

Analysis of Community Safety Conditions of an Old Public Housing Project: Case Study of Klong Chan Flat, Bangkok

Tanaphoom Wongbumru^{1,*} and Bart Dewancker²

¹ Faculty of Architecture, Rajamangala University of Technology Thanyaburi, Pathumthani 12110, Thailand

² Faculty of Environmental Engineering, The University of Kitakyushu, Fukuoka 808-0135, Japan

Abstract

Safety, in regards of all aspects, is considered a major priority to community. The residents perceived their safety through physical surroundings of living places. Accordingly, a long-established, old public housing community with open access, Klong Chan Flat, was chosen to be examined regarding safety issues through field survey and questionnaire. The results showed Klong Chan Flat is divided into three scale of safety-concerned areas; dwellings (installed with window and door grilles), buildings (provided with CCTV, lighting, and motorcycle docking), and community (stationed with a police check-point). The overall satisfaction towards community safety of residents staying in buildings with fully provided CCTV, lighting, motorcycle docking, and unsafe community area resulted in a significant relationship of these variables at .05. The motorcycle docking and lighting are found to be an important element of building safety with its high correlation value at .631 and .507 respectively. In addition, five significant spots evidenced with high criminal incidents were identified through an interview from residents and police information. Consequently, more surveillance must be acted upon and focused on physical conditions as well as building maintenance and management. These results conferred a baseline data of initial investigation of old public housing project towards safety issues. Thus, these significant factors are to be determined in terms of safety management to enhance standard and quality of living of the residents staying in Klong Chan Flat and contributed to more in-depth study afterwards.

* Corresponding author.

E-mail:

tanaphoom_w@exchange.rmutt.ac.th

Keywords: Community safety, Crime, Safety management, Public housing

1. Introduction

Housing has a relationship with safety as more than just a building, but also includes several aspects of a social, psychological, cultural and economic nature (Lawrence, 2002). Housing in a neighborhood might also affect the crime rates by influencing the propensity of existing residents to engage in crime (City of Darebin, 2012). The physical conditions of low-income housing, in particular high-density public housing, may increase criminal activity within the project (Newman, 1973). According to Wilson and Kelling (1982) in Matthew and Emily (n.p) stated that the housing projects age, the deterioration of the physical environment may directly encourage criminal behavior; as dilapidated, disordered structures may signal that more serious criminal behavior is tolerated in an area, or that the probability of being apprehended for unlawful acts is low. In Thailand, the National Housing Authority (NHA, 2014) of Thailand, established in 1973, initiated a social housing policy based on national development plans of walk-up flats with minimum standards of dwelling unit functions and community facilities. This typical form, affordable house for low-income and middle-income citizens has been provided throughout the country, especially in urban areas such as Bangkok and its vicinity. These public housing projects are now facing run-down conditions as they have aged more than 10 - 30 years. For example, Din Daeng Flat, Huay Khwang, Bonkai, Klong Toei, Bangchan, Klong Chan Flat, and Thung Song Hong Community are encountering poor conditions as shown in Table 1.

In addition, according to the crime statistics in Bangkok (1 October, 2014 - 30 September, 2015), the area under the responsibility of the Lat Phrao Police Station is ranked the first in robbery (701 cases) and was higher than the Thonglor Police Station (575 cases), and the Min Buri Police Station (542 cases), respectively (Daily News, 2015). Klong Chan Flat was

Table 1. The listed public housing projects in Bangkok with old conditions.

No.	Project	Built	Units	Accessibility	Years
1	Din Daeng, Din Daeng District	1977	4,868	Closed access (Concrete fence)	39
2	Huay Khwang, Huay Khwang District	1978	1,760	Closed access (Concrete fence)	38
3	Bonkai, Soi 1, Pathumwan District	1978	2,204	Open access	38
4	Klong Toei, Klong Toei District	1978	4,448	Open access	38
5	Bang Chan, Min Buri District	1979	1,252	Open access	37
6	Klong Chan, Bang Kapi District	1979	5,814	Open access (case study)	37
7	Thung Song Hong, Dong Muang District	1984	1, 314	Closed access (Concrete fence)	32
8	Thonburi, Bang Bon District	1993	4,108	Open access	23
9	Laksi, Lak Si District	1993	2,420	Closed access (Concrete fence)	23
10	Romkow, Lat Krabang District	1996	6,581	Closed access (Concrete fence)	20
11	Aur Ngeng, Sai Mai District	1998	2,262	Open access	18

Source: National Housing Authority and complied by author, 2015.

ranked the 2nd highest risk area of the Lat Phrao Police Station, while Lat Phrao Soi 101 and Klong Saen Saeb were ranked the 1st and 3rd, respectively (Khaosod, 2015). Therefore, considered as a large low-income public housing project located in the high crime area of Lat Phrao Police Station, Klong Chan Flat was chosen as a case study to identify the existing safety conditions as well as the safety management of how residents and Condominium Juristic Persons (CJP) protect their living area from criminal problems. Furthermore, perceptions towards community safety and risk areas were investigated in order to provide the useful information contributing to security management in specific areas as well as most importantly, for the safety of residents.

2. Literature Review

Low-income community safety:

Safety relates to discipline for public health, sociology, geography, criminology, architecture, political science, and urban planning (Whitzman, 2008, pp. 197-211). It is a subjective condition regarding a sense of ontological security based on a basic need of humans. Housing is one

of basic human requirements and relates to concerns about safety from various perspectives (Bonney, 2007, pp. 411-429; Ormandy, 2009). Also, the housing area and local amenities play a part in the influence of safety (Macintyre, Maciver, & Sooman, 1993, pp. 213-234). Many researchers have predominately focused on the conditions in individual dwellings rather than paying attention to the quality of neighborhood safety (Lujanen, 2001), although the level of crime in a neighborhood has been recognized as a key stressor in the residential environment (Kullberg, 2010). According to Wilson (1987), the study of poverty inner city neighborhoods in the U.S. have been documented since 1970. The growth of neighborhoods with extreme levels of poverty has created a social transformation. It has very detrimental consequences for the residents of poor neighborhoods; and very high crime levels are one of the most serious factors. In particular, extremely disadvantaged neighborhoods are characterized by a high degree of social isolation from mainstream society (Lauren & Ruth, 2013, pp. 619-648). As a result, the residents of poor neighborhood would have a less access to jobs. These qualitatively distinct features of the social environment lead to the unusually high levels of crime.

