Environmental Psychological Assessment for High-rise Residents in Bangkok Metropolitan Area:

Safety Concern, Privacy Satisfaction, and Sense of Community

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ENVIRONMENTAL PSYCHOLOGICAL ASSESSMENT FOR HIGH-RISE RESIDENTS IN BANGKOK METROPOLITAN AREA: SAFETY CONCERN, PRIVACY SATISFACTION, AND SENSE OF COMMUNITY

Een ruimtelijke en psychologische beoordeling voor hoogbouwbewoners in de metropoolregio Bangkok: veiligheidszorgen, privacyborging en gemeenschapszin

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RESEARCH SUMMARY

Due to rapid population growth and spatial limitation of urban environments, the vertical expansion of city space including high-rise habitat has become an inevitable resolution for metropolises all over the world. Likewise, Bangkok, the capital city of Thailand and one of the most extreme primate cities in the world, the number of the population residing in high-rise buildings known as "condominiums" has expeditiously augmented. Despite the four decades of high-rise housing development in Thailand yet the empirical research echoing the consequences of living in high-rise has gone out of focus.

This quantitative study conducted during 2014 and 2016 contributed to assessing and analysing the mental status of the people dwelling in the physical environment of high-rise housing in the urban context of Bangkok. The three psychological domains defined as the dependent variables comprised 1) safety concern, 2) privacy satisfaction, and 3) sense of community. Hypothetically, these three underlying feelings of homeyness were expectedly influenced by the two primary independent variables, which were the physical environmental factors and the personal factors as well as the interdependencies amongst the three dependent variables were anticipated.

Methodically, the multi-stage sampling technique was administered in consideration of recruiting 1,206 respondents living in the eighteen condominiums located in the six different zones of Bangkok Metropolitan area, namely 1) Northern Bangkok, 2) Central Bangkok, 3) Southern Bangkok, 4) Eastern Bangkok, 5) Northwestern Bangkok, and 6) Southwestern Bangkok. The two interdisciplinary research instruments: the Physical Environmental Assessment (PE) and the Personal and Environmental Psychological Questionnaire (PEP) were particularly invented for this research and then were performed to collect data from the field.

In respect of the research framework and procedure design, the physical environmental data derived from the PE assessment were analysed and classified into the different set of variables both in categorical and numerical forms. For furthering the statistical effect investigation, the qualitative data involving the existing

environment of the condominiums was scored and converted into the numerical variable sets consisted of 1) defensible characteristic score of the building, 2) privacy supportive score of the building, and 3) communal characteristic score of the building.

In the same way, both categorical and numerical data obtained from the PEP questionnaires was preliminarily categorised and analysed in the framework of the research. According to the questionnaire, the primary personal psychological background of the respondents was scored and transformed into the numerical variable sets which were 1) experience of threats score, 2) privacy need score, and 3) social capital and participation score. Meanwhile, the observed psychological variables: safety concern, privacy satisfaction, and sense of community, which were self-reported by the respondents was measured by a Likert-scale, one to five. During the data-analytical stage, the demographic configuration of this sampling group was explored by employing the descriptive statistics. Meanwhile, the multiple inferential statistical approaches were applied to test the research hypotheses and sub-hypotheses. The statistical outcomes acquiesced at the 95% confidence interval (significant level of 0.05).

In consideration of the first research question, which hypothesised that the mentioned three psychological domains of high-rise residents were affected by the physical environmental factors and the personal factors, the results of the field survey and statistical analysis revealed that the remarkable differences in the psychological status existed amongst the dwellers living in the different contexts of city zoning and density of population including the land use policy.

The one-way analysis of variance confirmed that the high-rise residents residing on the western side of Bangkok, known as Thonburee area, where was a newly urbanised area, notably showed a greater concern about safety than the dwellers from the eastern side of the city particularly the issues of behavioural disorder and emergency evacuation. In the meantime, the statistical results significantly confirmed that the weakest sense of community amongst this sampling group was reported by the high-rise dwellers from Central Bangkok, the zone well known as the central business district of the country.

As well, the density of population had played an important role to explain the psychological variation of the participants of this study. The result of the simple linear regression analysis affirmed that, statistically, the population densification had been deterring their positive sense of community in all aspects. Correspondingly, the medium-density residential neighbourhood was proved as an environment motivating the greater sense of community amongst the residents than the high-density residential surroundings.

The architectural indicators particularly initiated for this study also exposed their capacities of influencing the mental status of the high-rise dwellers. Based on the outcomes of the multiple linear regression and the structural equation modelling, it was indicated that the defensible characteristic of the building consisted of 1) access control, 2) territoriality, 3) surveillance, and 4) milieu and juxtaposition proved its potential of suppressing the safety concern involving crime incident. More than that, it was also significant that the defensible features had reduced the sense of community especially the feeling of membership amongst the residents.

Meanwhile, the privacy supportive characteristic of condominium comprising 1) the number of units per floor, 2) the typical floor plan, and 3) the number of unit's members were found supporting the increase of psychological and physical privacy satisfaction amongst the dwellers. Also, its capacity of diminishing the concern of behavioural disorder amongst the high-rise residents was identified. The communal features of the condominiums were characterised by two sub-indicators, which were 1) the variety of common and recreational areas and 2) the exposure and ease of accessibility of such facilities. The statistical results confirmed that these communal features negatively impacted the residents' satisfaction of privacy significantly.

Furthermore, the personal attributes and the psychological indicators were also statistically affirmed their distinctive effects on the three dependent variables. The findings of the multiple linear regression modelling and the structural equation modelling extracted the principal psychological factors, especially the numerical variables that appeared to have significant domination on safety concern, privacy satisfaction, and sense of community of Bangkok high-rise residents. The residents’ personal experience of threats was an indicator assembled based on the three types

of modern tall building's threats: 1) crime, 2) behavioural disorder, and 3) emergency caused by human and nature. After all, the statistical analysis approved its impact directly on the safety concern of the respondents.

The privacy need was an indicator that had the multi-directional effects on all psychological domains. This indicator was built based on the psychological concept of the six types of privacy: 1) isolation, 2) reserve, 3) anonymity, 4) solitude, 5) intimacy with friends, and 6) intimacy with family. The findings confirmed that the privacy need or the introvert personality of the high-rise residents motivated their concern of safety in every aspect. Meanwhile, it also diminished the satisfaction of social-interactional privacy amongst the dweller as well as suppressed their feeling of membership, reciprocal influence, community reinforcement, and shared emotional connection with their community.

The social capital and participation were the factors composed of the sub-indicators namely 1) sharing and donating 2) public volunteering, and 3) civic duty. Apparently, the frequency of sharing and public volunteering of the residents could significantly predict the increase of their sense of community in all aspects. In the interim, the more frequency of community volunteering, the less psychological privacy satisfaction amongst high-rise dwellers was predicted.

In consideration of the second research question of which hypothesis expected the interrelationships amongst the three mental fundamentals; the research findings along with the analytical outcomes confirmed the predictable pattern of the psychological mechanism amongst them. The statistical modelling identified the interdependencies amongst safety concern, privacy satisfaction, and sense of community of the high-rise inhabitants in the context of the urban Bangkok. On the condition that the observed data needs to be measured by the PE assessment and the PEP questionnaire, the predictive equations revealed in this report could forecast the trend of these psychological variables by replacing the values of each indicator into the equations.

According to the statistical modelling, the investigation affirmed the inconsistent mediation pattern between these three psychological domains. Apparently, the pessimistic angle of safety concern of the high-rise residents negatively impacted their satisfaction of privacy as well as weakened their sense of

community. For the time being, the optimistic demeanour of sense of community acted as the mediator that alleviated the adverse effect of safety concern on privacy satisfaction.

Conclusively, the findings of this interdisciplinary study had achieved the purpose of exploring and disclosing the mental status of high-rise dwellers in Bangkok Metropolitan area. The reliable interpretation of the statistical analyses had also proved and uncovered the environmental psychological mechanism in the particular context of the high-rise habitat to which connect the multi-dimensional benefits in contributing to the urban and housing development especially in the context of Bangkok. The further implementation of the results and research instruments developed in this study were anticipative both for the academic generalisation and for the professional purposes to better the high-rise housing development in the future.

Keywords: high-rise housing; environmental psychology; urban psychology; urban and housing development; housing environmental design

ONDERZOEKSSAMENVATTING

Onder invloed van een snelle bevolkingsgroei en de beperkte ruimtelijke beschikbaarheid in stedelijke omgevingen is de verticale uitbreiding van stadsruimte, waaronder hoogbouw voor bewoning, een onvermijdelijke oplossing geworden voor metropolen over de gehele wereld. Zoals Bangkok, de hoofdstad van Thailand en een van de meest extreme voorbeelden van primate cities in de wereld. Het aantal inwoners van de hoogbouw, die bekend staan als “condominiums”, is snel gestegen. Ondanks vier decennia hoogbouwontwikkeling in Thailand heeft het empirisch onderzoek naar de gevolgen van het leven in hoogbouw de focus verloren.

Deze kwantitatieve studie is verricht tussen 2014 en 2016 en droeg bij aan de beoordeling en analyse van de mentale staat van de mensen die wonen in de fysieke omgeving van hoogbouwbewoning in de stedelijke context van Bangkok. De drie psychologische domeinen, gedefinieerd als afhankelijke variabelen bestaan uit 1) veiligheidszorgen, 2) privacyborging en 3) gemeenschapszin. Hypotetisch te verwachten werd dat deze drie onderliggende gevoelens van huiselijkheid beïnvloed werden door de twee onafhankelijke variabelen, te weten de fysieke omgevingsfactoren en de persoonlijke factoren. Daarnaast werd geanticipeerd op de onderlinge samenhang tussen de drie afhankelijke variabelen.

Methodologisch werd een multistage sampling techniek toegepast waarbij 1.206 respondenten betrokken werden die leefden in de 18 condominiums die verspreid staan in de 6 verschillende zones van de metropoolregio Bangkok, namelijk 1) Noord Bangkok, 2) Centraal Bangkok, 3) Zuid Bangkok, 4) Oost Bangkok, 5) Noordwest Bangkok en 6) Zuidwest Bangkok. De twee gebruikte onderzoeksinstrumenten - de Physical Environmental Assessment (PE) en de Personal and Environmental Psychological Questionnaire (PEP) - zijn specifiek voor dit onderzoek ontwikkeld en vervolgens toegepast om de data in het veld te verzamelen.

