of CPTED's effectiveness in reducing crime. With considerable help from Lieutenant Gyeongseok Oh, the author was able to acquire necessary data. Since this thesis aims to compare the crime rates for the two different towns, the police-recorded crime data were needed for both of the towns. The period of analysis was three consecutive years (Jan. 2009 ~ Dec. 2011), because people did not begin to move into Pangyo New Town until the end of 2008. Thus, we chose these three years of crime data to be used for the analysis.

The categories included in the police-recorded crime data were five major crimes in Korea: murder, robbery, burglary, violence and sexual violence. Some of the categories seem a bit confusing since they are defined differently worldwide (GRHS, 2007). 'Violence' includes threatening, damage to property, bodily harm, and assault. 'Burglary' in the collected data includes stealing valuables by breaking-into houses and cars, car theft, bike theft, shoplifting, and pick-pocketing. These definitions were provided by Lieutenant Oh of the Gyeonggi Provincial Police Agency.

In this thesis, burglary was considered as the focal crime activity for analysis since the literature notes that it is the most frequent property crime in Korea and the most serious property crime worldwide. Other types of crimes are considered not as accurate as the burglary because they are not reported as frequently to the police. The total numbers of these crime incidents were then converted into rates per 100,000 people for both CPTED and non-CPTED communities. Next, calculated crime rates were compared between both towns with further analysis of statistical significance (i.e. ANOVA). In order to calculate the crime data into rates per 100,000 people, population data were also collected from the district office of each town. The data were then classified into 11 different age groups to find out the distribution of the population. This was an important procedure in determining the proportion of young males, who are considered the most likely group to be crime offenders. Even though many people suggest that criminal activities are committed by intruders from other areas, it was considered to be worthwhile to check the relationship between the number of young males dwelling in the province and the frequency of crime incidents.

Short Interviews

As a means of gathering thoughts and ideas on experts' experiences and perceptions of crime and its prevention schemes, short interviews with two people are included in the thesis. However, the interviews were not scheduled ahead with arranged questions. They were casual conversations between Dr. Hyeonho Park and the author, and between Lieutenant Gyeongseok Oh and the author.

The first interview took place at the Institute of Crime Science office where Dr. Park is the director. The institute is located within the department of police administration in Yong-in University, in South Korea, which is not far from the study

sites used in this research. The discussion took approximately 2 hours, and the main objective of the conversation was to hear about his experiences with crime and his efforts to adopt CPTED in Korea. Dr. Park is an expert in the field of crime prevention and studied CPTED at the University of Portsmouth. His background is in police administration and criminal justice with a concentration in CPTED, and he is a recognized expert in crime science, especially in CPTED. Interviewing Dr. Park allowed the author to understand in depth about the world of CPTED and also gain a perspective on the future of Korea relative to crime prevention.

The second interview was with Lieutenant Gyeongseok Oh. However, this interview only lasted for approximately half an hour. Officer Oh works at the Gyeonggi Provincial Police Agency. He expressed his thoughts on the application of CPTED in the residential complexes in Korea from a police officer's point of view. He also provided insight into how other colleagues think about CPTED as a crime prevention measure.

Limitations

The author experienced a few limitations while conducting this research. These limitations appeared during the visual audit and while comparing the data between the two towns. The time and days spent during the visual audit did not seem sufficient to fully observe effects of CPTED. Also, the author acknowledges that the time of year he observed these communities can affect the audit. This is because in summer, there is much more daylight than in winter. Since the auditing time was between 12 pm and 8pm, it was still bright enough to walk around the site with just a small number of street lights close to finishing time. But during winter season, it would be expected to be darker close to finishing time, so the effect of lighting systems installed would be observed more clearly.

Another limitation was the lack of manpower for the visual audit. The whole procedure was conducted solely by the author. If more people were involved in the audit, multiple observations of the site would be possible, and the data collected could be more extensive. Since the audit was only done by the author, some observations may be biased to achieve the expected results for the research, although all attempts were made to be impartial.

Other limitations arose while data were compared between the two towns. First, even though the number of population for both towns was similar, the geographical size of the two towns was different. The geographical size and the population for both towns are provided in Chapter 1 under ‘Brief Description of Two Towns’. Furthermore, some variables, such as income levels and employment status, were unable to be retrieved because they were not open to public. Since the income levels and employment status, which were considered to be indicators of wealth, were not available to the public, the housing value was considered as a good indicator to identify and compare relative wealth. This is considered as an important factor too because one could make the assumption that the prosperity level in residential complexes may correlate with the crime rate. However, differences in housing values between the two towns did not tell the status of wealth due to other factors that determine housing preference of the residents. This will be discussed in Chapter 5 in detail.

The following chapter will describe the outcomes of the research and analyze these observed results. This will allow the readers to understand whether CPTED has actually performed effectively.

CHAPTER 4
FINDINGS AND ANALYSIS

This chapter illustrates the findings of the research relating to the methodology discussed in the previous section. The results of the site visit and the impressions observed during the site survey are included in this chapter in detail. The context of the checklist and worksheets used for the site survey were reviewed by Dr. Hyeonho Park before the visit, and the collected crime data and necessary information were also reviewed afterwards. The results for each methodology will be supported by necessary evidence such as pictures and worksheets, and the context of the interviews conducted.

Visual Audit

Pangyo New Town

As illustrated at the beginning of the thesis, Pangyo was approved for development in 2001 to solve the demand for housing shortage problems in Gangnam (a district located in the South side of Seoul which is suffering from environmental problems and overpopulation) and central Bundang (a district located in Seongnam, Gyeonggi province which was developed to alleviate the excessive demand for apartments in the similarly affluent, but much older Gangnam). As such, the residential complexes were designed as high-story apartment buildings to accommodate more dwellers in town. The name of the two complexes selected were Pangyo-won Village Community No.3 and No.5 (“Humansia-Prugio” is the name of the apartment complex). There are 486 units and 5 buildings (each with 35 stories) in Community No.3, and 567 units and 7 buildings (each with 35 stories) in Community No.5.

Figures 4-1 and 4-2 are provided to show the site plans of Pangyo-won Village Community No.3 and No.5, and its surrounding areas.

When the author arrived at the complex, the first thing confronted was the gated entrance with the emblem of the complex clearly visible near the gate (Figure 4-3). This expressed territoriality. Permission was required to enter the complex by submitting an identification card to the security officer and explaining the purpose of the visit. The author explained that the visit was to conduct a visual survey and take a number of pictures of the complex for the purpose of research. However, in order to take pictures, prior permission was also needed by the authorities at the main office of the complex. The first impression of this community was that it was ‘strict’, and the CPTED principle of access control (Chapter 2 for the definition) was clearly noticeable.

The audit started from the underground parking lot. Two or three parking spaces for disabled individuals and emergency vehicles were available on the ground level of each building (Figure 4-11), but all other parking spaces were provided underground. Numerous lighting systems and CCTVs were easily noticed as the author entered the parking lot. Plenty of spaces were available with clear directions, space numbers, and exit signs printed where people could see without difficulty. The elevator hall was located underground within the parking lot so residents could go to their homes directly from where they leave their vehicles using the pass code or access card (Figure 4-10). However, the author had to go out through the vehicle exit because he did not have an access card or any acquaintance living in the apartment. Immediately exiting the parking lot, well designed and planned pavement and trees were easily observed. The material and the color of the pavement expressed that it was for pedestrians only, and the curved pathways naturally guided people through the complex.

Since there were no vehicles going through the complex, it seemed very clean and safe. The trees and shrubs planted along the pathways looked very organized and well managed. It was not difficult to find my way around the complex, since sign boards (Figure 4-15) were located in several places. The bicycle racks were located close to the building entrance (Figure 4-17), so the bicycles could be easily seen by residents both from inside and outside their homes. Children's playground, resting areas, and other recreational spaces were located in the center of the complex and surrounded by the apartment buildings. This allowed clear visibility from residents' homes in terms of natural surveillance, and also could naturally attract people to come out and use the area.