Resident safety based on physical environments:

Safety is the state of being protected from harm or other non-desirable events as well as in relation to crime control that is strongly related to residents' perception of feeling unsafe (Kawachi, Kennedy & Wilkinson, 1999, pp. 719-731). Braubach & Fairburn (2010) stated that socio-economic factors seem to involve residential segregation which is based on where people settle down and live in. Low socio-economic conditions are associated with the housing environment such as crime, fear of crime and social behavior (Davidson, 2009). Another factor of safety is residents' perception of their neighborhood, which may also influence their physical activity (Wendel Vos, Droomers, Kremers, Brug & van Lenthe, 2007, pp. 425-440). Public areas are most relevant to surrounding neighborhoods in that people's perception of safety can result in avoiding walking in a place of poor physical environments in daytime or nighttime, due to lack of maintenance in public areas contributes to fear due to graffiti, wall paintings, and insufficient public lighting. Also, the design of those buildings or places might increase crime in closed spaces and result in violence as well (Kihl, Brennan, Gabhawala, List & Mittal, 2005). A poorly maintained community with unorganized physical surroundings and abandoned areas shows the result of unawareness of the management and reduces the

potential of a community (Wilson & Kelling, 1982, pp. 29-38). In a study of the relationship between residents' evaluation of the residential environment and the present physical environment, it was found that the improvement in the amenities of the living environment and townscape in Nagano City was important for enhancing the residents' consciousness and safety (Fuji & Kawata, 2007, pp. 799-802). Regarding community safety research in Bangkok, Srisopon (2012) has studied sense of safety from crime on the environment of an old community in an urban area of Bangkok by a field survey, observation, and interviews, which found that the sense of safety is varied by groups of population, such as natives and migrants. Particularly, this could possibly be considered another factor concerning safety management. Yiamphan (2010) analyzed the hot spot of crime in Bangkok to help planners or police identify high-crime areas, types of crime being committed, and the best way to respond. An application of the Geographic Information System (GIS) is recommended to be useful in developing strategic program and financial plans for the maintenance and development of victim services. Mhankatidham (2015) found that in the slum areas in Bangkok, there was a yearly crime rate average about 32.8% due to the risky major areas, including invisible points, areas without lighting, and secluded paths during 18.00 – 24.00 pm.

Safety management:

A healthy and safe neighborhood can be a successful development including five main features 1) physical environment, 2) good environments at home, work, and play, 3) facility services and well-maintained outdoor environments, street cleaning and sufficient lighting, 4) social functions with norms, values, and a degree of community integration, and 5) self-esteem of the residents depending on who moves in and out (Macintyre, Ellaway & Cummins, 2002, pp. 125-139). To promote neighborhood safety, there are three different approaches (Australian Institute of Criminology, 2015). First, the environmental approach which includes situational crime prevention techniques and broader urban planning initiatives as well as modification of the physical environment to reduce the opportunities for crime to occur. Second, the social approach, which focuses on the underlying social and economic causes of crime in the community (e.g. lack of social cohesion, limited access to housing, unemployment, poor education and health services). And third, the criminal justice approach, which refers to various programs delivered by the police, the courts and correctional institutions that aim to prevent recidivism among those people who have already

engaged in offending behavior. Therefore, based on the literature review, it has shown that the community safety is an important issue to bring about the quality of living. Extending research on community safety to identify safety issues in urban areas such as Bangkok will contribute and fulfill to the body of public housing development. The physical environment of low-income residents and their ways of living are determined by choosing one of the old public housing projects of the National Housing Authority (NHA) located in Bangkok (Figure 1).

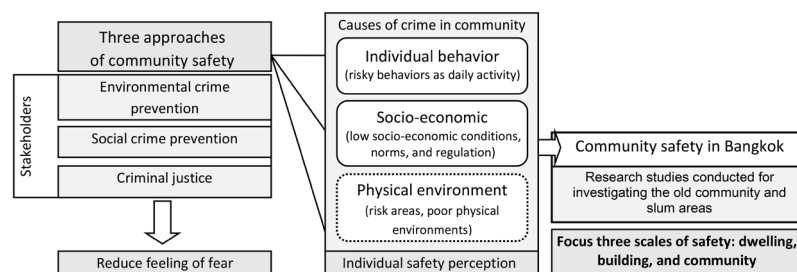


Figure 1. Summarized literature review on community safety.

3. Research Method

3.1 Case Study Profile

Klong Chan Flat Project, one of the first prototypes of low-cost public housing developments and also one of the largest open access communities in Thailand, was chosen for this research study. Klong Chan Flat was established in 1979 comprising of 30 buildings with a total of 5,814 living units. The project is located in Bang Kapi District, Bangkok (Figure 2) covering an area of approximately 0.485 sq.km.

3.2 Data Collection and Analysis

Firstly, the physical surrounding of Klong Chan Flat community was investigated towards safety concerns. Three scales of physical features namely dwellings, buildings and community, as defined by context of living places ranging from small to large, were taken through field survey conducted throughout 30 buildings. The overall safety perception of residents was also examined by a questionnaire survey with 370 respondents, calculated from the total of 5,814 dwelling units with a 95% confidence level (Yamane, 1967). The questionnaire included personal profiles of respondents and specific questions on safety of the neighborhood on a 5-point Likert scale. Afterwards, the relationship between residents' safety satisfaction (dependent variables) and three scales of physical features (independent variables) was analyzed by chi-square and correlation method. Additionally, the criminal