Met betrekking tot het onderzoekskader en het procedureontwerp werd de uit de PE assessment vergaarde data geanalyseerd en geclassificeerd in de verschillende sets variabelen, zowel in categorische als in numerieke vormen. Om

het statistische effect van het onderzoek te vergroten, werd de kwalitatieve data met betrekking tot de bestaande omgeving van de condominiums gescoord en geconverteerd naar de numerieke variabele sets bestaande uit 1) verdedigbare karakteristieke score van het gebouw, 2) de privacybevorderende score van het gebouw en 3) de karakteristieke gemeenschapsscore van het gebouw.

Op dezelfde wijze werd zowel categorische als numerieke data verkregen uit de PEP vragenlijsten voorafgaand gecategoriseerd en geanalyseerd in kader van het onderzoek. Conform de vragenlijst werd de primaire persoonlijke psychologische achtergrond van de respondenten gescoord en getransponeerd naar de numerieke variabelen sets 1) dreigingsbelevingsscore, 2) privacybehoeftescore en 3) sociaal kapitaal en participatiescore. Tegelijkertijd werden de waargenomen psychologische variabelen: veiligheidszorgen, privacyborging en gemeenschapszin, die door de respondenten werden gerapporteerd, gemeten aan de hand van een Likert-schaal van 1 tot 5. Tijdens de fase van data-analyse werd de demografische samenstelling van de sample groep verkend door de toepassing van de beschrijvende statistieken. Tegelijkertijd werden meervoudige inferentiele statistische benaderingen toegepast om de onderzoekshypothese en sub-hypotheses te testen. Voor de statistische resultaten is een 95% betrouwbaarheidsinterval gehanteerd (onbetrouwbaarheidsdrempel van 0.05).

De eerste onderzoeksvraag in overweging nemende, welke hypotiseerde dat de voornoemde 3 psychologische domeinen van hoogbouwbewoners werden beïnvloed door de fysieke omgevingsfactoren en de persoonlijke factoren, onthulden de resultaten van het veldonderzoek en de statistische analyse dat opmerkelijke verschillen bestonden in de mentale staat van de bewoners in de verschillende contexten van de stadszones, de bevolkingsdichtheid en het ruimtelijk ordeningsbeleid.

De one-way analysis of variance bevestigde dat de hoogbouwbewoners van de westelijke kant van Bangkok, bekend als het Thonburee-gebied, een nieuw verstedelijkt gebied, in het bijzonder grotere zorgen over de veiligheid laten zien dan de bewoners van de oostelijke kant van de stad. Die zorgen betroffen vooral zaken als wangedrag en evacuaties in noodsituaties. Tegelijkertijd bevestigden de statistische resultaten significant dat het zwakste gevoel van gemeenschapszin in de

sample groep werd gerapporteerd door de hoogbouwbewoners in Centraal Bangkok, de zone die bekend staat als het centrale zakendistrict van het land.

Ook de bevolkingsdichtheid heeft een belangrijke rol gespeeld bij de verklaring van de variatie in de mentale staat van de deelnemers aan deze studie. Het resultaat van de simple linear regression analysis bevestigde dat, statistisch, de toename van de bevolkingsdichtheid afbreuk deed aan het positieve gemeenschapsgevoel in alle aspecten. In lijn daarmee bewees de gemiddeld bevolkte residentiële omgeving zich als een omgeving die het gemeenschapsgevoel van de bewoners meer stimuleerde dan de dichtbevolkte gebieden.

De in het bijzonder voor deze studie geïnitieerde architecturale indicatoren lieten ook hun invloed zien op de mentale staat van de hoogbouwbewoners. Gebaseerd op de resultaten van de multiple linear regression en de structural equation modellen was het geïndiceerd dat de verdedigende karakteristiek van het gebouw bestaande uit 1) toegangscontrole, 2) territorialiteit, 3) surveillance en 4) milieu en juxtapositie zijn potentieel bewees om veiligheidszorgen te onderdrukken waar het criminaliteit betrof. Daarentegen was het ook significant dat die verdedigingskenmerken het gemeenschapsgevoel, in het bijzonder het gevoel van verbondenheid, onder de bewoners verminderde.

De privacyondersteunende karakteristiek van het condominium inhoudende 1) het aantal wooneenheden per verdieping, 2) de meest voorkomende indeling van de verdiepingen en 3) het aantal bewoners per wooneenheid werd ondersteunend bevonden aan de toename van de psychologische en fysieke privacy-tevredenheid van de hoogbouwbewoners. Daarnaast werd het vermogen van deze karakteristiek om zorgen over wangedrag bij hoogbouwbewoners te verminderen geïdentificeerd. De gemeenschappelijke faciliteiten van de condominiums werden gekarakteriseerd door 2 sub-indicatoren; 1) de variëteit aan gemeenschappelijke en recreatieruimtes en 2) de zichtbaarheid en toegankelijkheid van deze faciliteiten. De statistische resultaten bevestigden dat deze gemeenschappelijke faciliteiten een negatieve impact hadden op de privacy-tevredenheid van de bewoners.

Verder bleek statistisch bevestigd dat de persoonlijke kwaliteiten en de psychologische indicatoren een kenmerkend effect hadden op de drie afhankelijke variabelen. Uit de bevindingen van de multiple linear regression modellen en de

structurele vergelijkingsmodellen werden de belangrijkste psychologische factoren onttrokken, in het bijzonder de numerieke variabelen waaruit een significante overheersing bleek op de gebieden van veiligheidszorgen, privacy-tevredenheid en gemeenschapszin onder de hoogbouwbewoners in Bangkok. De persoonlijke ervaringen van bewoners met dreigingen was een samengestelde indicator, gebaseerd op de 3 typen van moderne hoogbouw bedreigingen; 1) criminaliteit, 2) wangedrag, 3) noodsituaties veroorzaakt door mens of natuur. De statistische analyse confirmeerde diens directe impact op de veiligheidszorgen van de respondenten.

De privacy behoefte was een indicator die een multidirectionaal effect had op alle psychologische domeinen. Deze indicator was vastgesteld gebaseerd op het psychologisch concept van de 6 vormen van privacy: 1) isolatie, 2) gereserveerdheid, 3) anonimiteit, 4) eenzaamheid, 5) intimiteit met vrienden en 6) intimiteit met familie. De bevindingen bevestigden dat de behoefte aan privacy ofwel de introverte persoonlijkheid van de hoogbouwbewoners in elk aspect een motivator was van hun veiligheidszorgen. Tegelijkertijd zorgde dit voor een vermindering van de tevredenheid over sociaal-interactionele privacy onder de bewoners en het onderdrukte hun gevoel van lidmaatschap, wederkerige invloed, gemeenschapszin en een gedeelde emotionele band met de gemeenschap.

De factoren sociaal kapitaal en participatie werden samengesteld uit de sub-indicatoren 1) delen en doneren, 2) publiek vrijwilligerswerk en 3) burgerplicht. Blijkbaar kon de frequentie van het delen en publiek vrijwilligerswerk significant in alle aspecten de verhoging van het gevoel van gemeenschapszin voorspellen. In de tussentijd voorspelde een hogere frequentie van vrijwilligerswerk een lagere tevredenheid over de psychologische privacy-tevredenheid van de hoogbouwbewoners.

Met betrekking tot de tweede onderzoeksvraag waarbij de hypothese de interrelaties tussen de 3 psychologische fundamenten verwachtte; de onderzoeksbevindingen samen met de analytische uitkomsten bevestigden het voorspelbare patroon van het psychologische mechanisme hiertussen. Het statistisch model identificeerde de onderlinge afhankelijkheid tussen veiligheidszorgen, privacy-tevredenheid en gemeenschapszin onder de hoogbouwbewoners in de context van stedelijk Bangkok. Onder voorwaarde dat de geobserveerde data gemeten dient te

worden volgens de PE assessment en de PEP vragenlijst, kunnen de voorspellende formules in dit rapport de trend voorspellen van deze psychologische variabelen door de waarden van elke indicator in de formules te vervangen.

Volgens het statistisch model bevestigde het onderzoek het inconsistente bemiddelingspatroon tussen de 3 psychologische domeinen. Blijkbaar had een pessimistische kijk op veiligheidszorgen door de hoogbouwbewoners een negatieve impact op hun privacy-tevredenheid en het verzwakte het gevoel van gemeenschap. Voorlopig werkte een optimistische houding ten aanzien van de gemeenschapszin als de mediator die de nadelige gevolgen verlichtte van veiligheidszorgen op de privacy-tevredenheid

Concluderend hebben de bevindingen van deze interdisciplinaire studie het doel bereikt om de mentale staat van de hoogbouwbewoners van het metropoolgebied van Bangkok te onderzoeken en in kaart te brengen. De betrouwbare interpretatie van de statistische analyses heeft ook het omgevingspsychologische mechanisme bewezen en blootgelegd in de specifieke context van de hoogbouwbewoning waaraan multidimensionale voordelen zich verbinden in de bijdrage aan de stedelijke en woningbouwontwikkeling, vooral in de context van Bangkok. Verdere implementatie van de resultaten en de onderzoeksinstrumenten die in deze studie zijn ontwikkeld is mogelijk op zowel een geaggregeerd academisch niveau als voor professionele doeleinden ter verbetering van de hoogbouw woningontwikkeling in de toekomst.

Kernwoorden: hoogbouw woningbouw; omgevingspsychologie; stedelijke psychologie; stedelijke ontwikkeling en woningbouwontwikkeling; omgevingsontwerp, omgeving, design

GLOSSARY

1.	**Behavioural disorder**	A behaviour or action considered unsuitable with cultural norms and values of each community, for example, regarding universal norm, drug-abusing behaviour, domestic violence, trespassing, suicide risks, protests, drunk, etc.
2.	**Condominium/ Condo/ Residential high-rise**	A building higher than 23 meters, functioning as a human habitat during the daytime and the nighttime, for a temporary and a permanent stay. It contains multi-living units which each one comprised at least a bedroom or bedding area, a living area, a kitchen or pantry, and a bathroom and toilet.
3.	**Communal characteristics of the condominium**	A physical-environmental indicator aiming for assessing the condominium's features promoting the communal atmosphere amongst the residents. This indicator is composed of 1) variety of common and recreational area and 2) exposure & ease of accessibility.
4.	**Crime**	A commission of an act that is forbidden or the omission of a duty commanded by public law. According to Royal Thai Police data, there are five groups of crime, which are 1) felony crime, 2) crime against person and sexual harassment, 3) crime against property, 4) interesting crime, and 5) consensual crime (a victimless crime).
5.	**Defensible characteristics of the condominium**	A physical-environmental indicator aiming for assessing the condominium's features protecting the safety and security of the residents. This indicator is composed of 1) access control, 2) surveillance, 3) territoriality, and 4) milieu and juxtaposition.