As the author walked through the complex, nicely designed lighting systems and CCTV cameras (Figure 4-14 and 4-19) were installed in many locations in order to avoid dark areas after sunset for the security purpose. Tables and chairs, benches, various sculptures, and promenade walking tracks made the complex feel human-friendly, and allowed residents to gather at certain places. This could naturally allow the neighbors to get familiarized with each other, which will help spot the strangers. Short trees surrounding the buildings with equal distances apart, and no blind spots in between the buildings, eliminated hiding points for stealthy criminals. Another peculiar feature noticed during the audit was that the gas pipes outside each building were covered with specially designed stainless (Figure 4-26) covers in order to prevent burglars from using these pipes to climb up and enter the houses (this is a common method of breaking into high-story apartment buildings in South Korea).

The overall impression of the community was that it was well-managed, clean, bright-colored, human-friendly, and of course safe. While conducting the visual audit, the author realized how much of an effort has been concentrated on the development of the community and how serious many involved authorities and experts were in considering the well-being of the residents. Although the application of CPTED principles is not yet perfect, we speculate that it looks like a good start. With minor improvements of its principles, new town developments in the future could benefit from its impacts.

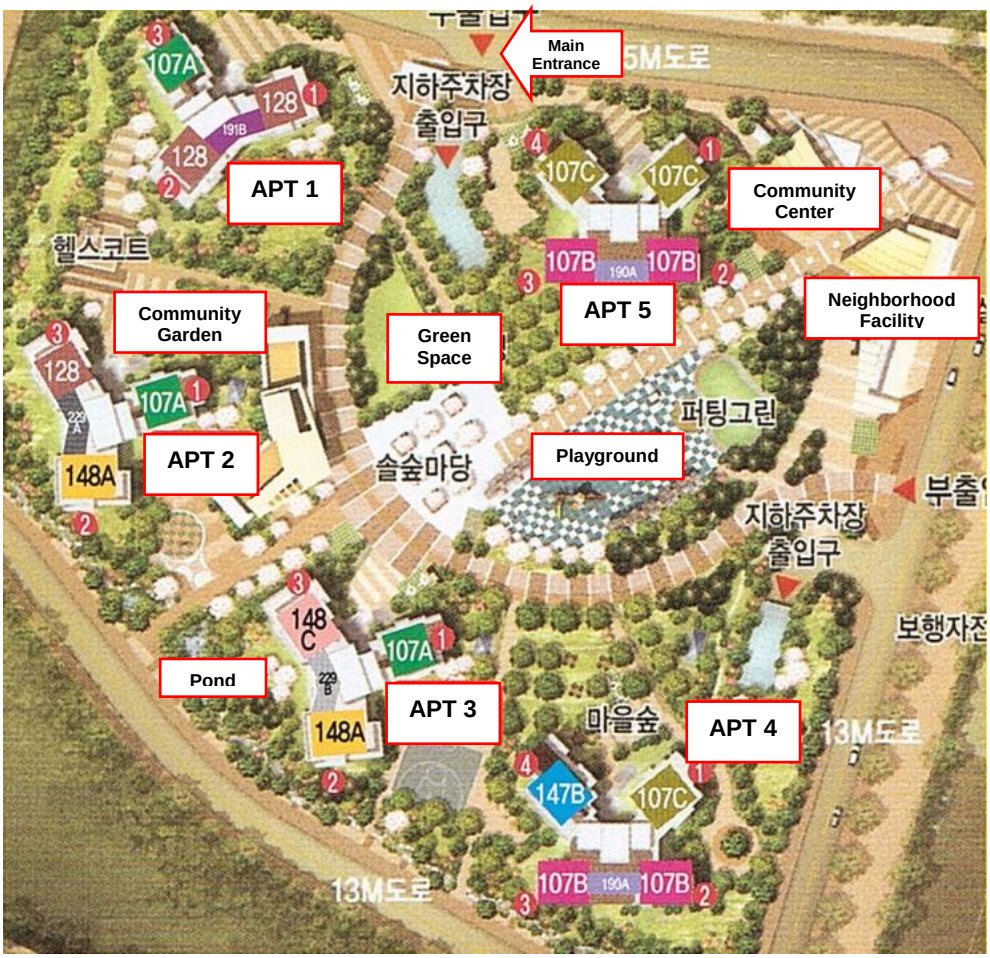

Figure 4-1. Site plan of Pangyo-won Village Community No.3. (Source: Budongsan 114, www.r114.co.kr).

Figure 4-2. Site plan of Pangyo-won Village Community No.5. (Source: Budongsan 114, www.r114.co.kr).

Figure 4-3. View of the main entrance to Pangyo-won Village Community No.3 and No.5 “Humansia-Prugio” with emblem. Photograph by author.

Figure 4-4. Security janitor’s office at the entrance. Photograph by author.

Figure 4-5. Gated entrance. Photograph by author.

Figure 4-6. Entrance to underground parking lot. Photograph by author.

Figure 4-7. Direction signs and caution alarm at underground parking lot. Photograph by author.

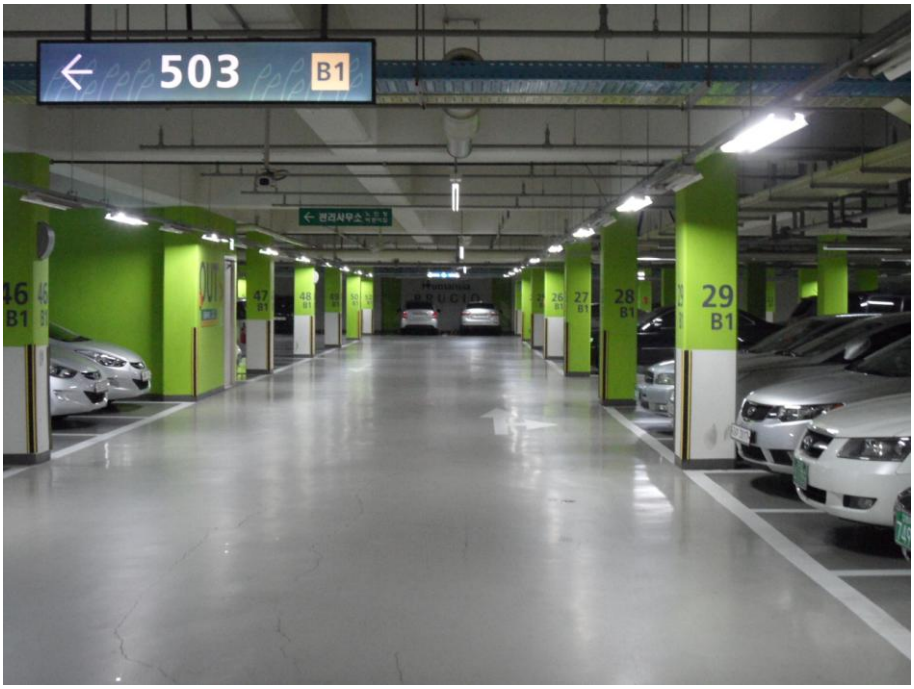

Figure 4-8. Underground parking lot. Photograph by author.

Figure 4-9. CCTV camera installed in underground parking lot. Photograph by author.

Figure 4-10. Elevator hall entrance at underground parking lot. Photograph by author.

Figure 4-11. Parking spaces for the disabled and emergency vehicles. Photograph by author.

Figure 4-12. Curved pavement for pedestrians. Photograph by author.