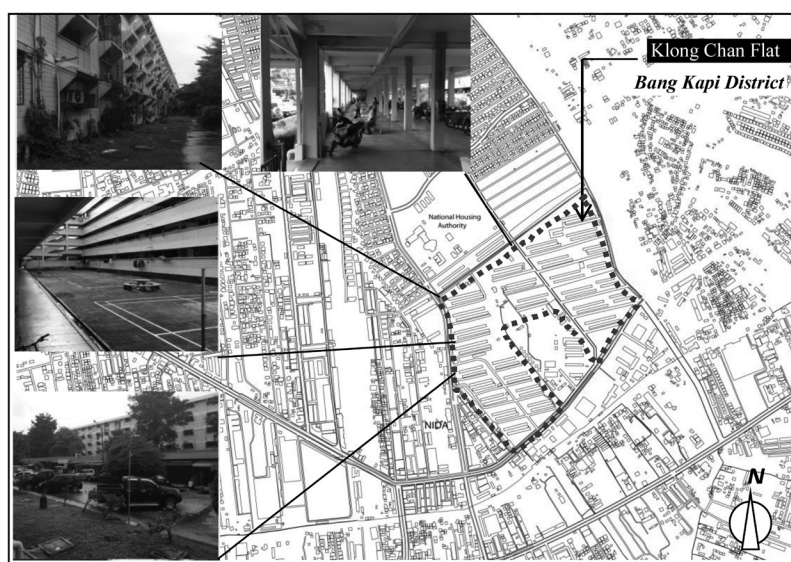


Figure 2. Klong Chan Flat location and current physical surroundings.

incident statistics of a 5-year period in the community were collected from the district police station in order to analyze the related influencing factors that could affect the criminal events in the community. The interviews were conducted with 15 representatives, in charge as building managers, of the Condominium Juristic Persons (CJP is a group of local residents selected by occupants, including Flats No. 1, 3, 7, 8, 10, 15, 16, 17, 20, 23, 24, 26, 28, 29, and 30) as well as police officers stationed at Lat Phrao Police Station to identify the criminal problem areas of the community. Finally, the current roles of relevant stakeholders in managing

community safety were addressed in order to determine the obstacles towards safety management together with any challenging conditions found at Klong Chan Flat.

4. Results and Discussion

4.1 Analysis on Existing Safety Conditions and Residents' Satisfaction

The community safety in Klong Chan Flat was investigated in three aspects as follows:

Dwelling units:

The results of field survey, distributed to residents throughout 30 buildings, found that a solution for preventing any criminal approaches is to install a steel grille on windows and doors (Figure 3). However, the steel grilles are not normally allowed to be installed in case the unit is on rental agreement as building modification is not permitted by NHA. This solution has long been a common type of security for Thai residents. Staying in low-income communities is critical to encounter the risk of crime due to disadvantageous socio-economic structures (Freedman & Owners, 2010). "Normally, a thief breaks into a room where the owners are not in, a stranger

walks in the building, illegal activity in the room; drug abuse and playing cards, which have been a concern regarding residents' safety". "Drug abuse is the most serious problem and the groups of offenders are usually aged in a range between 15 – 23 years old. These problems are not well managed as some building managers do not pay attention to them". "The criminal incidents are often reported to the local police station by the residents" (Mrs. Supawadee Klinsana (44-year-old), interview, 2015).

Building units:

As the community is an open access, safety assessment to protect the residents of each building (30 buildings) has been implemented by the Condominium Juristic Persons (CJP). The building security management is based on personal CJP discretion. The three main responsibilities of the CJP regarding safety are as follows:

1) Installation of closed-circuit television (CCTV) 16 points out of 29 buildings, excluding Flat No. 29 which was contributed by NHA in 2001 through a special community development fund allocated under the government budget amendment (field survey, 2015). However, the CCTV points were found to be improperly and inefficiently placed as stated by residents' requirements to have them located on each floor, not only on the ground floor, aiming to control and look after any suspicious behaviors. Although the CJP representative mentioned that CCTV could help residents feel safer at home, the electricity fees and maintenance costs of CCTV are quite high while a budget of building expenditure is critically limited. (Mrs. Kanitha Sheena (48-year-old), interview, 2015) (Figure 4).

2) Installation of public lightings on buildings' ground floor for Flats No. 6, 7, 8, 11, 12, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 29, and 30 in order to prevent crime during nighttime. However, installation of lighting is particularly determined following



Figure 3. Steel grilles installed in front of windows and doors, increasing security of residents.



Figure 4. CCTV spotted inside buildings for security.

management policy and budget of each flat. Due to the fact that the area allocated for car parking facility is the property of the NHA, a lighting pole must be permitted prior to installation. Consequently, the parking areas in the Klong Chan Flat community are mostly not provided with sufficient lighting at night, possibly leading to unsafe conditions around residents' properties. Nevertheless, in order to provide proper lighting spots in parking areas, the CJP is required to invest a large amount of money for electricity payment (Figure 5).

3) Facility of motorcycle parking or docking areas for residents to avoid vehicle theft. Due to the low budget, steel bars with chains are provided only on the ground floor of 17 flats, including Flats No. 1, 3, 7, 9, 10, 14, 15, 16, 18, 20, 21, 22, 24, 25, 26, 27, and 29. The area for storing residents' belongings, caged with steel, is also provided as an optional service for residents staying in those buildings (Figure 6).

Community unit:

As Klong Chan Flat is considered a large community, the intersection of place and safety as an explicitly desired outcome is important. Fifteen building managers who represent the CJP were asked about the community safety issues. The criminal incidents in the community were basic crimes which could normally occur, including crimes against property such as theft, burglary, and robbery (Mrs. Kanittha Sheena (48-year-old), interview, 2015). Those offenders are residents in the community. Another type of crime was rampant alcoholism and drug abuse, and violence. According to the crime report of Lat Phrao Police Station, Klong Chan Flat community is one of the highest risk areas in the three zones of the police boundary area, especially at night. Installation of lighting and CCTV was required to reduce unsafe situations for the daily lives of residents (Mr. Nipol Keawkaw (68-year-old), interview, 2015) (Figure 7).

The interview with police officers of Lat Phrao Police Station showed that Klong Chan Flat have been evidenced with burglary, robbery, and motorcycle theft. The police checkpoints located in 30 buildings shall be signed by officers in order to monitor the surroundings of the residential areas every day. To identify unsafe areas in the Klong Chan Flat Project, the researcher gathered information and discussed with local residents along with 15 building managers (CJP). The study showed that the unsafe areas were divided into five zones; A, B, C, D, and E (Figure 8) as described with more details below (Table 2).



Figure 5. Installation of lighting poles in the front and back side of buildings.



Figure 6. Motorcycle parking lot and area for storing residents' belongings.



Figure 7. Open community and police checkpoint.

Table 2. The summary of five zones with unsafe conditions of Klong Chan Flat.