6.	**Environmental Psychology**	A study that examines the interrelationship between environment and human's perception, cognition, and responsive behaviour.
7.	**Emergency**	An unexpected situation requiring immediate action caused by 1) human such as elevator malfunction, fire, terrorism, etc., and 2) nature, such as floods, earthquake, land sliding, etc.
8.	**Experience of threats**	A level of personal experience of facing or being a victim or a casualty of the three types of threat, namely, 1) crime, 2) behavioural disorder, and 3) emergency incident caused by human or nature.
9.	**Personal factors**	The determinants associated with attributes and personality of the respondents. These factors are categorised into three aspects: 1) personal attributes and socio-economic status, 2) personal dwelling behaviour, and 3) personal psychological background.
10.	**Physical environmental factors**	The determinants associated with the physical environment and urban context of each condominium. These factors are assumed to have influences on the three psychological senses of home. There are two scales of physical environment needed to be concerned: 1) urban and community scale and 2) architectural scale.
11.	**Privacy need**	A level of the respondent’s dissocial mindset that is assumed to affect the psychological status in the residential high-rise environment. There are five conditions of privacy need considered in this study: 1) solitude, 2) isolate, 3) anonymity, 4) reservation, and 5) intimacy with friends/ family.
12.	**Privacy Satisfaction**	A level of satisfaction to control over the access to self and the transaction between a person and

		other(s) in four dimensions, namely, 1) psychological privacy, 2) informational privacy, 3) physical privacy, and 4) social or interactional privacy.
13.	**Privacy supportive characteristics of the condominium**	A physical-environmental indicator aiming for assessing the condominium's features supporting the privacy of the residents. This indicator consists of 1) the number of units per floor, 2) typical floor plan, and 3) the number of unit's members.
14.	**Social capital and participation**	A level of frequency of the respondent's social participation and investing in social capital both formal and informal types. This indicator is categorised into three aspects as follows: 1) sharing and donating, 2) public voluntary, and 3) civic duty.
15.	**Safety concern**	A level of feeling worried about being harmed by three types of high-rise building's threat, which are 1) crime, 2) behavioural disorder, and 3) emergency encompassing human-caused emergency and nature-caused emergency.
16.	**Sense of community**	A level of mutual feeling between individuals and their community in multiple issues, namely, 1) membership, 2) reciprocal influence, 3) integration and fulfilment of needs (reinforcement), 4) shared emotional connection. In this research, the boundary of community refers to the high-rise compound.

LIST OF ABBREVIATIONS

AD	Anno Domini
ANOVA	Analysis of Variance
AVE	Average Variance Extracted
BAF	Biotope Area Factor
BE	Buddhist Era
BMA	Bangkok Metropolitan Administration
BTS	Bangkok Mass Transit System
CB	Central Bangkok
CBD	Central Business District
CCTV	Closed Circuit Television
CFA	Confirmatory Factor Analysis
CFI	Comparative Fit Index
CM	Communal Characteristic
COPSOQ	Copenhagen Psychosocial Questionnaire
CPD	City Planning Department
CPTED	Crime Prevention Through Environmental Design
CR	Comparative Fit Index
DF	Defensible Characteristic
DOL	Department of Lands
DPT	Department of Public Works and Town & Country Planning
DV	Dependent Variable
EB	Eastern Bangkok
EFA	Exploratory Factor Analysis
FAR	Floor Area Ratio
GFI	Goodness of Fit Index
GHB	Government Housing Bank
H_0	Null Hypothesis
H_1	Alternative Hypothesis
IOC	Index of Item-objective Congruence

IV	Independent Variable
KMO	Kaiser-Meyer Olkin Measure of Sampling Adequacy
LSD	Fisher's Least Significant Difference
M&E	Monitoring and Evaluation
MHRC	Minneapolis Highrise Representative Council
ML	Maximum Likelihood
MLR	Multiple Linear Regression
MRT	Metropolitan Rapid Transit
MSV	Maximum Shared Variance
NB	Northern Bangkok
NESDB	National Economic and Social Development Board
NHA	National Housing Authority
NSOT	National Statistical Office Thailand
NWB	Northwestern Bangkok
OSR	Open Space Ratio
PE	Physical-Environmental Assessment
PEP	Personal and Environmental-Psychological Questionnaire
PMC	Pearson’s Movement Correlation
PV	Privacy Supportive Characteristic
PWB	Psychological Well-Being Scales
R&D	Research and Development
REIC	Real Estate Information Center
RMSEA	Root Mean Square of Error Approximation
RQ	Research Question
SB	Southern Bangkok
SCI	Sense of Community Index
SCP	Situational Crime Prevention
SDG	Sustainable Development Goal
SEM	Structural Equation Modelling
SLR	Simple Linear Regression
SWB	Southwestern Bangkok
TCA	Thai Condominium Associate

TCRC	Thai Condominium Residents Council
TMBA	Thai Building Manager Association
TOL	Tolerance
UN	United Nations
UNESCO	United Nations Educational, Scientific and Cultural Organization
VIF	Variance Inflation Factor
WHO	World Health Organization

CHAPTER 1
INTRODUCTION

1.1 Statement and Significance of the Problems

The concept of vertical living has been developed for more than two thousand years starting in the period of Roman Empire and pushed towards universality due to the human population increase and urbanisation. In the eighteenth century, together with modern architectural and engineering advancement, the high-rise tenements were constructed in metropolitan areas through the continents of Europe and North America for sheltering immigrant labour and low-income tenants. Due to the overcrowded and the substandard of the living environment of the tenements, namely, poor ventilation, unsanitary, etc., this type of vertical housing became infamous and entailed the demolition and the housing reformation in several cities both in Europe and the United States afterwards. (Apmann, 2016, Worsdall, 1979)

The popularity of mass high-rise housing rose up again during the accommodation shortage after World War II. This time, it played a new role as a human's habitat representing the ideation of social equity. (Cizek, 2013) Notwithstanding, the apprehension involving the physical, behavioural, and psychological impacts of high-rise housing environment on the dwellers had been observed and investigated by the Western scholars since the 33 concrete residential buildings known as Pruitt-Igoe were demolished in 1970 owing to the crime-infested environment, decay, and depopulation after fourteen years of the first occupancy. (Bristol, 2015, Newman, 1972) About the same period, the demolition and recovering operation of mass high-rise housing compounds as well appeared in other cities in Europe, for example, London, Glasgow, Barcelona, Amsterdam, and so on. (Leslie, 2015, Moss, 2011, Rodger, J., 2004, Van Soomeren, De Kleuver, et al., 2014) The failure of high-rise building as a decent house was broadly argued amongst stakeholders in various approaches such as architecture, urban and housing study, sociology, etc. for decades.

In the following years, the development of high-rise housing in Asian's capital cities, for examples, Hong Kong, Singapore, etc. was contrasting and more lucrative. These vertical housing projects were promoted for solving a major issue of land scarcity and high density of population. The design and construction were more pronounced, and the towers were taller than the high-rise housing previously built in the Western regions. Some of them were more than fifty-storey high. (Van Soomeren, De Kleuver, et al., 2014) Up until now, the living in high-rise building has become a normal lifestyle for the urban population across the world. At the beginning of the twenty-first century, there are approximately 16 million people of the global population living in this type of habitat. (Cizek, 2013)

In Thailand, the pioneered project schemes of high-rise housing had been developed and promoted since 1970 in the business districts of Ratchadamri and Sathorn. However, these projects had never been constructed because of the conflicts of law provision and the economic recession after the Second Indochina War (Vietnam War) ended in 1975. (Boonkajai, 1993) The high-rise residential business revived again due to the Condominium Act enactment in 1979. Thenceforward, many residential high-rise projects as known as “condominium” or “condo” mostly operated by the private sector have been launched and played a significant role in Thai property market. In the early years of Thai's condominium industry, during 1979 to 1985, the high-rise residential buildings, namely, Siam Penthouse, Grandville House, and Klongton Condominium were constructed in Bangkok Metropolitan area. (Boonkajai, 1993) All through four decades, the high-rise housing development in Thailand has faced several major economic crises and impacts of political and social shifting. Nevertheless, the demand and supply of Bangkok residential high-rise are still enlarged gradually due to the extreme primate city characteristic generating an influx of people seeking for economic opportunities plus a behindhand development of infrastructures in other parts of the country. The land value in Bangkok urban area has been continually increasing in so much that the majority of the urban population cannot afford to buy their own piece of land. Thus the typical low-rise housing in Bangkok urban areas has been transformed into high-rise residential buildings. At the end of 2015, the number of occupied high-rise dwelling units in Bangkok

metropolitan area was at least 200,000. (Population Statistics Group, 2010, Rujibhong, Koorutanapisan, et al., , 2015, The Nation, 2015)

Unlike the Western world, the empirical research and in-depth studies involved the physical and mental issues of high-rise dwellers in Thailand have not been reported academically. Mostly, the orientation of housing research in Thailand tends towards the behavioural consumerism, market price, preference of house, provision of law, ownership and tenure, etc. To some extent, they could reflect the Thai condominium buyers' requirements and expose the desirable features of high-rise house that people want to live in but did not focus on reverberating the consequences of living in these vertical habitats. (Rakbumroong and Tiangtham, 2013, Sodchuenjit, 2011, Sookmode and Kongsawatkiet, 2012, Wutthisukhum, 2011)

A universal definition of home has been consistently discussed researchers yet has not converged to a static resolution. (Appleyard, 1979, Dupuis and Thorns, 1998) The psychological definition of home adopted in this research was constructed based on the most elementary function of a habitat, which is to provide physical security and health. Then the spatial quality of home supports the psychological need for privacy that involves the desire for property control. A further level of psychological need is social recognition and empowerment, which can be partially fulfilled by the transmittance from home to the outside world. (Després, 1991) This theoretical concept conformed to the classic Maslow's theory of personality regarding the functioning of fulfilling a hierarchy of human needs and the global housing goals addressed by the United Nations (UN) and World Health Organization (WHO) in 2011 that housing should ensure privacy, safety and security for the occupants. (WHO, 2011)

Besides the aspects of privacy and safety, WHO (2011) also stated that housing should provide access to economic and social opportunities, which positively have an impact on the dwellers' health related to the physical movement and the psychological and social benefits of social interconnectedness. The last mentioned social opportunity and community connectedness seem to be problematic issues for the gated residential high-rises where surveillance and communal space are naturally scarce. Regarding the literature review and the psychological definition of home, there were three fundamental psychological

domains accentuated in this research, namely, the psychological safety, privacy, and a sense of community.