Figure 4-13. Different material and color of the pavement, and bollards express the territoriality. Photograph by author.

Figure 4-14. Designed lighting systems installed along the pavement. Photograph by author.

Figure 4-15. Guide and information map of the complex. Photograph by author.

Figure 4-16. Location of the main entrance of the apartment building allows for good surveillance from windows. Photograph by author.

Figure 4-17. Bicycle racks located in front of apartment building. Photograph by author.

Figure 4-18. Resting area and children's playground located in center of the complex. Photograph by author.

Figure 4-19. CCTV camera and street light. Photograph by author.

Figure 4-20. Tables and chairs for residents. Photograph by author.

Figure 4-21. Benches provided for residents. Photograph by author.

Figure 4-22. Sculptures are located throughout the complex to provide warm and friendly atmosphere. Photograph by author.

Figure 4-23. Trees surrounding the buildings. Photograph by author.

Figure 4-24. Entrance of emergency safety shelter. Photograph by author.

Figure 4-25. Waste disposal located under a shelter with lighting system installed beside. Photograph by author.

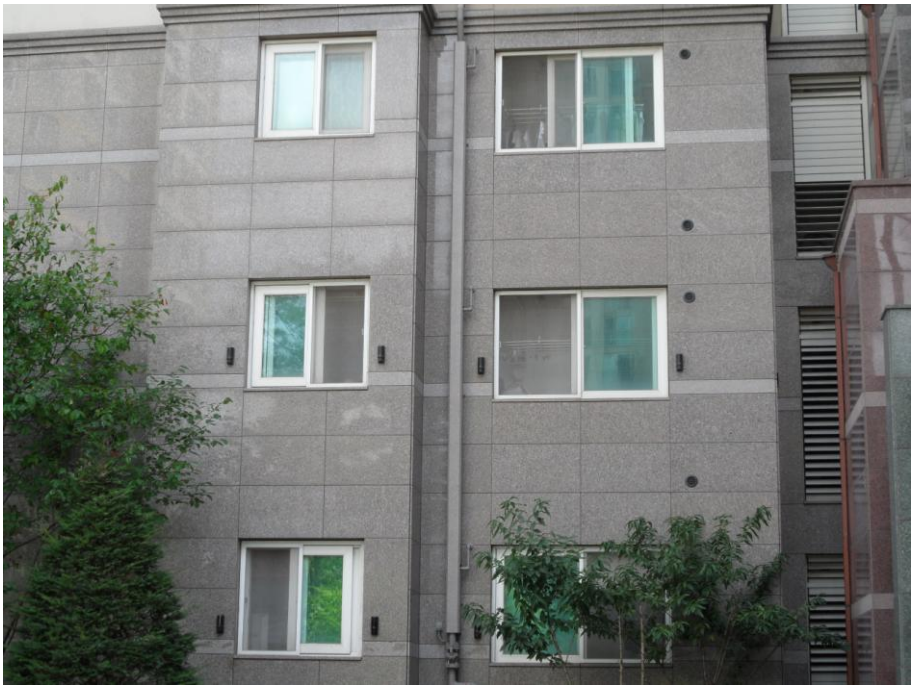

Figure 4-26. Gas pipes covered with specially designed covers to prevent burglars from climbing up. Photograph by author.

Yatap Town

Yatap is one of the oldest neighborhoods in the Bundang district in the city of Seoungnam, Gyeonggi province. It is divided into three villages which are named Yatap 1-dong, Yatap 2-dong, and Yatap 3-dong (a “-dong” is the lowest administrative unit of a district and of a city which is not divided into wards). Yatap was one of the first sets of towns planned and developed within the Bundang district approximately 20 years ago. The proximity to Seoul, convenience of public transportation, and quality of education are main reasons why people reside in this town for long periods without moving out to other places.

Two complexes selected for the audit were the “Dongbu-Kolon” Apartment Complex in Jangmi Village Community No.1 and “Hyundai” Apartment Complex in Jangmi Village Community No.8. There are 1134 units and 21 buildings (each with 17 stories) in “Dongbu-Kolon” Apartment Complex, and 1083 units and 18 buildings (each with 16 stories) in “Hyundai” Apartment Complex. Figure 4-27 presents brief outline of the site plan of the two selected apartment complexes in Yatap Town.

It took approximately 15 minutes for the author to drive from Pangyo New Town to arrive at Yatap Town. Traffic was not a significant problem in this district, compared to Seoul where almost everywhere is suffering from traffic congestions. The roads in Yatap Town were wider with fewer vehicles on the streets. When the author arrived at the complex selected for the audit, the gate was closed with a security officer present. However, it was surprising that as soon as the author approached the gate, the officer immediately opened the gate without checking for identification or asking about the purpose of the visit.

Two words to describe the first impression on this apartment complex are ‘murky’ and ‘negligence’. The sense of tranquility and security which the author had received when visiting Pangyo were not present in this complex. Since there were no emblems that express the apartment at the entrance, there were no noticeable signs of territoriality. The first thing the author had noticed about this complex was that there were too many trees and bushes surrounding the buildings (Figure 4-29). Although abundant vegetation allowed for a natural and green atmosphere throughout the complex, too many tall trees and thick bushes were blocking the view for natural surveillance. Trees that covered the entrances and the windows on the first floor of the apartment buildings looked very distracting and messy. There were signs that the plants were managed, but their volume was too great and needed more careful consideration of their distribution (Figure 4-30 ~ 4-32). Many trees and building structures made shades and dark corners which could be used as hiding spots for criminal offenders.

Some features that are considered to be “CPTED” principles were observed, such as lighting fixtures and CCTVs (Figure 4-35). However, these elements seemed very antique and did not reflect any specific design concept that harmonized with the whole complex. Streetlights were installed in certain areas but the number of lamps was too small and the condition of the lamps was poor.

Unlike Pangyo, there were parking spaces on the ground level. So, many vehicles were going through the complex and small pedestrian walkways were provided along the side of the streets. To solve the lack of parking spaces on the ground level, underground parking lots were also provided. Small lamps were attached along the wall of the entrance of the parking lot, but they were not sufficient enough to fully light up the

area (Figure 4-40 ~ 4-42). The impression of the underground parking lot was that it was damp, dark, and unpleasant. The floor was partially wet and whole area was not bright enough to feel comfortable or safe. A couple of CCTV cameras were installed near the entrance, but their locations did not seem to be effective in monitoring possible dangerous situations that could occur in the parking lot. Shadowed dead spots were noticed which could be a hiding point for the criminal offenders.

An important problem of underground parking lots in old fashioned apartment complexes is that there is no direct elevator hall to residents' homes. A small opening with stairs is provided for people to enter and exit the parking lot (Figure 4-43), but this staircase did not seem to be managed properly. The automatic sensor light did not work when walked through, so it was very dark (Figure 4-44).

The next feature observed was the entrance of the apartment buildings. The access to each building was not difficult, since there were no special pass code or RFID cards needed to enter the building. Large transparent doors were left opened most of the times (Figure 4-45). As the author looked around the complex, an isolated space where garbage and thrown away goods were piled was observed. This area was considered the most serious spot within the complex because things like trash, broken furniture, chopped trees, and used papers were all stacked in this area, while only one lighting fixture was present, which was unclean and useless in lighting up this space (Figure 4-48). This area was totally isolated from the complex without any management, so we speculate that delinquent students could possibly use this spot as their secret gathering place.

The purpose of the visual audit was to identify existing problems so we could solve them in advance. Therefore, the author inevitably primarily searched for problems in the two Yatap Town complexes, even though several positive measures to prevent crime were also noticed.