Zone	Problems
A	The area includes Flats No. 5, 7, 8, 9 and the playground. Teenage drug abuse around these areas, especially in the evening, is commonly found which might lead to the committing of violent crimes. Also, the playground area is not well maintained and is rarely used. This could be considered a serious problem at night because of no lighting provided around playground area as well as walking path. (Mr.Malham Madsthet (59-year-old), interview, 2015).
B	This zone is normally crowded every morning because plenty of vendors and daily fresh market are located in the area, behind Flat No. 16 and Flat No. 17. Although the sub-main road is crowded with lots of residents, the street lighting at night is not provided. Insufficient street lighting is thus a vital contributory cause of theft. In front of Flat 16, along the canal, some homeless people could be found around this area (Mrs.Supawadee Klinsana (44-year-old), interview, 2015).
C	For the areas of Flats No. 18, 14, and 13, the residents usually go for work or school by crossing a bridge to a bus stop. This zone is typically quiet and the surrounding buildings are in need of maintenance. The offenders committed to robbery and theft have been found in this area at night. For the property and life security of residents, the lighting near the bridge was personally installed by CJP of Flat No. 14 regardless the area is administered by the NHA (Mr.Thava (63-year-old), interview, 2015).
D	The walkway along the canal is not well organized and structured by the NHA, especially near Flats No. 22, 24, 26, and 28. This could be seen as risk areas to the residents because the gangsters for drug abuse normally are gathered here. The walking path along this canal should be maintained under NHA's responsibility. (Mr.Phisan Chantataphatep (66-year-old), interview, 2015).
E	There are five bus stop services, administered by the local government, located nearby the community. The bus stop condition lacks of maintenance yet particularly no enough lighting at night, leading to a direct negative impact on the safety of local residents. There happened to be a theft around the bus stops of Flat No. 20 and Flat No. 23 occasionally. To improve the condition of bus stops, lightings have been installed by the CJP to provide more security for residents who live nearby and use the bus stop service. (Mrs.Kanitta Sheena (48-year-old), interview, 2015).

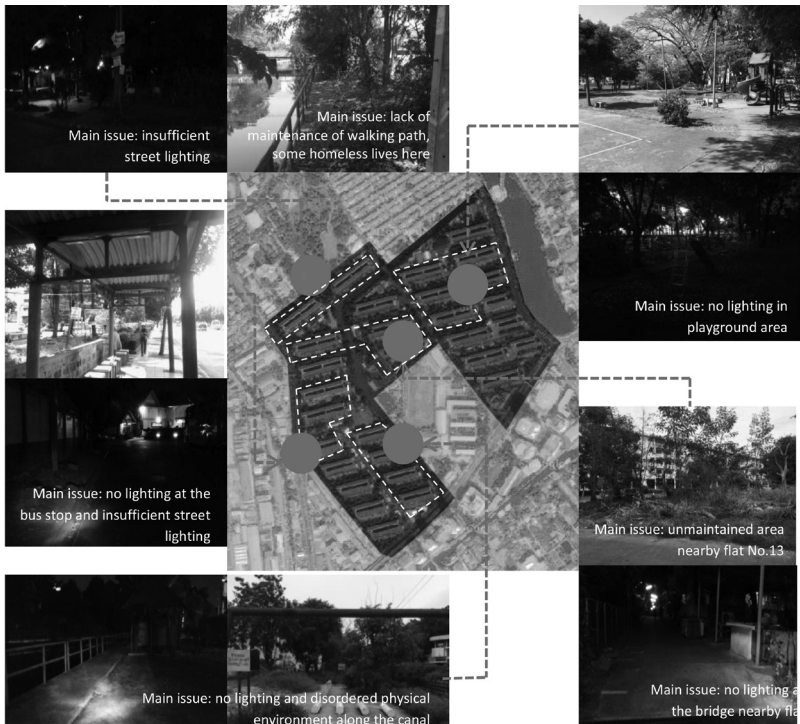


Figure 8. Illustration of five zones with unsafe conditions of Klong Chan Flat community collected by field survey and the CJP representatives interview.

From the investigation by observation method for the safety implementation in existing community areas, it was found that some protection measures have been implemented for residents' safety; meanwhile, the criminal incidents are still a major issue as shown in the five zones illustrated. Based on this situation, the questions regarding perception towards safety in the community were answered by 370 respondents. The majority of the respondents were female represented 57%, whereas 43% were male. The age of the respondents was ranged from 16 to 74 years old with a group of 30 – 39 years old indicated as the largest (31.6%). Period of stay in Klong Chan Flat was mostly found below 10 years (64.9%), whereas the percentage of residents who have lived here for 11 to 30 years was 30.3%. Also, moving out of the property was planned by 29.5% of the respondents of the Klong Chan Flat Project, tenants accounted 20%, whereas owners accounted merely 9.5%. The main reason for tenants planning to move out was to go back to their hometowns to find living places in the countryside due to the property has a poor environment, inefficiency for building maintenance and services, and risk of crimes. For the security of the

neighborhood, it was shown that the mean score on a scale of 1 - 5 (1 = not satisfied at all; 5 = highly satisfied) of respondents was 2.98 (fair level). Furthermore, the results of the questionnaire survey showed the reasons for living in Klong Chan Flat Project were contributed by the convenience in commuting (65.4%), nearby workplace areas (53%), affordable price (43.5%), and room quality condition (24.9%); meanwhile the perception regarding the safety and security conditions was found at the lowest percentage (13.8%). Based on the existing safety situation in Klong Chan Flat, the residents' satisfaction regarding safety was subjected to analysis with three safety scales. The hypotheses were described below based on Chi-square test analysis.

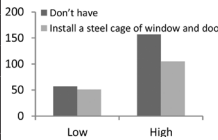
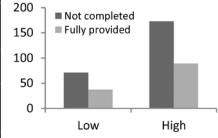
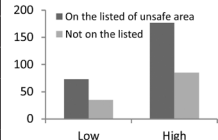
Hypotheses:

- H1: There is no difference between groups of respondents' safety satisfaction on the dwelling safety aspect.
- H0: There is a difference between groups of respondents' safety satisfaction on the dwelling safety aspect.
- H2: There is no difference between groups of respondents' safety satisfaction on the building safety aspect.
- H0: There is a difference between groups of respondents' safety satisfaction on the building safety aspect.
- H3: There is no difference between groups of respondents' safety satisfaction on the community safety aspect*.
- H0: There is a difference between groups of respondents' safety satisfaction on the community safety aspect*.