When considering physical features and environment of residential high-rise, its unique characteristic could be both advantageous and disadvantageous for safety, privacy, and sense of community of the occupants. Undeniably, the steady structure of the modern day's residential high-rises can shelter, protect, and keep their dwellers from external harmfulness. Nonetheless, some previous studies indicated fears related to the safety issue amongst high-rise residents, for instance, fear of being trapped in the building, fear of falling or jumping from high floor, fear of intruder and crime incident, etc. (Chatterjee, 2009, Gifford, 2007) Regarding the aspect of privacy, the partitional structure of residential high-rises can be beneficial for their occupants to control an unwanted social interaction and allow them to maintain their emotion and independent state when being alone. However, the unsatisfaction of privacy including complaints about noise amongst the dwellers was reported in some research. In the meantime, this type of enclosed spatial planning was assumed to cause loneliness and isolation, impede social participation, and reduce helpfulness amongst the residents. These matters of fact could be the obstacles for promoting the sense of community in this type of habitat. (Bynum and Purri, 1984, Gifford, 2007, Minnery and Lim, 2005) Notably, these controversial research findings were differentiated depending on the particular context of each region, country, city, and the community surrounding the high-rise residential compound including the personal factors of the sampling group.

In consequence, regarding the mentioned phenomena and problems exploration, the predicaments, which were requiring further study, were identified as follows:

- Concerning urban and environmental psychology, a capacity of high-rise residential building to function as the “home” for human beings needs an empirical clarification, and investigation to establish a comprehensive basis for the further housing research and theoretical development.
- It is important to explore and analyse the consequences of living in high-rise building especially in Thailand. Regardless of a business purpose, the result of this empirical research and surveys can forthright

reflect the physical and psychological problems of the dwellers as well as be generalised by multi- disciplined stakeholders.

- Since the psychological safety, privacy, and sense of belonging to the community have been separately developed for decades, yet the discovered overlapping has implied the connectedness amongst them, in relevance to the fundamental psyche of home, the scientific research which integrates these three domains along with the particular environmental context of housing then still in need.
- Since the feelings of safety, privacy, and sense of community interweave with numbers of factors, the investigation of these factors then become more important to identify the outstanding significant determinants that could lead to the most practical and implementable conclusion. Thus far, there are two categories of factors deduced from the theoretical concept, namely, 1) the factors involving personal and psychological context, and 2) the factors involving built-environmental and community context.

The statement as mentioned earlier was to confirm the directional goal of this research which was to explore the capacity of high-rise building as the home for Bangkok urban population, besides the physical dimension of place, the primary psychological functions delivered to the residents should be examined. In this research then the environmental psychological domains, namely, safety concern, privacy satisfaction, and sense of community were spotlighted as the core indicators influenced by the physical features of vertical habitat cooperated with the unique context of Bangkok urban area, and the personal attributes of the dwellers.

The result of this research was expected to reflect the hidden mental status of the inhabitants and lead to the infirmity of the existent environmental design for the residential high-rise. Moreover, the proposition of an overall recommendation for bettering the vertical housing environment including a new active mental well-being index for high-rise residents in the urban context of Bangkok also prospected.

1.2 Research Objectives

1.2.1 To explore the three environmental psychological senses of home, which were 1) safety concern, 2) privacy satisfaction, and 3) sense of community, amongst the dwellers of high-rise buildings located in Bangkok Metropolitan area.

1.2.2 To analyse the significant influences of the two important factors, which were 1) personal factors, and 2) physical environmental factors comprised urban and architectural features, towards the three environmental psychological domains to synthesise and provide an explanation as well as a causal effect/ relationship from the results retrieved from the field survey.

1.2.3 To assess the accuracy of the environmental psychological assessment implemented in this research and affirm the statistical relationships between the three psychological domains, which led to a solid recommendation for designing the better environment of high-rise habitat.

1.3 Research Questions and Hypotheses

The hypothesis and sub-hypotheses of this research were deductively built based on the theoretical concept that the physical environment comprised urban context and architectural features of the high-rise housing along with the personal attributes and the individual psyche fostered by social mechanism had major influences towards the individuals' psychological senses of home as the dependent variables. Besides, the existence of interrelationship between these three dependent variables -safety concern, privacy satisfaction, and sense of community- was assumed as well.

Research question one (RQ1):

How are the three fundamental psychological senses of home, namely, 1) safety concern, 2) privacy satisfaction, and 3) sense of community amongst high-rise dwellers in Bangkok urban area affected significantly by the physical environmental factor composed of urban and architectural context and the personal factor composed of attributes, personality, and experiences?

Null hypothesis one ($H1_0$): The safety concern, privacy satisfaction, and sense of community are not significantly affected by the physical and personal factors.

Alternate hypothesis one ($H1_1$): The safety concern, privacy satisfaction, and sense of community are significantly affected by the physical and personal factors.

Research question two (RQ2):

How do the safety concern, privacy satisfaction, and sense of community associate with each other?

Null hypothesis two ($H2_0$): The safety concern, privacy satisfaction, and sense of community do not associate with each other.

Alternate hypothesis two ($H2_1$): The safety concern, privacy satisfaction, and sense of community associate with each other.

1.4 Scope of Research

1.4.1 Research Setting

Regarding the mentioned statement and objectives focusing on high-rise dwellers in the urban area, the possible setting of this research was then confined to the residential high-rise buildings located in Bangkok, Thailand. To facilitate the survey and to ensure that the sampling group effectively represents the entire population, the Bangkok Metropolitan area was clustered into six different zones categorised by the urban sprawling trend of the city defined by the City Planning Department (CPD), Thailand.

The six zones are as follows: 1) Northern Bangkok, 2) Central Bangkok, 3) Southern Bangkok, 4) Eastern Bangkok, 5) Northwestern Bangkok (North Thonburee), and 6) Southwestern Bangkok (South Thonburee). From each zone, the three residential high-rise buildings higher than 23 meters were randomly selected which each one represented the low-selling price, middle-selling price, and high-selling price residential high-rise consecutively. Finally, the number of selected residential high-rises then was eighteen.

1.4.2 Population and Sampling Group of research

The population of this study addressed on the dwellers of high-rise residential buildings located in Bangkok urban area. As mentioned earlier, the entire population of the high-rise residents in Bangkok was expected to be more than 200,000 people. The sample size for this study was calculated based on the Taro Yamane's sample size table for the number of the population more than 100,000. The desired sample size yielded between 1,111 and 1,222 participants with a ±3.0 % margin of error, a 95% confidence interval, and a 10% response rate. Individuals were recruited by using random sampling amongst the residents who were currently living in the eighteen selected high-rise residential buildings as mentioned earlier.

1.5 Research Instruments

Based on the integration of the multidisciplinary theories and the specific context of high-rise housing in Bangkok, the two primary research instruments were invented in particular for this field survey. Since both environmental physical conditions of the condominiums and the personal data of the respondents needed to be collected thoroughly, each research tool was meticulously designed for serving the distinctive purpose and being practical on the field.

The two instruments initiated in this research are described as follows:

1.5.1 Physical-Environmental Assessment (PE)

The PE assessment was the research tool designed for evaluating the physical environment of the selective residential high-rise including its surroundings context as framed in the scope of the study. This tool was implemented during the non-participant observation by the researcher.

1.5.2 Personal and Environmental psychological Questionnaire (PEP)

The PEP questionnaire was congregated for the purpose of collecting the personal information from the sampling group. The PEP survey allowed respondents to self-report their personal background information and the three domains of psychological status, namely, safety concern, privacy satisfaction, and sense of community while living in the environment of their condominiums.

1.6 Research Procedures

Since the research aimed to explore and reveal the environmental psychological status of the high-rise dwellers in Bangkok urban area as well as to pursue a decent explanation for the results derived from the field survey, the procedure of this study was carefully designed and then divided into the eight stages integrated both quantitative and qualitative methodologies as follows:

1.6.1 Stage 1: Literature and secondary data review

The purpose of this step was to examine the literature and secondary data derived from the reliable sources such as academic journals, articles, news, statistical data, online sources, etc. involving with the research objectives and the context of the topic.

1.6.2 Stage 2: Operationalising variables and research instruments

This phase aimed to employ facts and knowledge extracted from literature, make an assumption, and draw a conceptual diagram beneficial to building the practical research indicators and instruments. During this process, background data involving problems caused by high-rise living was linked to the tangible determinants of safety concern, privacy satisfaction, and sense of community deduced from the theoretical concept. Meanwhile, the framing the scope of research applied the present situation and law provision of Bangkok. The units of measurement implemented in the research instruments established based on the previous empirical research.

1.6.3 Stage 3: Evaluating research instruments

This stage was to assess a content validity of the research instrument, which was the Personal and Environmental psychological Questionnaire (PEP). The evaluating process applied at this stage was known as the Index of item-objective congruence (IOC), which required at least three specialists to evaluate the question items contained in the PEP questionnaire.

1.6.4 Stage 4: Pilot study

The pilot study was performed after the adjustment of the research tools followed the experts' recommendation. Both the physical environmental assessment and the psychological assessment survey were administered at one of the targeted residential high-rises. The physical environmental assessment was performed along

with a non-participant observation by the researcher. Meanwhile, the survey was distributed to the participants living in that building. The result derived from pilot study was examined its validation, reliability, and unidimensional qualification by calculating the Cronbach's Alpha coefficient value as well as the eigenvalue of the each item. At the end of this stage, the last adjustment for the PEP questionnaire was completed.

1.6.5 Stage 5: Field Survey

At this juncture, the full-scale physical environmental observation and field survey were performed along with the two research instruments, namely, the Physical-Environmental Assessment (PE), and the Personal and Environmental psychological Questionnaire (PEP). As mentioned earlier, this study applied the multi-stage sampling technique. Firstly, the cluster sampling technique was to define the eighteen residential high-rise buildings as research setting followed by the second stage, the simple random sampling technique, to recruit the survey respondents, who were living in these buildings. Noted that the non-participant observation somehow needed a permission of the building's juristic committee as well as recruiting the participants required a willingness of individual. The physical environmental observation covered the surroundings, community, the exterior and interior conditions of the residential compound yet the inside of dwelling unit was exceptional.