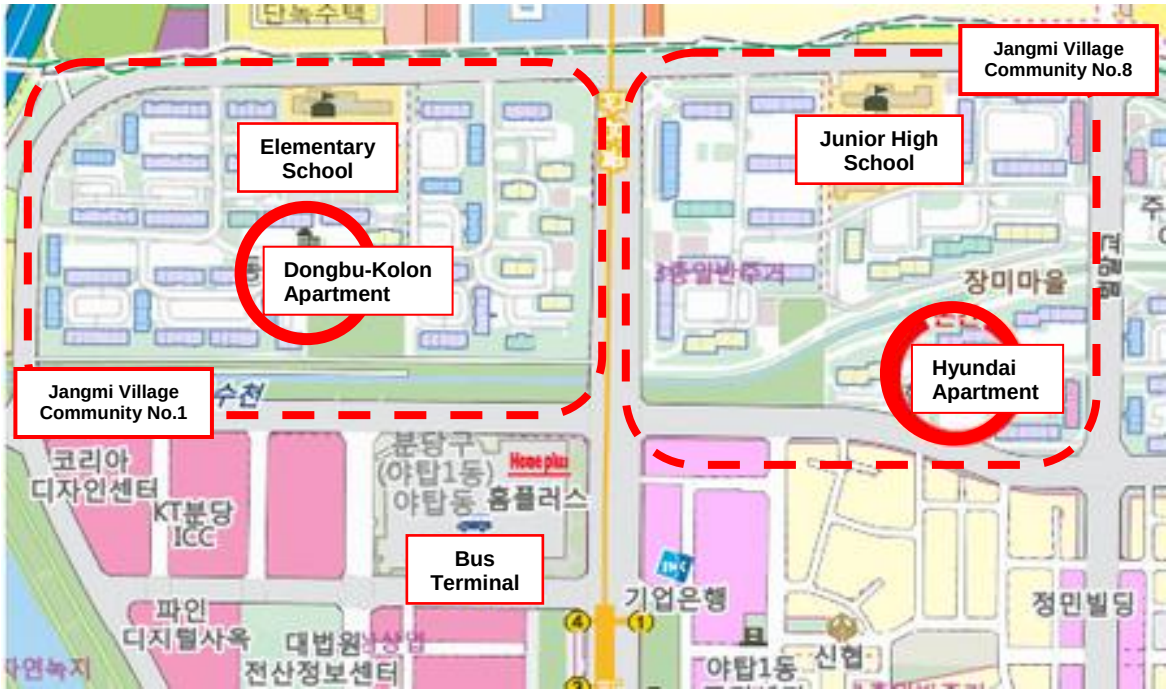

Figure 4-27. Site plan of Jangmi Village Community No.1 and No.8. (Source: Budongsan 114, www.r114.co.kr).

Figure 4-28. Main entrance of apartment complex in Yatap Town. Photograph by author.

Figure 4-29. View of the street inside the complex. Photograph by author.

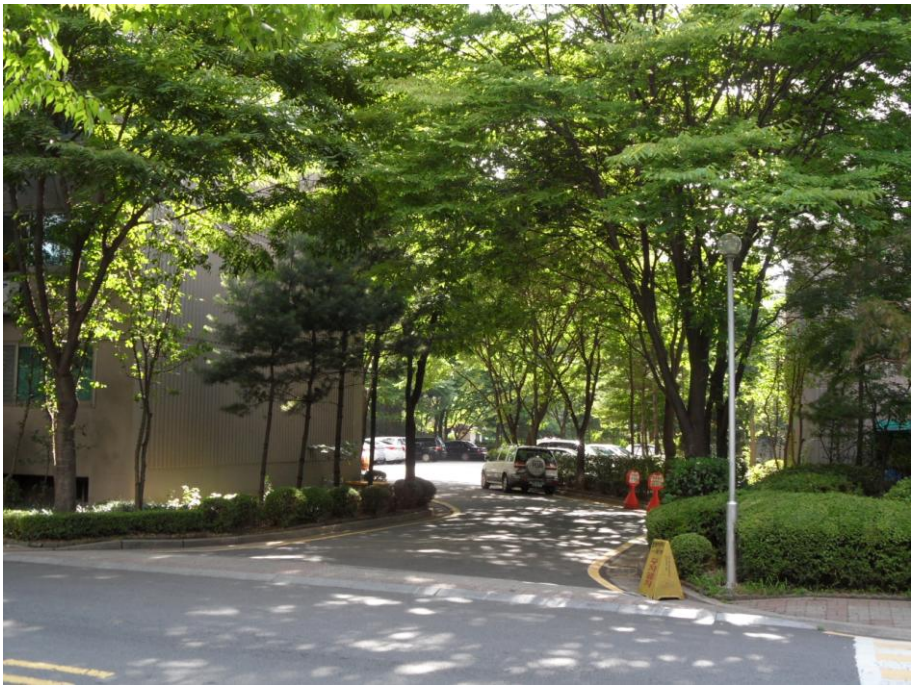

Figure 4-30. Tall trees are planted beside the buildings throughout the complex. Photograph by author.

Figure 4-31. Street lamp and overgrown vegetation. Photograph by author.

Figure 4-32. Overgrown vegetation. Photograph by author.

Figure 4-33. Structure in front of the window of first floor. Photograph by author.

Figure 4-34. Window of the basement of apartment building. Photograph by author.

Figure 4-35. Security janitor's office, CCTV camera, and street lamp. Photograph by author.

Figure 4-36. Rest area for residents. Photograph by author.

Figure 4-37. Benches and shelters for residents. Photograph by author.

Figure 4-38. Children's playground is located in an isolated space. Photograph by author.

Figure 4-39. Trees in front of the building block the view from homes. Photograph by author.

Figure 4-40. Vehicle entrance to underground parking lot. Photograph by author.

Figure 4-41. CCTV cameras installed in underground parking lot. Photograph by author.

Figure 4-42. View of underground parking lot. Photograph by author.

Figure 4-43. Staircase to underground parking lot. Photograph by author.

Figure 4-44. Broken automatic sensor light. Photograph by author.

Figure 4-45. Entrance of apartment building. Photograph by author.

Figure 4-46. Trees and shrubs near the building entrance are blocking the view. Photograph by author.

Figure 4-47. Isolated area where garbage and other thrown away materials are stacked. Photograph by author.

Figure 4-48. Unclean lamp. Photograph by author.

Figure 4-49. This place looks dangerous and not managed. Photograph by author.

Self-Reported Examination

In addition to the visual audit of the two towns, self-reported examination was conducted as a site assessment in order to support the visible observation of the two areas by the author. The self-reported examination includes: (1) CPTED audit checklist and (2) CPTED post-audit evaluation worksheet. Samples of these are provided in the Appendix section as a reference.

The main purpose of the site assessment was to emphasize existing safety factors in the communities, determine measures and design elements which will enhance the safety of the residents, and to identify design elements that are responsible for potential criminal activities. The outcomes from the site assessment could be used to support suggestions for identified problems.

The CPTED audit checklist contains a list of required CPTED principles for each location with separate sections to score points and check its existence. The score is given by the author at a scale of 0 to 5, 0 being the most negative and 5 being the most positive. If the author recognized the sign of CPTED, it is checked on the last section. Ten different areas were designated as the observation locations within the complexes. Sample checklist is presented in Appendix A to show the readers the areas being observed and the required principles. Tables 4-1 and 4-2 show the results of the CPTED audit conducted in four complexes in Pangyo and Yatap.

The overall score difference between the two complexes in Pangyo New Town and the two towns in Yatap Town clearly showed that the new town possessed more elements that express safety measures. Again, results may be subjective since the points were scored entirely by the author, but he tried to stay neutral. The average score was 228 out of 290 in Pangyo, and 130 in Yatap. The higher score in Pangyo tells

us that it considered safety measures in the CPTED guidelines. Also, Pangyo satisfied the average of 53 principles out of 58 suggested principles in the guideline, where Yatap only satisfied 23 of the principles.