*Remark: risk areas of crime in community aspect were based on the five zones with unsafe conditions.

The results in Table 3 shows that there is no statistical significant relationship between two groups of respondents in terms of the dwelling safety condition as the P-value is .206, which is greater than 0.05. For the building safety condition and the community safety condition, both variables indicated that there is a difference

Table 3. Variables in association with residents' satisfaction on overall community safety.

Satisfaction on overall community safety					
Room safety		Score of satisfaction			
		Low	High		
Don't have	Pearson	57	157		
Installed a steel grille on windows and doors	Chi-square .206	51	105		
No. of respondent		108	262		
Satisfaction on overall community safety					
Building safety (CCTV, lighting, motorcycle docking)		Score of satisfaction			
		Low	High		
Not completed	Pearson	71	173		
Fully provided	Chi-square .009*	37	89		
No. of respondent		108	262		
Satisfaction on overall community safety					
Community risk areas		Score of satisfaction			
		Low	High		
On the list of unsafe areas	Pearson	73	177		
Not on the list	Chi-square .000*	35	85		
No. of respondent		108	262		

between groups of respondents' safety satisfaction with a statically significant relationship by the P-values of less than 0.05 (.009 and .000) with acceptance of the null hypothesis (H0). These results convey that providing safety measures, especially in both aspects of the building and community levels, would contribute to the safety satisfaction of the residents.

The elements of the building safety aspect (CCTV, lighting, and motorcycle docking) were analyzed in order to determine a relationship with respondents' safety satisfaction by correlation analysis, the motorcycle docking shows a highly significant correlation coefficient value of .631, whereas lighting and CCTV are ranked second and third with .507 and .137 respectively (Table 4). These two elements of the building safety aspect should be addressed in terms of security management.

Table 4. Correlation matrix between covariates (3 variables).

Variables		Building safety	CCTV	Lighting	Motorcycle docking
Building safety	Pearson correlation	1	.137**	.507**	.631**
	Sig. (2-tailed)		.008	.000	.000
CCTV	Pearson correlation	.137**	1	-.135**	-.167**
	Sig. (2-tailed)	.008		.010	.001
Lighting	Pearson correlation	.507**	-.135**	1	-.006
	Sig. (2-tailed)	.000	.010		.908
Motorcycle parking	Pearson correlation	.631**	-.167**	-.006	1
	Sig. (2-tailed)	.000	.001	.908	

** . Correlation is significant at the 0.01 level (2-tailed).

Figure 9. Criminal incidents in 2012 – 2016 (5-year period).

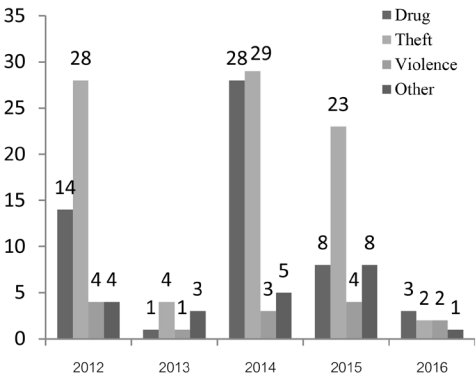
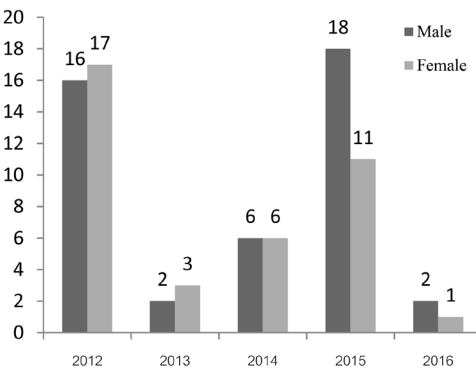


Figure 10. Criminal victims in 2012 – 2016 (5-year period).



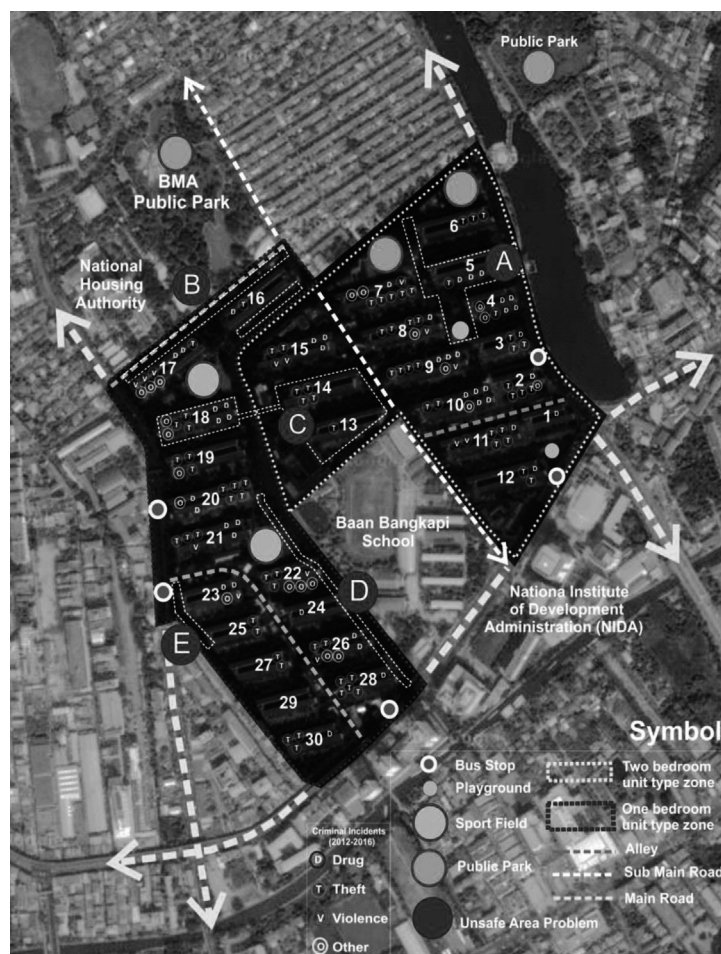
4.2 Investigating Criminal incidents at Klong Chan Flat

The 5-year (2012 – 2016) criminal incidents reported by Lat Phrao Police Station were analyzed to indicate the criminal issues which later would assist NHA, CJP, and residents to understand more on crime threats and consider as critical matters. A total of 154 cases of criminal events were found in four major categories: drugs, theft, violence, and others (drunkenness, fighting, and gambling), especially in 2012, 2014, and 2015, which were significantly the top highest (Figure 9). The victims were 82 people (male = 44; female = 38) (Figure 10). Theft was the most commonly occurring criminal issue, while drugs, violence, and other crimes were found less common.