1.6.6 Stage 6: Data analysis

At this stage, the entire collection of data was categorised and analysed by several methods depending on the type of data concerning the hypotheses testing and the answering the research questions. The analytical procedures applied in this stage were both descriptive and inferential statistics.

1.6.7 Stage 7: Summing-up research report

In this final stage, the results of the study were discussed. The acceptance or rejection of hypotheses and sub-hypotheses was also summarised and communicated in the form of a document.

The complete seven procedures of this research are illustrated step by step as shown in the figure below. (See Figure 1.1)

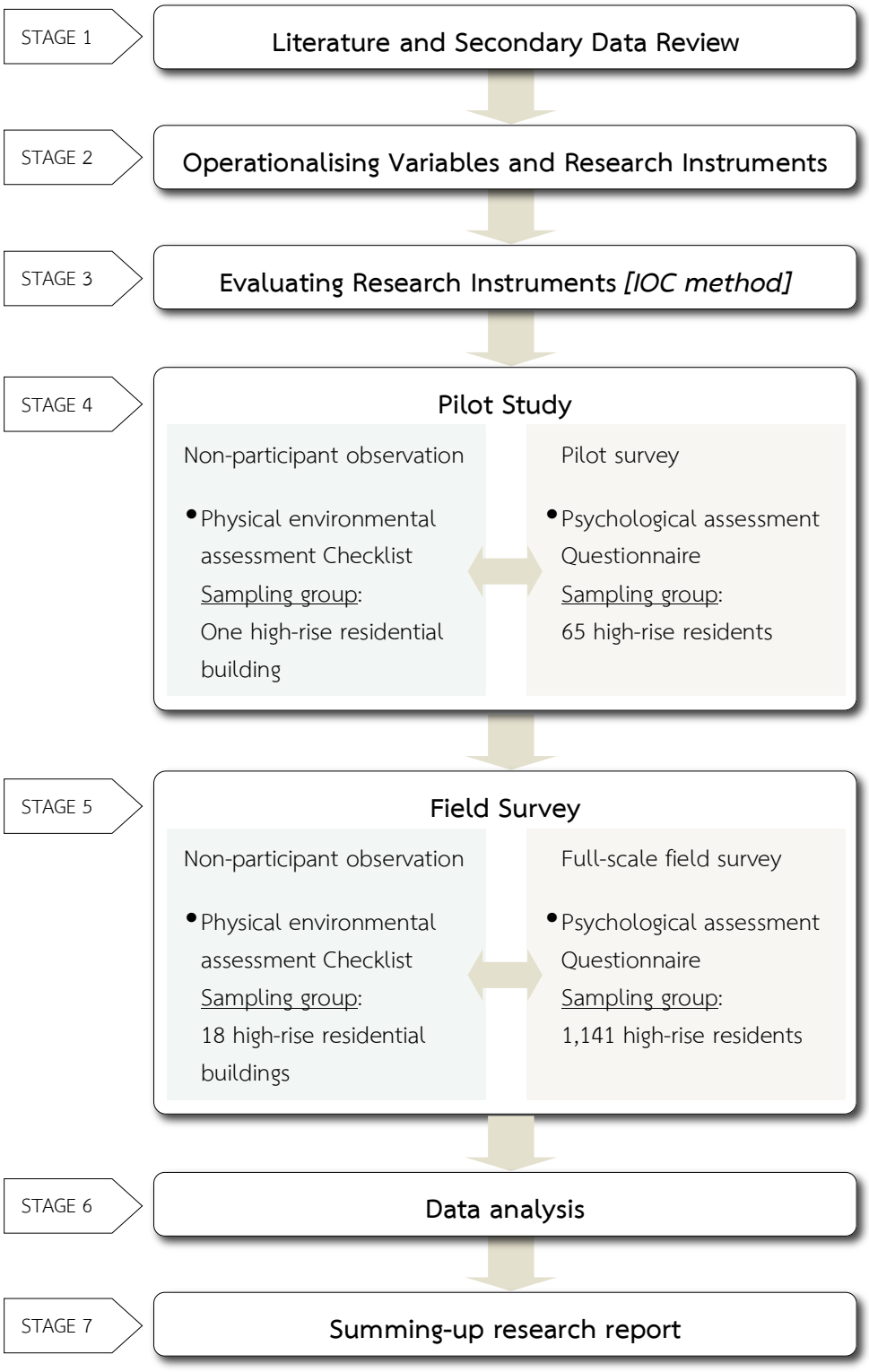


Figure 1.1 The diagram of research procedures

CHAPTER 2

LITERATURE REVIEW

Chapter Summary

The literature review of this study is directionally planned and categorised concerning questions and hypotheses of the research. Also, it aims to benefit extracting the core contents and operationalising the essential factors that potentially influence the psychological status of the high-rise dwellers.

The main topics underlined in this section comprise 1) the environmental psychology of high-rise housing connected with urban context, 2) the psychological properties of home encompassing safety concern, privacy satisfaction, and sense of community, 3) the measurement and indicators implemented in environmental psychological research, and 4) the summary of theoretical framework and tools for variables construct. Figure 2.1 below represents all topics and sub-categories of the literature review including the connectedness of each other.

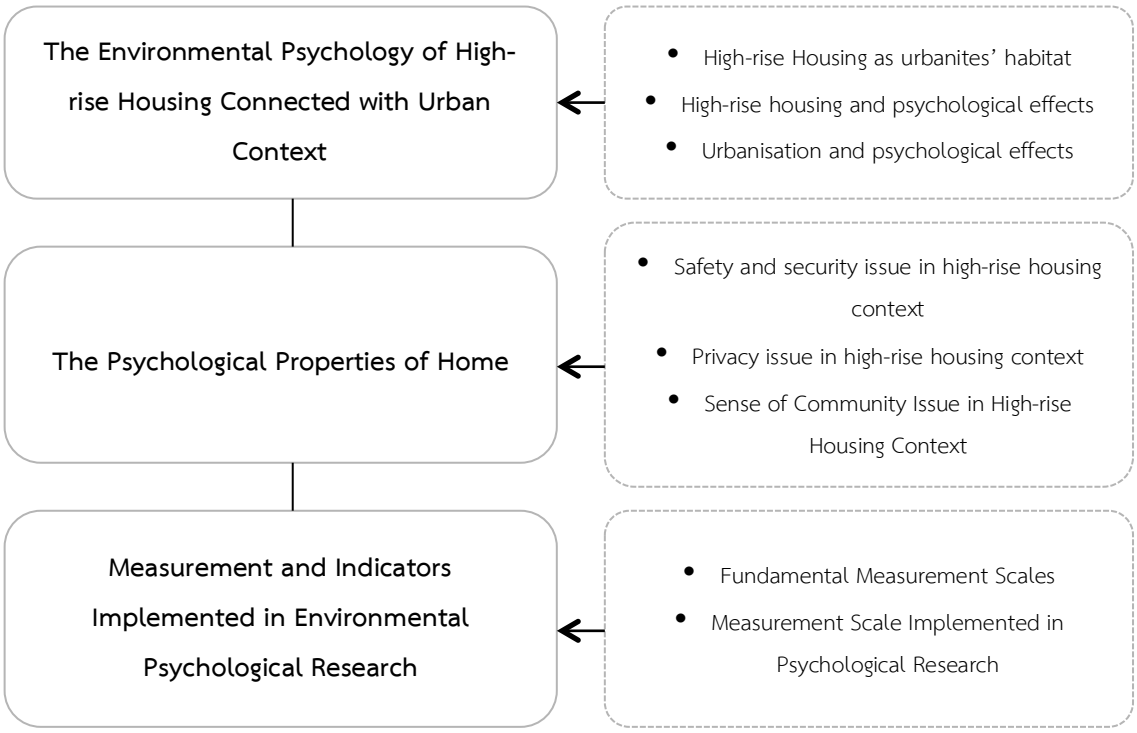


Figure 2.1 The structural diagram of literature review

2.1 The Environmental Psychology of High-rise Housing related to to Urban Context

2.1.1 High-rise housing as the urbanites' habitat

As introduced earlier, the concept of vertical housing originated since the period of ancient Roman Empire (AD238), when the majority population of Rome could not afford their own houses and lived in rented five to six-storey height apartment known as "insula", which meant island. As revealed in the archaeological research, the insula refers to a large and typical high block divided into separate dwelling unit and let separately. Due to the demand for accommodation exceeding supply, the insula became an attractive investment for the wealthy class citizens at that time. (Cizek, 2013, Li, 2013, Van den Bergh, 2004)

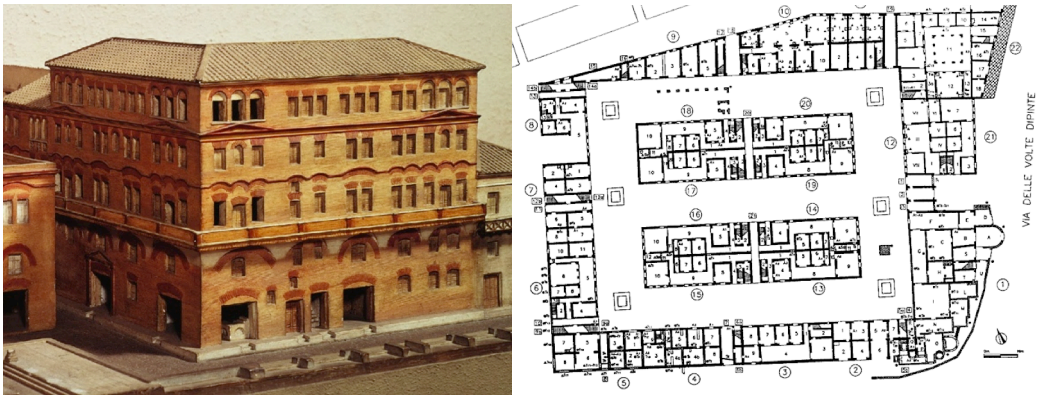


Figure 2.2 The ancient Roman vertical habitat "Insula"

(Left) The ancient Roman vertical habitat, "Insula", source: http://www.planetainsolito.es/tour/ruta-barcelona-romana/

(Right) Plan of Regio III – Insula IX – Case a Giardino (Garden Houses), source: https://www.khanacademy.org/