The result shows that in the new town development plan, the developers considered crime prevention schemes significantly in order to increase the residents' quality of life by designing the dwellings to be safe and sound. Since one of the major concerns of choosing the houses is safety, it could be anticipated that people would favor the newly developed complexes with CPTED.

After auditing the site using the provided checklist, the author completed the CPTED post-audit evaluation worksheet in order to assess the two towns in terms of sense of security. This worksheet asks the researcher's observation and feelings of the visited sites in eleven different topics. Several questions were included under these topics beginning with the general impressions of the site. The topics included lighting, signage, sightlines, isolation, movement predictors, entrapment sites, escape routes, activity uses, maintenance, and territorial definition. The questions were answered by checking five perceptions: Poor, Bad, Fair, Good, and Excellent. Some of the questions asked for yes or no answers, or specific descriptions. Table 4-3 and 4-4 show the total and the average number of each perception recorded for all four apartment complexes visited.

The average number of positive perceptions which are "excellent" and "good" in Pangyo was 11.5 and 13 consecutively, while it was 0 and 0.5 in Yatap. On the other hand, the average number of negative perceptions which are "bad" and "poor" in Pangyo was both 0, while it was 16 and 8.5 consecutively in Yatap. Although the result

is based on the researcher's observation, one could conclude that the CPTED principles applied in Pangyo New Town are in a close relationship with increasing the residents' sense of security.

However, the visual audits and the evaluation worksheets completed after the audit do not fully provide much proof as to whether or not CPTED is actually performing well in reducing crime incidents in residential complexes. It is too hasty to form a conclusion with just observation and feeling. Therefore, the crime data collected by the police are retrieved in order to provide evidence to support the research and hopefully draw an expected result.

Analysis of the Police-Recorded Crime Data

The major method utilized in this research to evaluate the effectiveness of CPTED in Pangyo New Town was the analysis and comparison of the police-recorded crime data. These data are valuable and could be provided as evidence of effectiveness of CPTED. As highlighted in the methodology section, the crime data for both Pangyo New Town and Yatap Town was retrieved from the police for three consecutive years (2009 ~ 2011). The data includes the number of incidents occurred in each year in each town for five major crime types. Table 4-5 shows the collected crime data. The five major types of crime in the collected data are: murder, robbery, burglary, violence, and sexual violence. These types of crimes are the major crime activities occurring in South Korea classified and defined by the police.

As you can see from the provided table, except for the robbery cases in 2011, Yatap experienced more crime incidents than Pangyo during the period between 2009 and 2011. In this thesis, the burglary rate will only be compared for the analysis since burglary is the most frequent incident and concern in the residential complexes. Again,

burglary includes stealing valuables by breaking-into houses and cars, car theft, bike theft, shoplifting, and pick-pocketing. From the data in the Table 4-5, the total number of burglary cases is converted into rates per 100,000 people and then compared between both towns in order to find out the difference in burglary rates. ANOVA in SPSS is used to find out whether this difference is statistically significant. Table 4-6 presents the converted burglary rates per 100,000 people for both Pangyo and Yatap.

As presented above in Table 4-6, the burglary rates in Yatap, where CPTED is not applied, were significantly higher than that of Pangyo where CPTED was concerned and applied from the planning stage of the development. The difference between the burglary rates between Pangyo New Town and Yatap Town were found to be statistically significant (ANOVA, $P<0.05$). Table 4-7 presents the overall number of crime cases and crime rate in South Korea, to explain how high Yatap Town's crime rate is compared to Pangyo New Town.

The police-recorded crime data was considered the key factor in determining the effect of CPTED in residential complexes. Comparing the practical data actually collected by the police would be reliable evidence to support the hypothesis made in the beginning of this research that CPTED is effective in reducing crime rates in residential complexes in South Korea.

Although the data suggests that the crime rate in the apartment complexes in Pangyo New Town is lower than the complexes in Yatap Town, the result should be treated with care when generalized, since the number of samples chosen to be evaluated was small and other factors such as societal or economical issues that could

impact crime rates were not considered. The findings from this section do indicate some evidence for the success of CPTED in residential communities.

Table 4-1. Result of CPTED audit in Pangyo New Town

Areas	Total Score in Pangyo A	Number of "Yes"s in Pangyo A	Total Score in Pangyo B	Number of "Yes"s in Pangyo B
1. Main Entrance	33(35)	7(7)	33(35)	7(7)
2. Sub Entrance	23(35)	6(7)	25(35)	6(7)
3. Apartment Building	19(30)	4(6)	20(30)	4(6)
4. Security Janitor's Room	16(25)	4(5)	16(25)	4(5)
5. Fences & Hedges	20(25)	5(5)	21(25)	5(5)
6. Subsidiary Facilities	20(20)	4(4)	20(20)	4(4)
7. Parking Lot	42(55)	10(11)	41(55)	10(11)
8. Elevator	15(20)	4(4)	15(20)	4(4)
9. Apartment Corridor/Staircase	20(20)	4(4)	20(20)	4(4)
10. Exterior Gas Pipes	19(25)	5(5)	18(25)	5(5)
Total	227(290)	53(58)	229(290)	53(58)

Note: ( ) indicates the maximum value.

Table 4-2. Result of CPTED audit in Yatap Town

Areas	Total Score in Yatap A	Number of "Yes"s in Yatap A	Total Score in Yatap B	Number of "Yes"s in Yatap B
1. Main Entrance	15(35)	3(7)	14(35)	3(7)
2. Sub Entrance	16(35)	5(7)	16(35)	5(7)
3. Apartment Building	11(30)	3(6)	10(30)	3(6)
4. Security Janitor's Room	8(25)	1(5)	9(25)	1(5)

Table 4-2. Continued

Areas	Total Score in Yatap A	Number of "Yes"s in Yatap A	Total Score in Yatap B	Number of "Yes"s in Yatap B
5. Fences & Hedges	12(25)	2(5)	10(25)	2(5)
6. Subsidiary Facilities	11(20)	0(4)	11(20)	0(4)
7. Parking Lot	22(55)	2(11)	23(55)	2(11)
8. Elevator	10(20)	2(4)	10(20)	2(4)
9. Apartment Corridor/Staircase	15(20)	4(4)	14(20)	4(4)
10. Exterior Gas Pipes	11(25)	1(5)	11(25)	1(5)
Total	131(290)	23(58)	129(290)	23(58)

Note: ( ) indicates the maximum value.

Table 4-3. Result of post-audit evaluation

Perception	Pangyo Complex A	Pangyo Complex B	Yatap Complex A	Yatap Complex B
Excellent	11	12	0	0
Good	13	13	0	1
Fair	6	5	5	5
Bad	0	0	17	15
Poor	0	0	8	9

Table 4-4. Average of the results

Perception	Pangyo	Yatap
Excellent	11.5	0
Good	13	0.5
Fair	5.5	5
Bad	0	16
Poor	0	8.5

Table 4-5. Police-recorded crime data for 5 major crime types (2009 ~ 2011)

Year	Type of Crime	Pangyo	Yatap
2009	Murder	0	1
	Robbery	0	12
	Burglary	125	383
	Violence	96	378
	Sexual Violence	7	29
2010	Murder	0	0
	Robbery	0	3
	Burglary	118	336
	Violence	140	259
	Sexual Violence	5	34
2011	Murder	1	3
	Robbery	3	0
	Burglary	148	245
	Violence	148	301
	Sexual Violence	6	34

Source: Gyeonggi Provincial Police Agency

Table 4-6. Burglary rates per 100,000 people

Year	Pangyo (No. of cases)	Pangyo (Rate)	Yatap (No. of cases)	Yatap (Rate)	Significant difference
2009	125	282.25	383	527.09	$P<0.05$
2010	118	177.02	336	466.19	$P<0.05$
2011	148	189.38	245	344.96	$P<0.05$

Table 4-7. Overall number of crime cases and crime rate in South Korea (2009 ~ 2011)

Year	Overall Number of Crime Cases	Overall Crime Rate
2009	256,680	516
2010	268,007	524
2011	281,561	555

Source: Supreme Prosecutor's Office Korea, www.spo.go.kr

CHAPTER 5
DISCUSSION

This thesis was initially planned and designed to address the effectiveness of CPTED applied in the new town developed in South Korea by comparing the crime rates between the two selected towns and conducting visual audits. It was anticipated that comparing the crime rates between the CPTED town and non-CPTED town would support its performance as a crime prevention measure. Also, through this research, the author expected to investigate the problems of the current application of CPTED, and consequently provide suggestions to improve its performance.