Considering the criminal events of each year, it was obviously indicated that motor vehicle theft was a major problem. An interviewing with police (Pol. Col. Saksit Meesawat, Lat Phrao Police Station) revealed that vehicle thefts usually occur between 18.00 pm. – 24.00 pm. Others found in acts of personal property, robbery in dwelling units and personal belongings, usually happen between 24.00 pm. – 6.00 pm. For drug crimes, selling was higher than using, which would normally be found between 12.00 pm. – 18.00 pm. Based on the criminal incidents information, the warning or cautious notices, described as crime alerts, could be executed in the community area, purposely for the security of residents and CJPs. Crime alerts could be classified and designed to properly respond to types of crimes happened during specific periods. Table 5 shows the detail of 5-year criminal incidents which signifies the residents and the CJPs to be aware for neighborhood as well as for each flat. Table 5 illustrates the locations where the crimes took place. Also, the information could be regarded as a database for community safety management in identifying specific spots that could become the crucial parts of criminal investigations.

Table 5. Frequency of criminal incidents in Klong Chan Flat Project during 2012 – 2016.

Flat No.	Frequency					Total
	2012	2013*	2014	2015	2016*	
1				1		1
2	2		2	2		6
3	3			1		4
4	3		2		2	7
5	1			3		4
6	1			1		3
7	2		5	2		9
8	2		2	3		7
9	2	1	5	2		9
10	2		5	1		8
11	1		2	2	1	7
12	1		1	1		3
13			1			1
14		1	2	1	1	4
15	3		1	1	2	7
16			1	1		2
17	2	1	1	5		9
18	2	1	5		1	9
19	2		1	1		4
20	3	1	3	1		8
21	4		2	1		7
22	2	2	1	2		7
23	2			2		4
24	2			1		3
25	2					2
26	3		1	2	1	7
27	1	2		1		4
28	3			3		6
29						
30	1		1	2		4



Source: Lat Phrao Police Station (2016) and classification of criminal cases of Klong Chan Flat by author, 2016
 *criminal incidents are not a complete recording as showing a half year of information.

Integrated study from local residents (interviews) and criminal statistics shown on Table 4 was able to clearly state the needs of community surveillance. A total of 29 flats have encountered criminal incidents, especially on theft and drugs, except Flat No. 29 with no report found throughout five years. As Flat No. 29 is daily monitored by CJP and is fully provided with public lighting, the possibility of criminal incidents is less likely to happen by the fundamental safety management applied. Zones of A, B, C, and D were identified as risk areas due to drug problems being

found around Flats No. 5, 9, 10, and 15. These zones are located near area of vendors and market which might increase the possibility of criminal incidents; whereas Zone E having Flats No. 23, 25, 27, 29, 30 is found with several theft incidents. These criminal spots should be immediately managed for short- and long-term security of urban neighborhoods, in which several aspects must be involved with investigations. An intensive crime prevention program must be implemented in these areas by involving local people for patrol monitoring. Therefore, these

five zones of risk must be taken into consideration to establish a program of improvement responsible by related stakeholders including residents, CJP, NHA, and local police officers. As the results of section 4.1 show the lighting and motorcycle docking areas are given with high correlation coefficient values on the building safety scale, the map of risk areas of crime spots of the community was created accordingly. However, a relationship between existing safety conditions and the risk areas has not yet been investigated. Additionally, the physical surrounding of each flat was used for examination as it would likely affect the criminal issues as previously mentioned in literature review. Thus, the next section would provide the significant factors to be addressed for safety management. The variables were listed in Table 6 below. Correlation was employed to examine the relationships between variables (Sauder, Lewis & Thornhill, 2009).

Table 6. Variables explained by relationship analysis.

Variables	Value	Variables Explained
Criminal Incidents of Klong Chan Flat	Continuous	Information on criminal incidents in 30 flats, criminal data from 2012, 2014, and 2015 (3 years) was applied in regards of accuracy to provide less error.
Building Condition	Score	The building conditions due to lack of physical management might be related to the risk of crime.
Ground Floor	Score	Unorganized ground floor of flat might is related with crime issues.
Surroundings of Buildings	Score	Surrounding areas are in unmaintained conditions, some flats are well maintained while others are unconcerned, which is relevant to possibility of criminal incidents and perceptions towards safety.
Safety System	Categorical	Incomplete installation of safety system (CCTV, lighting, motorcycle docking area) is related with criminal incidents.

Table 7. Correlation matrix between covariates (5 variables).

Variables	CI	BC	GF	SR	SS
Criminal Incidents	1.00				
Building Condition	-.366* Sig. (2-tailed) .05	1.00			
Ground Floor	-.405** Sig. (2-tailed) .011	.755** .000	1.00		
Surroundings of Buildings	-.447** Sig. (2-tailed) .015	.504** .005	.347 .060	1.00	
Safety System	.082 Sig. (2-tailed) .672	-.044 .819	-.062 .745	-.192 .309	1.00

Noted: CI = Crime incidents, BC = Building condition, GF = Ground floor, SR = Surroundings of buildings, SS = Safety system, **. Correlation is significant at the 0.01 level (2-tailed)., *. Correlation is significant at the 0.05 level (2-tailed).

The results found that there are three significant variables associated with criminal incidents occurred at Klong Chan Flat. These three variables are the building conditions, the ground floor, and the surroundings of the buildings, which were calculated by performing Pearson’s correlation analysis at .05, .011, and 0.15 respectively. Surrounding areas of the buildings yield a higher coefficient value than the others at -.447. The second and the third are the ground floor and the building conditions at -.405 and -.366, respectively. Thus, it could be concluded that physical conditions of a living place and the surrounding environments are associated with criminal incidents, which is in line with the results of Srisopon (2012), who found that the unorganized surroundings and abandoned areas of a community increased the unsafe condition of its residents (Table 7).