Later in the 12th-13th century, another form of vertical habitat was found in the different regions of the world. The Montezuma's Castle Cliff in Arizona, United States of America was a five-storey structure built in the cliff at the elevation of 100 feet up from the ground. The Sinagua architecture, the irrigation canal, and the petroglyphs painting nearby made this high-rise house unique. In the 15th century, the 46 vertical and massive residential compounds known as Fujian Tulou was confirmed existent in Tulou, Taiwan. "Several storeys high, they were built along an

inward-looking, circular or square floor plan as housing for up to 800 people each". (UNESCO, 2008) At the centre of each compound, the communal courtyard was available for sharing by the occupants concerning the principle of Fengshui. (Cizek, 2013) This type of habitat was "built for defence purposes around a central open courtyard with only one entrance and windows to the outside only above the first floor. Housing a whole clan, the houses functioned as village units and were known as a little kingdom for the family or bustling small city." (UNESCO, 2008)

Figure 2.3 The vertical habitats in U.S.A. and Taiwan

(Left) The Montezuma's Castle Cliff, USA, source: http://www.arizonaruins.com/montezuma_castle

(Right) The Fujian Tulou, Taiwan, source: http://whc.unesco.org

During the 16th century, another renowned type of the vertical habitat was constructed in the region of Shibam near the cliff edge of Wadi Hadramaut, Yemen. According to UNESCO, it was "one of the oldest best examples of urban planning based on the principle of vertical construction". (UNESCO, 1982) These tower houses structured with the sun-dried mud brick were up to seven storeys high and no longer existed elsewhere in the region. The outstanding qualification of this settlement clearly was its defensive character, a fortress-like appearance which fortified the city of Shibam from its antagonists while functioned as a human habitat and protected urban fabric including Islamic former traditional way of life. (Li, 2013, UNESCO, 1982)

Figure 2.4 The old walled city of Shibam

(Left) The aerial view of the old walled city of Shibam, source: http://whc.unesco.org/en/list/192/

(Right) The inside perimetre of the old walled city, source: http://whc.unesco.org/en/list/192/

Likewise, the steam locomotive was propellant an industrial revolution; the elevator invention did the same to construction advancement. It encouraged human to build the taller structures accommodating multi-households in the one footprint. Most of these multi-family residential buildings were located in the urbanised areas closed to the factories for which the tenants worked. This form of high-rise housing, in that period, was called "tenement". This type of residential building was considered as a substandard multi-family living unit located in the urban core of the major cities in Europe and North America, such as New York, London, Edinburgh, Glasglow, Berlin, etc., of where their population doubled every decade. It purposely served the immigrants and the working class due to industrialisation and urbanisation of the cities. (Cizek, 2013, History, 2010, Li, 2013) "From 1800 to 1880, the buildings that had once been single-family dwellings were increasingly divided into multiple living spaces to accommodate this growing population". (History, 2010) Most of the tenements were the walked up flats, which were not higher than fifteen-storey, due to the unprovided passenger-elevators for poor tenants. A social reformer, Jacob August Riis photographed and described the infamous conditions of the tenement as follow. "Their large rooms were partitioned into several smaller rooms, without regard to light or ventilation, the rate of rent

being lower in proportion to space or height from the street; and they soon became filled from cellar to garret with a class of tenantry living from hand to mouth, loose in morals, improvident in habits, degraded, and squalid as beggary itself." (Riis, 1890)

Figure 2.5 The living conditions in tenements, U.S.A.

(Left) The tenement in Lower East Side, New York, source: http://thegildedhour.com/tenements/

(Right) The lodgers in a crowded Bayard street tenement, photo credit Jacob August Riis, source: http://www.nytimes.com/projects/2013/high-rise/

The public discernment of poor living conditions in the tenements led to the housing reformation in New York State and the passaging of new housing law known as the Tenement House Act of 1901. (Apmann, 2016) In the meantime, the urban renewal planning concept, "Garden City" proposed by Ebenezer Howard in 1898 was adopted to alleviate the working-class's substandard living condition in the industrialised zones in the United Kingdom. The proposed Garden City was a permanent concentric pattern of opened and agricultural land around town. The number of population was limited to 32,000 inside the area of 6,000 acres, which "soon became part of British planning doctrine that eventually developed almost into dogma". (Reps, J. W., 2002) Regarding “the labour movement after the First World War, the early low-quality tenements were continually demolished as a part of slum clearance, and public housing estates for the working-class, which were developed according to the garden city model.” (Li, 2013)

During the pre-war period, the architectural modernism movement in the Western world, such as Bauhaus in Germany, Le Corbusier in France, Vkhutemas in the Soviet Union, and Chicago school in the United States, (Li, 2013) along with the revolution of technology, engineering, and construction materials, had promoted the

functionalism and rationalism ideation instead of the traditional architecture.

Le Corbusier was one of the outstanding modern architects and urban planners. Based on the new technology of reinforced concrete, he invented the utopic "Tower in the parks" which influenced the vertical urban design for the next five decades. (Cizek, 2013) Also, his perspective on the habitat was that "A house is a machine for living in". To him, it meant, "a house is an efficient tool to help provide for the necessities of life and no more. Decoration and extra frills are not necessary". (Mos, 2015) These concepts very well reflected his functionalism trajectory, which as well attuned with the upheaval destruction and the age of decadence during the post-war period later on. (Power, 1999)

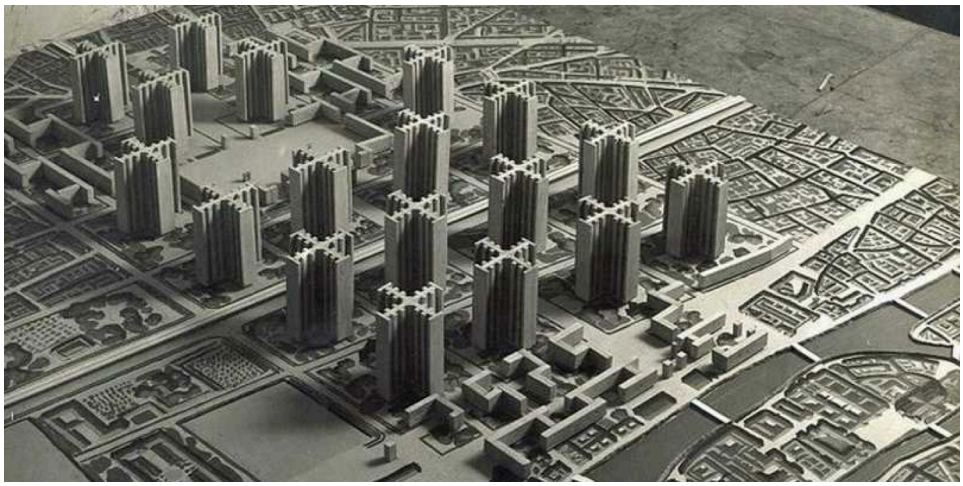


Figure 2.6 The model of Tower in the parks designed by Le Corbusier,
Source: http://www.businessinsider.com

After the Second World War, several countries faced widespread housing deficits running into many millions of population. Since then, the living in high-rise housing became universally beloved. (Cizek, 2013, Power, 1999) During the 19th century (1945 - 1970), the rise of public mass housing projects appeared in the major cities of Europe and the United States such as Vienna, Moscow, London, Berlin, Amsterdam, New York, Chicago, etc. On the socialistic side, it became an icon of social equilibrium that encouraged interactions across social hierarchies.

Figure 2.7 The Karl-Marx Hof social housing, Vienna, photo credit: Christopher Pizzi, Source: http://christopherpizzi.blogspot.nl

On the capitalistic side, it was a middle-income housing plan, which soon transformed into the public-private partnership project. The approach of "mixed-use" and "mixed-income" development did not seem to go well in some cities after a while. (Cizek, 2013, Holder, 2016) In the United States, where the segregation and discrimination were deep-rooted in society, such equity appeared to turn upside down. The public mass high-rise housing projects, for instance, the Pruitt-Igoe, the most infamous mass high-rise housing complex located in St. Louis, Missouri became unlivable places due to several causes that entailed the declination of occupancy. (Bristol, 2015)

For the purpose of budget constraint, the Public Housing Administer of St. Louis changed and eliminated some elements of the original design especially the shared amenities that connect people to the living place, namely, playground, green areas, ground floor bathroom, etc. Also, the quality of construction materials was substandard. The segregated environment of the compound -the Pruitt zone was for blacks, whereas Igoe zone was for whites- and the failure of attempts to integrate the community slowly weakened the residents' sense of community. Furthermore, the architectural elements of the buildings exacerbated safety concern of the residents, namely, the skip-stop elevators and the galleries[1], which pushed them

[1] The skip-stop elevators and the galleries were the design features of Pruitt-Igoe high-rise buildings creating "individual neighborhoods" within each building. The galleries were located on every third floor and were conceived as the vertical hallways. The skip-stop elevators carried residents to the gallery level from which they could walk to their apartments including laundry and storage facilities opened off the galleries. (Bristol, 2015)

towards the vulnerability of being victims of crime. (Bristol, 2015) Occupants, who potentially had a more economic opportunity, especially the white middle-class, deflected from the compounds. (Von Hoffman, A., 2013, Cizek, 2013)

Figure 2.8 The public mass housing projects in U.S.A., Pruitt-Igoe

(Top) The Pruitt-Igoe, St. Louise, Missouri, U.S.A., source: https://en.wikipedia.org/wiki/Stuyvesant_Town–Peter_Cooper_Village

(Middle) The Pruitt-Igoe, St. Louise, U.S., source: https://s-media-cache-ak0.pinimg.com/originals/09/b4/a5/09b4a5d46752df4c02f4289870c871ac.jpg

(Bottom) The demolition of Pruitt-Igoe, source: http://www.stltoday.com/

Regarding the failure of management, such as elevators' malfunctioning, vandalism, the crime-infested environment, decay, and depopulation after fourteen years of the first occupancy, eventually, the infamous high-rise housing, Pruitt-Igoe turned into a neglected troublesome neighbourhood and was demolished abided by the government's order. (Bristol, 2015, Von Hoffman, A., 2013)

After the utopia turning into the social stigma, the obliteration was considered as a light at the end of the tunnel. During the 1970s, many public high-rise buildings in the United States were demolished due to the failure of the government's involvement to alleviate the controversy over the racial and social-class fragmentation, destruction of the modern age construction materials, economic decline, etc. (J.S., 2011, Bristol, 2015) Meanwhile, in the United Kingdom, the pre-fabricated structure started to collapse and caused numbers of casualty in the incidence. The high-rise's growth dropped down again, and the urban sprawling was the following phenomenon. Nevertheless, the situation of high-rise housing development in Asia, for example, Hong Kong, Singapore, etc. was contrasting and more lucrative. These high-density isle countries had the major issue of land scarcity. In consequence, vertical housing appeared to be an irresistible option on which both the government and people agreed. The subsidised high-rise housing projects were comprehensively planned, designed, constructed, managed and sustainably maintained. They got a new name, "condominium" or "condo". (Cizek, 2013, Li, 2013, Van Soomeren, De Kleuver, et al., 2014)


Figure 2.9 The modern high-rise housing projects in Asia

(Left) The modern high-rise housing in Singapore, photo courtesy: Iwan Baan, source: http://www.metropolismag.com

(Rigth) The modern high-rise housing in Hong Kong: source: https://www.lonelyplanet.com/china/hong-kong

The history and evolution of high-rise housing mentioned above manifested the convergence of urbanisation and vertical housing. One could say that the multi-family high-rise housing was the unique pattern of human settlement that emerged only in the urban area, not elsewhere specified. Learning from the past led to the refining denouement that in the various cultural contexts, the salient environment of high-rise habitat had been functioning to fulfil the different physical and psychological needs of human regarding the following psychological and humanistic standpoints.