New Town Development in South Korea

New town developments in Korea began in 1960s when there was a dramatic population growth in the capital city and need for industrial development. Therefore, the Korean government decided to develop the outskirt areas to decentralize the growing population and also create industrial districts ready for economic growth. However, more active new town developments occurred in the early 1990s. This was named the 1st generation new town and they were a set of new towns concentrated solely on transportation access, convenience of living, high quality education opportunities, and housing. Since, the main focus and the initial idea were to solve housing shortage problems in the capital city, there were no specific considerations on preventing anticipated crime incidents. The new design concepts for the new communities made some areas vulnerable for criminal activities, such as burglary, robbery, rape, and violence.

In the early 2000s, due to the rise of crime incidents and their seriousness, the police agencies and the local governments planned a new type of town development,

named the 2nd generation new towns, which considered safety concerns for the residents. In July, 2005, the National Police Agency and the local governments decided to adopt CPTED in the newly developed towns. Pangyo New Town was selected as the first development project to apply CPTED from the planning stage, and they created their own “Crime Prevention Design Guidelines”.

Analysis of the Findings

As described above, the safety issue is not somebody else’s matter anymore. It should be dealt carefully and considered significantly by related officials, such as local government and police, and scholars to make the city safe and pleasant for people to live in.

Pangyo New Town may be recognized as a good starting point and established as a standard for future developments in Korea. Through the visual audits conducted by the author, it was clear that CPTED principles were considered and applied within the residential complexes in Pangyo. Strict access control, CCTV cameras, well-organized vegetation, nicely designed and located lighting systems, and well managed surroundings are some of the safety measures immediately apparent during the visit. The author felt extremely comfortable and safe throughout the whole audit and wanted to stay there longer.

However, upon arrival to the complexes in Yatap Town, the author experienced a contrary feeling. Since this apartment complex was constructed approximately 20 years ago, the author did not expect many safety measures to exist and tried to be generous in the evaluation. Old-fashioned lighting systems, overgrown trees and bushes, easy access to the complex, and many isolated areas with garbage and thrown away goods

made this place unattractive. The environment and atmosphere in Yatap did not give the author safe and comfortable feelings.

After the visual audit, post-audit evaluation worksheet was completed by the author to assess the efficiency of the applications of the CPTED principles. The results of the worksheet indicate difference between the two towns in terms of safety measures being adopted. However, the limitation of the visual audit and the post evaluation is that they were all conducted by the author only and this could mean the information and the outcome may be less reliable than when it is conducted by more people and residents themselves.

The main focus of this thesis, however, was to compare the crime rates between Pangyo New Town and Yatap Town to find out whether CPTED is performing well as anticipated. Although the crime rate is not the only factor to decide its effectiveness, it is considered one of the clear signs of performance to support it as effective. It could be carefully stated that low crime rates in Pangyo compared to Yatap provide some evidence that CPTED has worked to some degree in reducing the crime rate. One has to keep in mind, however, that there are other factors, such as economic and social conditions, that should also be considered as element that impact crime rates.

In order to conduct a comparative study, the variables need to be similar to be reliable for generalization. In this research, we considered many factors before we chose to select Yatap Town as the comparable sample in this study. For example, the number and types of population, geographical size of the area, and distance from Pangyo were considered cautiously to make the results as significant as possible. However, many important factors such as income levels and employment status were

unable to be procured, although these elements were considered to be in close relationship with the crime rates.

The wealth status of the residents could be determined by looking at the housing values but there is a limit to this. To understand the reason, you need to know the cultural difference and the housing issues in Korea versus the US or the UK. There are various traditional factors that people consider when choosing their homes in Korea, such as the name value of the apartment (i.e. company that constructed the complex), public transportation availability, quality of schools, convenience of living, and surrounding environments. Residents of Yatap Town are mostly people who had been living in that area for a long period of time. An employee at the real estate office in Yatap Town stated that some of the reasons for choosing Yatap are: proximity to Seoul, high quality schools, easy commute to work (proximity and transportation issue), and of course convenience of living.

On the other hand, people who choose new towns like Pangyo, are those who like quiet and clean atmosphere although it is far from Seoul. They prefer new apartments to old ones. Another reason could be because it is considered safer than older apartment complexes. Therefore, even though the housing value of the two towns differs greatly, it could not be concluded that residents of Pangyo New Town are wealthier than the residents of Yatap Town.

Another factor to look at was the distribution of the residents in terms of age groups. This was because, if one town has more young male population (age from 10 to 39 in this research) than the other, this could impact the crime rate to some degree. To find this out, the population data for two towns were divided into 11 age groups (Figure

5-1). The result showed that the population for young males was similar between Pangyo and Yatap, so it was not deemed as the crucial factor that impact the difference in the crime rates.

Overall analysis of the findings suggest that CPTED has been applied efficiently and it is performing well in reducing crime activities so far in the sample residential complexes chosen in this research. The author admits that there are limitations in this research and results should be treated with care before they are applied to other studies. Therefore, the findings from this research should be limited in their use as an indicator of evidence of the effect of CPTED in South Korean residential communities. In addition, hopefully the result of this research could be used to support the continued use of CPTED in other places in the future and improve its application in South Korea.

Yatap Town						
Age Group	2009		2010		2011	
	Male	Female	Male	Female	Male	Female
0~9	3,891	3,727	3,628	3,554	3,493	3,360
10~19	5,009	4,502	4,825	4,420	4,562	4,196
20~29	5,582	5,863	5,483	5,725	5,440	5,531
30~39	7,112	7,107	6,867	6,881	6,616	6,741
40~49	5,892	6,484	5,919	6,330	5,779	6,179
50~59	4,755	4,610	4,972	4,980	5,173	5,257
60~69	2,214	2,395	2,323	2,466	2,341	2,488
70~79	973	1,486	1,051	1,516	1,113	1,570
80~89	263	686	293	710	297	736
90~99	37	74	34	92	32	114
Over 100	0	1	2	3	0	4
Total	**35,728**	**36,935**	**35,397**	**36,677**	**34,846**	**36,176**

A

Pangyo New Town						
Age Group	2009		2010		2011	
	Male	Female	Male	Female	Male	Female
0~9	2,722	2,735	4,213	4,027	5,166	4,787
10~19	3,336	3,120	5,019	4,850	5,857	5,625
20~29	2,622	2,814	4,006	4,284	4,684	4,899
30~39	3,845	4,290	5,525	6,410	6,216	7,282
40~49	4,496	4,380	6,720	6,607	7,882	7,818
50~59	2,843	2,767	4,387	4,236	5,314	5,103
60~69	1,200	1,244	1,798	1,816	2,079	2,110
70~79	472	804	735	1,166	907	1,366
80~89	137	396	186	566	230	689
90~99	10	52	20	83	24	101
Over 100	0	2	0	6	1	8
Total	**21,683**	**22,604**	**32,609**	**34,051**	**38,360**	**39,788**

B

Figure 5-1. Population data for Pangyo and Yatap (2009 ~ 2011). A) Yatap, B) Pangyo. (Source: Korean Statistical Information Service, http://kosis.kr)

CHAPTER 6
CONCLUSION

The main objective of this study was to investigate whether CPTED applied in the residential complexes in South Korea is performing effectively as anticipated, by conducting a comparative study between CPTED town and non-CPTED town. Pangyo New Town was the town that adopted CPTED from its planning stage, while Yatap Town was the non-CPTED with which Pangyo New Town would be compared.