Therefore, to prevent criminal issues occurred Klong Chan Flat, these variables should be considered to apply for the efficient and applicable management mainly for physical improvements of buildings. Although the safety system variable was not shown to be significant, it still should be improved to ensure more security would be implemented in residents’ living places.

4.3 Challenges of Klong Chan Flat Safety Management

Being safe and secure in living place is one of basic human needs. Four key factors of successful crime prevention are surveillance, access control, territorial reinforcement, and maintenance and management (Royal Thai Police, 2007). However, the environmental settings for low-income housing in urban communities make it challenging to achieve safe and livable communities, as the conditions of low cost low-income development projects are an inclusive limitation for the rental-purchasing terms. After the property rights are transferred to all residents, the entire building and community area should be managed by CJP. Nevertheless, the

insufficient CJP's capacity and lack of residents' awareness are obstacles of community safety. With this challenge, to enumerate critical safety barriers for community residents to feel safe and empowered is important. Based on three aspects of existing safety features (dwellings, buildings, and community), the main stakeholders who hold responsibility of Klong Chan Flat in handling safety management are identified as shown in Figure 11. The three levels of community safety through these elements should be effectively managed to protect people and their properties from unsafe conditions.

However, difficulties in handling three levels of community safety management are described below:

- *Providing door and window steel grille installation (Safety at Dwelling Level)*

According to the field survey, most of the residents' units have been installed with a steel grille on windows and doors under room owners' spending. Thus, in the case of rental rooms, there still remains the original condition without a steel grille because the tenants do not tend to spend money on the cost of modifications. A steel grille is a simple structure with the effective function to prevent burglaries, but installation somehow must be allowed by the CJP in order to maintain the building condition. However, rules and regulations are not entirely followed by all residents. Therefore, the unorganized installation of steel grilles, especially on the back side of the rooms, is found in 30 buildings. Accordingly, this outcome draws the negative perception towards deterioration of buildings and thus creates significant effects on building conditions, possibly leading to ineffective maintenance program for entire building.

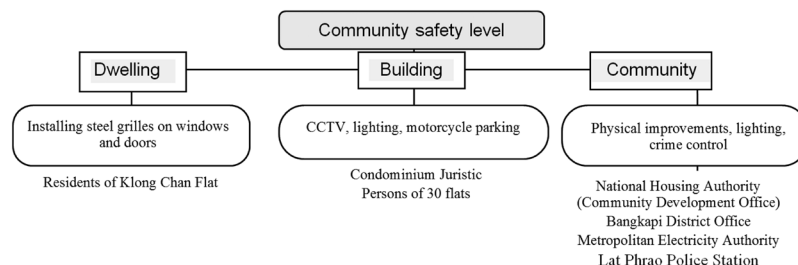


Figure 11. Community safety through physical aspects management and stakeholders involvement.

- *CCTV, lighting, motorcycle parking (Safety at Building Level)*

Typical safety systems and features for accommodation; CCTV, lighting, and motorcycle parking areas should be provided. For CCTV, even though the government (NHA) has launched a surveillance system, there are still no systematical plans on maintenance and control over CCTV management. Therefore, 16 points of CCTV are considered obligations in terms of high operational and maintenance costs. No technician is hired or stationed to daily and properly operate CCTV. Thus, the government should offer help and support rather than leaving the community unattended. Nonetheless, fee of CCTV has been charged for the case that some residents require records but this amount only slightly contributes to the maintenance costs. In addition, it is recommended that CCTV be installed on the 2nd – 5th floors for benefits of security. To effectively and efficiently prevent crimes in community, not only the safety systems should be provided but also participation from residents is another key factor required to help monitoring such circumstances. Parking areas, also, should be managed by the CJP. However, CJP currently is not granted any rights to implement any projects without NHA's permission.

- *Physical improvement, lighting, crime monitoring (Safety at Community Level)*

Due to being a large community project with the limited capacity of the CJP to maintain the areas of public facilities and utilities, including roads, sidewalks, lighting, sewage and water supply systems, the NHA has transferred those services to local governments. Unfortunately, those public utilities and infrastructure are found inefficient and unmaintained. Presently, the National Housing Community Development Office 1 (NHCDO) operated by NHA is assigned to manage and operate Klong Chan Flat. Hence, parking areas of 30 buildings and public areas in the community are now being responsible by NHCDO. Limited financing for development as well as few numbers of active staff lead to an ineffective community management, as seen for the case of insufficient lighting provided in parking areas. Also, bars serving alcoholic beverages are usually prohibited to be opened and run near the academic institutions (Mr. Sangkhom Thinnapai (56-year-old), interview, 2015), but no actions have been taken by local authorities to resolve this problem. This issue might become a factor of criminal incidents that would occur in residents' area afterwards. In help of observing crime in community, a volunteer police center has been established. A group of authorized local residents is assigned and accounted to act as volunteer police to assist policeman stationed in Klong Chan Flat to monitor any criminal suspicion. However, in practical implementation, the role of volunteer police seems quite difficult to accomplish as it requires the full cooperation between related authorized parties and residents' participation.

5. Conclusions

This research study on safety applied in Klong Chan Flat, a community located in urban area with open accessibility, which conducted through field survey from local residents and condominium juristic persons, found that the community is still facing a high risk of crime due to poor physical surroundings and plenty of entrances enabling criminals to easily get in and out. Currently, there are three existing safety levels applied throughout community: dwellings (installation of steel grilles), buildings (CCTV, lighting, motorcycle docking areas), and community (checkpoint area of police). These security measures were examined by Chi-square which indicated that the safety aspects of buildings and community are associated with residents' safety satisfaction. Also, the identified elements of building safety stated that the motorcycle docking areas, lighting, and CCTV system are

found with high coefficient values. The area map was applied to develop a profile of criminal incidents at Klong Chan Flat, providing more insight into five areas of unsafe conditions and thus allow authorized parties to identify specific areas where residents must be given with most secure conditions. This spotted map is essential to divide areas to respond to particular offenders and develop such preventive plans. Each household would be beneficial in terms of finding its most applicable plan to prevent such crime usually occurred in particular areas. Substantially, the community security of Klong Chan Flat is generally handled by the residents themselves and the CJP. Although there is the cooperation with local government units, such as district police station, due to the condition of being a large community, the security could not be fully managed and organized by few policemen. In addition, the lack of granted rights between the CJP and the NHA could be another cause of the inefficient community management. Nonetheless, another essential aspect to promote security and prevent any misconduct in community is to gain full participation of residents. Being aware of current situations and engaged in security practices would help enhance the safety in community and eventually uphold the standard of living. Consequently, the results generated from this research study would be beneficial in terms of providing useful guidelines to conduct the safety management practices, specifically for NHA's public housing community projects. In addition, more in-depth analysis of three safety aspects; dwelling, building, and community can be further applied in a study of close-accessed community safety management to effectively explain safety issues encountered and experienced by residents living in community projects.