- The need of being sheltered:

It is a common understanding that human beings are physically weak compared to other creatures. Unlike animals, humans barely survive in a harsh natural environment. (Lawrence, 1996, Maslow, 1943, McLeod, 2007) Similar to other types of house, high-rise housing proved its qualification of sheltering and fulfilled the physiological needs of human. Behind its wall, a man can live safely from natural harmfulness.

- The desire for surviving:

Since human beings inherently “tend to behave in ways making

movement from physical deprivations, for example, pain, hunger, sex demands, needs for sleep, towards the physical well-being, and Euphemia". (DeMartino and Stacey, 1958, Maslow, 1958, Symonds, 1958) In a contemporary context, choosing to live in a high-rise located in an urban area is likely to be the better option for earning convenience and access to water supply, food, electricity, job, hospital, entertainment, etc. than to live remotely in a suburban area.

- The need of being protected:

In some particular regions and periods, restless situation, riot, and war were people's way of life. The defensible characteristic of high-rise could keep its occupants safe on the higher and better spot than their enemies. The surveillance was constantly drilled, meanwhile living everyday life was continuing. The old walled of Shibam in Yemen is a good example of this desire due to the context of the area and its practicality available until now. (Maslow, 1943, UNESCO, 1982)

- The desire for balancing between individual and social interaction:

Regarding psychological sphere, it is important for humans to balance their need satisfactions comprising of the three universal psychological needs for 1) competence, 2) autonomy, and 3) relatedness. "Competence" refers to the necessity of people feeling effective in acting to the world. "Autonomy" refers to the experience that one is acting in choiceful ways and able to endorse his or her behaviour. When experiencing their reactions as autonomous, individuals feel a sense of personal congruence—they experience their different thoughts, emotions, and behaviours as being in harmony with one another. "Relatedness" reflects trust and satisfied relationships with others, and a sense of belonging to valued groups or organisations. (Weinstein, 2014) With respect to the need of satisfaction, high-rise housing can physically support this psychological practising with its tightened proximity between occupants that increase chances of social interaction yet the partitional structure can still keep them separate from each other. (Gifford, 2007)

- The desire for empowerment and belonging to the community:

As well, the psychologist stated that human beings tend to keep themselves aloof from being unwanted towards being loved and given intimacy, tenderness, and a sense of belonging as well as from being bored and monotonous towards experience and zestful activity. (Symonds, 1958, DeMartino and Stacey,

1958, Graffam, 1958) This subconscious desire is one of the motivations that cause congregation of human society and urbanisation. The images of social equity and the ideation of utopia of mass high-rise housing after the post-war period ignited the feeling proud and empowered, when living in such idealistic society amongst the residents. (Cizek, 2013, Holder, 2016) Besides the shortage of accommodation after the Second World War, the new experience of life that high-rise housing offered to the residents was one of the reasons that drove up its popularity during that time.

2.1.2 High-rise housing and psychological effects

The behavioural and psychological changes amongst high-rise dwellers have been concerned and observed by the Western scholars since the demolition of the public mass high-rise housing in the 1970s both in the United States and Europe. (Van Soomeren, De Kleuver, et al., 2014, Rodger, J., 2004) The failure of high-rise building as a proper house was broadly argued amongst stakeholders in various approaches such as urban and housing study, architecture, sociology, etc. for decades. Unlike the Western world and the other countries in Asia, for instance, Singapore, China, Hong Kong, etc. the empirical research and in-depth studies involving the behavioural and mental issues of high-rise dwellers in Thailand have not been reported academically. (Yuen, Yeh, et al., 2006b, Li, 2013, Minnery and Lim, 2005a)

Mostly, the orientation of housing research in Thailand tends towards the behavioural consumerism, market price and preference of housing choice, and provision of law including ownership and tenure. Nevertheless, there were remarkable results of the empirical research that revealed the effects of demographic and personal attributes on the decision of housing buyers, which led to the different backgrounds and requirements of the high-rise dwellers. Rakbumroong and Tiangtham (2013) reported that the personal factors, namely, ***age, education, and monthly income*** were found significantly affecting the decision making of buying condominiums in Bangkok. Meanwhile, Sookmode and Kongsawatkiet (2012) reported that the ***marital status*** significantly influenced the consumers' decision of buying. Some studies defined that all of the mentioned demographics including

gender of potential customers significantly affected their purchasing decisions. (Rakbumroong and Tiangtham, 2013, Sookmode and Kongsawatkiet, 2012)

Apart from the demographical factors, the issues of psychological and behavioural consequences of living in high-rise seemed to be indistinct. This matter of fact was reflecting the negligence of Thai researcher on these aspects. Instead of being aware and learning from the history of high-rise, they were allured by the ascending and the flourish of the condominiums' market.

Robert Gifford (2007) defined in his work that high-rise housing brought less satisfactory and higher level of a ***security risk*** to their dwellers than other housing forms. The primary reasons were that the residential high-rises were not optimal for children and ***social relations*** inside the compound were more impersonal. Meanwhile, helping behaviour was less than other housing forms, crime and fear of crime were also greater, and they might interdependently account for suicides by jumping off the high floor. The weakened sense of community including sense of belonging and identity of high-rise dwellers would eventually influence their quality of life. However, the poor social relations might associate with more complicated psycho-factors, such as more ***demands of privacy and isolation*** from an unwanted social interaction, less intimate social interaction, and less caring about others, which are influenced by some moderators such as gender, age and life-stage. (Gifford, 2007, Li, 2013) Meanwhile, the previous research involving high-rise housing estates in Glasgow pointed out to the physical characteristic of high-rise flat that it "isolates people with each other" and it "is a sealed cell and the people on one floor know far less above or below them than would be the case were they in neighbouring houses in a street". (Jephcott and Robinson, 1971, Li, 2013)

Additionally, several works of literature agreed on that there were at least six fears proved existent amongst high-rise residents. These concerns were 1) fear of falling or jumping from a high window, 2) fear of being trapped inside during a fire, 3) fear that entire building falling because of an earthquake, 4) fear of being attacked by terrorists, 5) fear of strangers which leads to fear of crime, a felt lack of social support and the absence of community, and 6) fear of becoming ill from communicable diseases generated by others such as air/touch-borne flu and cold. In the meantime, high-rise residents in Singapore were also concerned about lacking in neighbourhood

facilities, fear of being trapped and being a victim of crime in an elevator, respectively. (Gifford, 2007, Yuen, Yeh, et al., 2006a, Li, 2013) The previous research which was relevant to the livability of high-rise housing in China suggested the adverse effects occurring during living in this kind of habitat as follows: 1) heath problems, 2) lack of safety, 3) inadequate public security, 4) weakened social relations, and 5) difficulty of child care. (Li, 2013)

Based on the perception and experience of high-rise residents, the housing behavioural research conducted in Singapore in 2004 revealed that the experience of high-rise residents was an essential factor that influenced the perceived ***height of the building***. Notably, the Singaporeans who were living in the tall residential buildings tended to become more familiar to high-rise living. They were more confident and willing to live on the higher floor. Besides, their religions and beliefs were also considered as the moderating factors influencing their preferable floor and location of units. (Yuen, 2005)

In contemplation of variables constructing, there were potential factors that impacted the psychological wellbeing of the inhabitants identified by Gifford. He divided these factors into two groups, namely, 1) factors associated with residents and 2) factors associated with contexts. Besides, there were sub-indicators under these two categories as described in Table 2.1.

Table 2.1 The moderating factors differentiate high-rise housing residents' behaviour

Moderating Factor1	Moderating Factor2
Factor associated with residents	**Factor associated with context**
• Personal characteristics	• Environment
• Social relations	• Neighbourhood

Source: Adapted from(Gifford, 2007)

According to Table 2.1, Gifford described that these moderating factors associate the differences in the outcome of living in high-rises building -positive or negative- but not in a "causal sense" like "the mediating factors between the environment and the outcome." (Gifford, 2007, Evans and Lepore, 1997)

The group of moderating factors 1 (factors associated with residents) comprises of 1) personal characteristics and 2) social relations. He also raised the

socioeconomic status and the purpose of residency as the examples of this moderating group. Meanwhile, the group of moderating factors 2 (factors associated with context) involves the issues of 1) environment and 2) neighbourhood, for example, building's location, exposure to crime, etc. (Gifford, 2007)

2.1.3 Urbanisation and psychological effects

As stated earlier, high-rise housing is an iconic habitat of the urbanised environment. One could argue that the mental problems reviewed above could be consequences of the urban life as well. The urbanites' mental health impacted by the context of metropolis had been pointed out by, the sociologist and philosopher, Georg Simmel, since 1905. According to his centenary essay, the unique context of urban was acting as an external factor that continually impacted people's inner adaptations. (Simmel, 1905) The urbanised way of life had transmitted the intensification of nervous stimulation to the urbanites. The intellectualism way of thought: punctuality, calculability, and exactness manners drove people far away from human nature. This intellectualisation was dominating a man to react with his head instead of his heart. (Takooshian, 2005, Simmel, 1905) When surrounded by the urban environment, the rapidly shifting stimulation of the nerves could turn people into a blasé person who valued the distinctions between things as meaningless. (Simmel, 1905)