The first chapter of the thesis introduces the problem statement which addresses the concept of CPTED and its importance as a crime prevention measure. The research objective, which emphasizes the necessity of a comparison study to evaluate the effectiveness of CPTED, was also introduced. Lastly, this chapter provides a short description of the two towns selected for this research to provide background information.

The following chapter involves the literatures reviewed by the author prior to conducting this study. Some of the important terms such as CPTED, defensible space, situational crime prevention, and environmental criminology are defined through the review of numerous articles. The description of CPTED-related studies conducted in South Korea was listed in order to assert the importance of this research. The paper written by Armitage and Monchuk (2010) was also introduced to explain how the effectiveness of CPTED in other countries was evaluated.

The third section describes the methodology utilized to accomplish the study. The methods include: visual audits, self-reported examination, analysis of police-recorded crime data, and short interviews. In addition, the limitations of the study are also addressed to explain obstacles and problems experienced during the research.

Following the methodology is the findings and analysis section. This section presents the results of the visual audit, including personal photographs taken by the author during the visit to the sites, the outcome of the evaluation worksheet, and the context of the short interviews. Then, in the next chapter, findings are discussed in detail by explaining the history of new town development and the crime issues in South Korea. This is followed by an analysis of the findings.

The central question for this research was “Is CPTED effective in South Korea?” In fact, there was no clear evidence that CPTED is effective in reducing crime rates citywide so far. It is only “assumed” or “expected” to reduce crime activities. In order to assess its effectiveness, more thorough research and solid evidence is required.

However, by conducting this study and achieving desired results, the author realized that CPTED could be effective in reducing crime incidents in some areas of South Korea. This research was considered to be worthwhile research since it was successful in presenting positive results of CPTED adoption, and it could be carefully concluded that CPTED is performing as effectively as anticipated since its appearance to the world.

Prior to concluding the paper, the author suggests some recommendations for anticipated future CPTED research. First, use variety of neutral field researchers for the research, in order to achieve more broad and accurate results. Second, find out the effect of CPTED by re-evaluating this research every several years on a regular basis. This will allow researchers to provide evidence of the effect of CPTED, like Armitage and Monchuk’s paper has proved in their research. Finally, the author would like future researchers to deal with CPTED certification issue in their papers, which is also another

positive movement for developing safe community. Some of the major South Korean construction companies are beginning to adopt CPTED in their development plans and require certifications for approval from CPTED authorities. Therefore, thorough research on developing and standardizing CPTED regulations is considered important and necessary.

APPENDIX A
CPTED AUDIT CHECKLIST

CPTED Audit Checklist

Location :

Date :

1. Main Entrance

CPTED Principles				*Score	**Yes/No
Main entrance emblem					
Paving material difference(Inside/Outside)					
CCTV at the main entrance					
Gated entrance					
Gated entrance connected to control center					
Vehicle only road within the community					
Too many entrances to the community					
Total Score		Acquired Score			

2. Sub-Entrance

CPTED Principles				*Score	**Yes/No
Sub-entrance emblem(Symbolic sign, territorial elements)					
Visiblilty from the balcony					
CCTV at the sub-entrance					
Exercising equipments adjacent to the sub-entrance					
Visible or landscaping fence					
Lighting systems adjacent to sub-entrance					
Security janitor's room					
Total Score		Acquired Score			

3. Apartment Building

CPTED Principles				*Score	**Yes/No
Lighting systems at the entrance					
No trees or shrubs blocking the view					
Transparent glass door, RFID panel for access, CCTV at the entrance					
Cover the gas pipes on the wall of the building					
CCTV at the emergency exit at the rooftop					
Tempered glass, security alarm					
Total Score		Acquired Score			

4. Security Janitor's Room

CPTED Principles				*Score	**Yes/No
No obstacles blocking security janitor's view					
CCTV monitors in the janitor's room					
Janitor's room at every entrances					
Ability of security officer to observe the children's playground					
Connection with private security agencies					
Total Score		Acquired Score			

5. Fences & Hedges

CPTED Principles				*Score	**Yes/No
Fences or hedges for territoriality					
Fences installed in isolated areas to prevent intruders					
No entrance signage on the fences					
Landscape fences-All season trees, height 1~1.5m					
Higher fences (over 2m) where noxious facilities are present near the apartment complex					
Total Score		Acquired Score			

6. Subsidiary Facilities

CPTED Principles				*Score	**Yes/No
Locate children's playground where natural surveillance is possible					
Exercising equipments within the complex					
Public areas should be in the center of the complex for natural surveillance					
Locate bicycle racks near building entrances					
Total Score		Acquired Score			

7. Parking Lot

CPTED Principles				*Score	**Yes/No
Visibility of the parking lot entrance from the pedestrian passways					
Lighting systems at the entrance					
Clear way signs on the wall, pavement					
Glare-free lighting					
Sunken style or roof					
Gated entrance and CCTV					
Emergency alarm located every 25m					
Separate visitor's parking space					
Disabled parking space					
Walls and pillars located in equal distances apart					
Light lamps on the parking spaces					
Total Score		Acquired Score			

8. Elevator

CPTED Principles				*Score	**Yes/No
CCTV(Inside the e/v and e/v hall)					
Large capacity e/v(17persons) should have more than 2 control panels					
See through e/v					
Visibility of the e/v entrance from the building entrance					
Total Score		Acquired Score			

9. Apartment Corridor/Staircase

CPTED Principles				*Score	**Yes/No
Safety signs at the corridor					
CCTV at stairways					
Automatic sensor lighting system at the stairways					
Corridor without curves					
Total Score		Acquired Score			

10. Exterior Gas Pipes

CPTED Principles				*Score	**Yes/No
Avoid window areas for installation of the exterior gas pipes					
Nothing should be installed on exterior wall that could be used for climbing up					
Gas pipes should be covered with specially designed covers					
Install access prevention measure underneath the gas pipes					
Break-in prevention system near exterior gas pipes					
Total Score		Acquired Score			

Total Score		**Total Acquired Score**			

*Score: 0~5 scale

**Yes/No: CPTED considered (Yes=1, No=0)

APPENDIX B
CPTED POST-AUDIT EVALUATION WORKSHEET

CPTED Post-Audit Evaluation Worksheet

Location :

Date :

1. General Impressions	Poor	Bad	Fair	Good	Excellent
What is your first impression of this place? (in terms of safety)					
How comfortable do you feel?					

2. Lighting	Poor	Bad	Fair	Good	Excellent
How good is the lighting?					
Does it evenly illuminate the area?					
**Are any lights broken?					
Are there any signs indicating who to report this to?					
Trees or bushes do not obscure lighting?					
How well are pedestrian walkways illuminated?					
Are you able to identify a face 25 meters away?					
Does lighting illuminate directional signs or maps?					

3. Signage	Poor	Bad	Fair	Good	Excellent
Are there directional signs nearby?					
Are there signs to show you where to seek emergency assistance?					
**What signs should be added?					