References

- Australian Institute of Criminology. (2015). *Effective crime prevention interventions for implementation by local government*. Retrieved from http://www.aic.gov.au/publications/current%20series/rpp/100-120/rpp120/07_approaches.html.
- Bonnefoy, X. (2007). Inadequate housing and health: an overview. *International Journal of Environment and Pollution*, 30(3–4), 411–429.
- Braubach, M., & Fairburn, J. (2010). Social inequities in environmental risks associated with housing and residential location--a review of evidence *European Journal of Public Health*, 20(1), 36–42.

- City of Darebin. (2012). *Community safety strategy 2012–2016*. Retrieved from http://www.darebin.vic.gov.au/-/media/cityofdarebin/Files/Darebin-Living/CommunitySupport/CommunitySafety/Community_Safety_Strategy.ashx?la=en.
- Daily News. (2015, October 17). *Monitoring Latphrao police station*. Retrieved from <http://www.dailynews.co.th/crime/354945>.
- Davidson, M. (2009). *Perception of safety and fear of crime*. In: D. Ormandy (Ed.), *Housing and Health in Europe*. New York: Routledge.
- Freedman, M., & Owners, E. (2010). *Low-Income housing development and crime*. Retrieved from <http://socrates.berkeley.edu/~raphael/IGERT/Workshop/Matt%20Friedman%20-%20Fall%202010.pdf>.
- Fuji, Y., & Kawata, A. (2007). Study on evaluation method of residential environment in residential area level. *Journal of The Japanese Institute of Landscape Architecture*, 69(5), 799–802.
- Kawachi, I., Kennedy, B. P., & Wilkinson, R. G. (1999). Crime: Social disorganization and relative deprivation. *Social Science & Medicine*, 48(6), 719–731.
- Khaosod. (2015, October 17). *Police general visits Latphrao police station*. Retrieved from http://www.khaosodonline.com/view_newsonline.php?newsid=1445078877.
- Kihl, M., Brennan, D., Gabhawala, N., List, J., & Mittal, P. (2005). *Livable communities: An evaluation guide*. Washington, USA.: AARP.
- Kullberg, A. (2010). *My home is my castle: residential well being and perceived safety in different types of housing areas in Sweden*. (Ph.D. dissertation). Faculty of Health Sciences, Linköping University. Retrieved from <http://liu.diva-portal.org/smash/get/diva2:355507/FULLTEXT01.pdf>.
- Lawrence, R. J. (2002). Healthy residential environments. In R. B. Bechtel, & A. Churchman (Eds.). *Handbook of environmental psychology* (pp. 394–411). New York: John Wiley.
- Lawrence, J., & Ruth, D. (1996). Extremely disadvantaged neighborhoods and urban crime. *Social Forces Journal*, 75(2), 619–648.
- Latphrao Police Station (2016, November). Secondary data of crime Statistic in Latphrao District. Bangkok, Thailand: Authors.
- Lujanen, M. (2001). *Boende och bostadspolitik i Norden (Housing and housing policy In the Nordic countries)*. Kopenhamn: Nordiska Ministerrdet (in Swedish).
- Macintyre, S., Maciver, S., & Sooman, A. (1993). Area, class and health should we be focusing on places or people?. *Journal of Social Policy*, 22, 213–234.
- Macintyre, S., Ellaway, A., & Cummins, S. (2002). Place effects on health: how can we conceptualise, operationalise and measure them?. *Social Science & Medicine*, 55(1), 125–139.
- Matthew. F., & Emily. G. O. (n.p). *Low-Income housing development and crime*. Retrieved from <http://paa2011.princeton.edu/papers/110122>.
- Mhankatidham, V. (2015). Factors affecting crime in relation to the physical environment of the slum. *International Conference, Suan Sunandha Rajabhat University*, (pp. 220–228). Retrieved from http://www.teacher.ssru.ac.th/winai_ma/file.php/1/Research/Tewaraj_layout.pdf.
- National Housing Authority [NHA]. (2014). *Affordable housing development standard for low and middle income people*. Retrieved from http://www.nha.co.th/ewt_news.php?nid=14957&filename=index.
- Newman, O. (1973). *Defensible space: People and design in the Violent city*. New York:McMillan
- Ormandy, D. (Ed.). (2009). *Housing and health in Europe*. New York: Routledge.
- Royal Thai Police. (2007). *Crime prevention through environmental design*. Retrieved from <http://highway.police.go.th/theory/CPTED.pdf>.
- Saunders, M., Lewis, A., & P., Thornhill, A. (2009). *Research methods for business students*. London, England: Pearson Education.
- Srisopon, S. (2012). Safety and sense of safety from crime in the environment of old community, Phra Nakhon District, Bangkok: A case study of Trok Sin-Trok Tuek Din Community. *Veridian E-Journal, Silpakorn University*, 8(1), 1517–1533.
- Wendel Vos, W., Droomers, M., Kremers, S., Brug, J., & van Lenthe, F. (2007). Potential environmental determinants of physical activity in adults: a systematic review. *Obesity Reviews*, 8(5), 425–440.
- Wilson, J. Q., & Kelling, G. L. (1982). Broken windows. *Atlantic Monthly*, 249(3), 29–38.
- Wilson, W. J. (1987). *The truly disadvantaged: The inner city, the underclass, and public policy*. Chicago, IL, USA: University of Chicago Press.
- Whitzman, C. (2008). Community safety indicators: are we measuring what counts?. *Urban Policy and Research*, 26(2), 197–211.
- Yiampisan, M., and Srivanit, M. (2010). Using the Kernel Density Estimation Surface for Criminal Pattern: A Case Study in Phranakhon District, Bangkok. *Journal of Architectural/Planning Research and Studies*, 7(1), 87–102.