4. Sightlines	Poor	Bad	Fair	Good	Excellent
Can you see clearly what's ahead?					
**Are there hiding places?					
Are landscaping planned not to block sightlines?					
**What would make it easier to see? (angled corners, mirrors, trimmed bushes, etc)					

5. Isolation	Poor	Bad	Fair	Good	Excellent
**Does the area feel isolated?					
Is it easy to predict when people will be around?					
Do you feel safe waiting for public transport here?					
Is the area patrolled or monitored with surveillance equipment?					
Is the area designed to facilitate natural surveillance? (e.g. windows on the street vs blank walls)					

6. Movement Predictors	Poor	Bad	Fair	Good	Excellent
How easy is it to predict a pedestrian's route?					
Is there an alternative well-lit route?					
Can you see what is at the end of this route?					

7. Entrapment Sites	Poor	Bad	Fair	Good	Excellent
**Are there recessed areas that could be locked? (e.g. laneways)					
**Are there small confined areas where someone could hide? (between garbage bins, doorways, construction sites)					

8. Escape Routes	Poor	Bad	Fair	Good	Excellent
How easy would it be for an offender to disappear?					
**Is there more than one exit?					

9. Activity Uses	Poor	Bad	Fair	Good	Excellent
How much activity is there in the area?					
Does the activity levels provide for passive surveillance of the area?					
Are activity uses compatible with each other?					

10. Maintenance	Poor	Bad	Fair	Good	Excellent
**Is there evidence of graffiti or vandalism?					
**Is there litter lying around?					
Do you know who to report maintenance to?					
Does the place feel cared for?					
**Are there other materials/textures/colors/features that would make the place feel safer?					

11. Territorial Definition	Poor	Bad	Fair	Good	Excellent
Is the site clearly defined?					
Are transitional zones defined?					
Is there conflicting use of space?					
Is there a clear definition between public and private space?					

**: Requires Yes or No answer, or description

APPENDIX C
SHORT INTERVIEWS

This appendix contains context of short interviews taken during the visit to South Korea. The research involved two short interviews with Dr. Hyeonho Park and Lieutenant Gyeongseok Oh. These two people assisted the author to achieve necessary data during the visit to South Korea. Interviews were not scheduled ahead. It was more like a casual conversation that happened when the author met with these two people to discuss the thesis topic. However, it contained some valuable information about safety issues in Korea, and their lifetime experiences. Although it is presumed that it will not impact the results drawn from other methodologies, the author decided to include this information under the sub-heading “Short Interviews” because it helped the author to understand more about CPTED in depth, and efforts being made in Korea in order to reduce crime rates.

The first interview was with Dr. Hyeonho Park, who is both a professor in the department of police administration in Yongin University and a recognized expert in CPTED. Talking with someone who is in an academic field of crime science helped to understand and approach CPTED from an academic point of view.

During the interview, he emphasized the importance of crime prevention measures and asserted that more CPTED related research is needed. Dr. Park also stated the importance of the roles of experts and local government in CPTED. There is lack of CPTED experts in Korea so far to accomplish the desired objective of reducing crime rates. The National Police Agency and scholars are putting great efforts to institutionalize CPTED in the local ordinances and development plan policies, but we need more experts from various fields, such as criminology, urban & architectural

engineering, and other social science divisions. It would be even better when there is someone with experiences in two or more of these fields together. The following is the attachment of the context of the interview with Dr. Park.

1. How did you get interest in the field of CPTED?

    - Working as a police officer, I faced many kinds of crime incidents in the city and noticed the importance of the crime prevention measures. While studying in UK, Dr. Mark Button who taught crime prevention and industrial security recommended this topic as my master's thesis. After all, my interest in CPTED and security issues in my home country allowed me to continue my study in the Ph. D program and become an expert in this field.

2. You are the director of the Institute of Crime Science. What is the main objective of this institute and what do you do?

    - Our institute works closely with experts of behavioral science, geography, information and communication technology, urban and architectural engineering, economics, criminology, and so forth in order to solve existing crime issues by developing advanced interdisciplinary crime preventing measures. We benchmarked the institute of crime science in University of College London (UCL).

3. How much interest do the cities in South Korea have on CPTED so far?

    - The National Police Agency showed interest in CPTED from the end of year 2000, and recently the Ministry of Public Administration and Security, the Ministry of Knowledge Economy, and the Ministry of Land, Transport and Maritime Affairs are also trying to get involved in the adoption of CPTED. Currently, the local government are developing new ordinances including safety measures and CPTED, and growing number of cities are showing great interest in including CPTED in their development policies.

    - Academically, Korea CPTED Association was established in 2010 to provide foundations for future academic research.

4. What do you think is the Korean people's perception of CPTED in terms of crime prevention measure?

    - People are getting aware of the concept of CPTED due to recent exposure on the media to the public.

- However, there are still people who do not know about CPTED. So more publicity activities are required by the local government to let the public know the effect and importance of the crime prevention measures.

5. In your opinion, do you think CPTED is really effective in reducing crime?

   - I think it definitely helps prevent or at least reduce the crime incidents that are related to citizens' quality of life. Also, there are numerous studies that address the effectiveness of CPTED, so I think it will definitely be effective in reducing crime incidents in Korea.

6. What efforts did you make in order to apply CPTED in Korean cities?

   - Since the end of year 2000, I was involved in development of CPTED guidelines with the National Police Agency, the standardization of CPTED principles, consulting work to the local governments, and other CPTED related consultations and projects.

7. What is your future plan as a CPTED expert?

   - I would like to make CPTED as the policy, not an option, for city redevelopment and new town developments. I will continuously work close with national authorities to institutionalize CPTED.

8. To become the next expert in CPTED, people from which academic field is the most appropriate?

   - We need people from various different fields such as criminology, urban planning, architecture, and also police administration. People who have practical experiences with knowledge in the mixture of these fields would be a perfect candidate to become the next expert.

The second interview was with Lieutenant Gyeongseok Oh. Since he was currently working as a police officer at the Gyeonggi Provincial Police Agency, the author could hear about the ideas and thoughts on CPTED from the law enforcement point of view. He insisted the significance of growing number of crime incidents and types of crime in Korea. The types of crime are changing from simple house break-in burglaries to intensive robbery involving abduction or even murder. He also mentioned that sexual violence was another big issue. Recent cases of sexual assaults involving

female and children show the importance of the local government and police to provide protective measures to prevent these crime incidents.

Lieutenant Oh stated that in order to stop crime, more incorporated efforts are needed by the local governments and the police. Adopting CPTED could be a good way to prevent crime, but adopting and just leaving it to work by itself is irresponsible. We need to develop more advanced and organized system to continuously monitor and evaluate the effects of the crime prevention measures and correct the problems detected. He finalized the interview by stressing the importance of people's interest in the safety issues and residents' attention to their living environment before asking for direct support from the government or the police.

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BIOGRAPHICAL SKETCH

Taehoon Ha was born in Seoul, South Korea, in April, 1982 as a second son in the family. He spent six years of his childhood in England, since his father was assigned to work at the overseas branch office when he worked at a construction company. Thankful to his parents, Taehoon had a great opportunity to observe foreign culture and learn English while living in England. This helped Taehoon to be able to understand and speak English fluently.

Taehoon attended Konkuk University in Seoul, South Korea, in 2001, and received his bachelor's degree in architectural engineering upon graduation in 2008. His interest in architecture continued after graduating from Konkuk University, and entered the major construction company, Daewoo Engineering and Constructions. He worked as a construction engineer for two years until he decided to pursue a master's degree in urban and regional planning in the United States.

Taehoon is enthusiastic about playing baseball. He plays baseball every week with his fellow Korean students at UF, ever since he arrived in Gainesville. Getting involved in an active sport, Taehoon was able to keep motivated physically and academically. After graduation, he is hoping to proceed with his education in the doctoral program in urban and regional planning, and become a renowned expert in this field.