Later in 1938, the sociologist, Louis Wirth, had indicated three theoretical variables as the root of a sociopsychological theory of city life, as follows: ***1) large numbers of people, 2) a high population density and 3) heterogeneity of population.*** (Wirth, 1938) Afterwards, the urban psychologist, Stanley Milgram, explained the phenomena of urban life in the more sense of psychology that "city life constitutes a continuous set of encounters with overload, and of resultant adaptations. Overload characteristically deforms daily life on several levels, impinging on role performance, the evolution of social norms, cognitive functioning, and the use of facilities." (Milgram, 1970) He also criticised that the willingness of trusting and assisting strangers of the urbanites was limited by a heightened sense of physical and emotional vulnerability. As well, "the heterogeneity of the city that produced a greater tolerance for behaviour and codes of ethics encouraging people to withhold

aid for fear of antagonising the participants or crossing an inappropriate and difficult-to-define line was another reason." (Milgram, 1970)

Besides, another particular feature of the urbanism community considered as a factor negatively impacting on the mental status of people was a gated residential boundary. Setha M. Low stated in his work in 2001 that the gated residential development was mirroring alterations in social values accompanying rapid globalisation. (Low, 2001) The gated community was described as the house's wall or fence that restricted accessibility from public. It characterised by legal agreements, which tie the residents to a common code of conduct and collective responsibility for management. (Atkinson and Blandy, 2005, Li, 2013) The previous housing research indicated that gated community had become acquiesced as a facility managerial approach amongst high-rise estates because it can secure the residents from intruders, unify the spatial identity of the residential compound as well as claimed that it was advantageous for generating the sense of community amongst the residents. (Li, 2013) However, an argument indicated that the gated community brought up the visual landscape of fear created by the walls, gates, and guards also appeared. (Low, 2001) Amongst these discourses and controversy, another research reported that the income level of the residents was a moderator of the differences between gated and non-gated communities on measures of sense of community, perceived safety, and actual crime. It created two different patterns of results for the low-income and the high-income community. Amongst high-income communities, the sense of community of the gated compound was significantly lower than non-gated residents yet amongst low-income residents it was indifferent. (Wilson-Doenges, 2000)

Such controversy amongst the empirical research implied that in the different urban context the territorial management and access control could impact on the psychological status of the residents, in particular, the sense of community. In consequences, this research had taken these factors into account for the furtherance of operationalisation to define the measurable indicators.

According to the above literature and research, notably, there were some determinants that were empirically proved that they had capacities to diversify the psychological and physical condition of high-rise dwellers. These factors are

categorised and concluded in the table below.

Table 2.2 The summary of potential factors influencing the psychological alteration and behavioural response of high-rise dwellers in urban area

Factors Influencing Physical & Psychological Conditions of High-rise Dwellers	**Physical & Psychological Alterations and Responses of High-rise Dwellers**
• **Demographic and Personal Attributes** Age, Gender, Education, Income, Marital Status, Religion, Culture and Norm	• Lack of sense of community • Vulnerability of Safety • Perception of privacy • Health problems • Negative Effect on Child Development
• **Personal Characteristics** Demand for Privacy and Isolation, social relations	
• **High-rise Environmental Characteristics** Height of Building, Vertical delivery system i.e. elevator, Lack of security, Non-optimal for children	
• **Urban Characteristics** Population density, Heterogeneity of population, Type of property (gated or non-gated community)	

Sources: (Rakbumroong and Tiangtham, 2013, Sookmode and Kongsawatkiet, 2012, Yuen, 2005, Li, 2013, Jephcott and Robinson, 1971, Gifford, 2007, Simmel, 1905, Milgram, 1970, Wirth, 1938, Wilson-Doenges, 2000, Low, 2001)

The above table preliminarily summarises and categorises the potential factors influencing the psychological and behavioural alterations of high-rise dwellers in the urban area regarding the relevant literature discussed in section 2.1.2 and 2.1.3. The left column describes potential dominators, which are divided into four categories as follows.

1) Demographic and personal attributes: the factors belonging to this group are age, gender, education, income (Rakbumroong and Tiangtham, 2013), marital status (Sookmode and Kongsawatkiet, 2012), religion, culture and norms (Yuen, Yeh, et al., 2006b, Milgram, 1970).

2) Personal characteristics: the salient factors in this group are the demand for privacy and isolation of each resident and their social relations. (Gifford, 2007, Li, 2013)

3) High-rise environmental characteristics: the presumptive architectural

factors including height of building (Yuen, 2005), vertical delivery system (i.e. elevator), lack of security, the non-optimal environment for children. (Gifford, 2007)

4) Urban characteristics: This group comprises population density, heterogeneity of the population (Wirth, 1938), and type of property -gated or non-gated community- (Low, 2001).

Meanwhile, the right column of the table indicates the potential physical and mental alterations (observed outcomes) amongst high-rise dwellers suggested by literature and previous studies. These observed outcomes are: lack of sense of community (Wilson-Doenges, 2000, Gifford, 2007), the vulnerability of safety (Wilson-Doenges, 2000), perception of privacy (Milgram, 1970, Gifford, 2007, Li, 2013), health problems including the negative effect on child development. (Gifford, 2007)

The preliminary literature and the summary table described above had revealed the concurrence and the controversy of high-rise building functioning as a house for a human being. Depending on specific contexts of urban and the number of factors, high-rise housing could be an impeccable habitat for one or a despicable house for another. The previous high-rise housing research also pointed out that the environment of high-rise could dominate the occupants' attitudes, which linked to their spatial behaviour, through the psychological and personal factors, for example, the demand for privacy, gender, educational level, etc.

For achieving the particular goal of this research, which focuses more on the environmental psychological relationships, it requires the further in-depth literature review to assemble the variable construct that consists of the cogent set of independent variables and the set of psycho-status of the high-rise residents as the dependent variables. In consequence, the literature review is continued to investigate and to define the fundamental psychological domains that represents a homeyness of a place, which are further developed as the essential observed variables of this study.

2.2 The Psychological Properties of Home

The meanings of “house” and “home” have been discussed amongst the urban and housing researchers consistently and never converged into a static resolution. Nevertheless, a congruent approach was scrutinised amongst plenty of literature, which basically was the attempt to separately consider the physical context of the house and the psychological context of the home. According to Easthope (2000), a home could be interpreted in different ways and homes were places that hold considerable social, psychological and emotive meaning for individuals, and for groups. (Easthope, 2004) Meanwhile, Dupuis and Thorns (1998) defined that the meaning of home was not just about an asset possession, but an interweaving of living in pursuit of security and identity reconstituted through individuals’ lives, experiences, and influence of age and generation. (Dupuis and Thorns, 1998) Giuliani (1991) also divided the rigid components for considering the home attachment into three dimensions, which were 1) the self, 2) the object, and 3) the self-object relations. (Giuliani, 1991)

Carole Després (1991) investigated and defined the several approaches for interpreting the meaning of home theoretically. These approaches are the followings: 1) territorial interpretations, 2) psychological interpretations, 3) socio-psychological interpretations, and 4) phenomenological and developmental interpretations. An unclouded psychological understanding of the meaning of home was the one cultivated from the Maslow’s theory of personality in the functioning of fulfilling a hierarchy of human needs. In that regard, the most elementary function of a home is to provide physical security and health. Then the spatial quality of home supports the psychological need for privacy involving the desire for property control. The further level of psychological need, social recognition and empowering, also can be partially fulfilled by the transmittance from home to the outside world. (Després, 1991)

Regarding the interpreted meaning of home mentioned above, one of the classical theories priory considered as the bottom line of this research is the Maslow’s hierarchy of needs proposed in 1954. A concordance between the human’s needs and the physical capability of a house can meet but only the first

two lower levels of needs which refer to 1) the physiological needs and 2) psychological needs. The three higher levels of needs, which refer to 1) love and belongingness needs, 2) esteem needs and 3) self-actualization needs, demand more involvement of social mechanism than the physical features of housing per se. This interpreting approach is illustrated as shown in Figure 2.10.

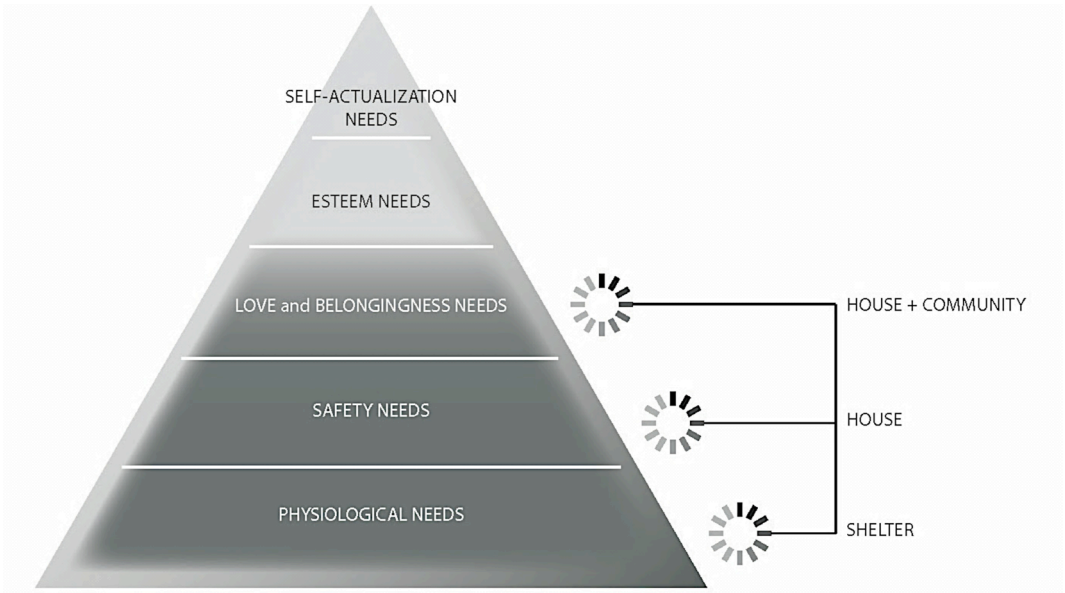


Figure 2.10 The psychological interpretations based on Maslow's Hierarchy of Needs

Source: Adapted from (Maslow, 1943, Després, 1991)

This approach is consonant with the contemporary global meaning of housing declared by the United Nations (UN) and World Health Organization (WHO). As stated in the Adelaide Statement on Health in All Policies in 2010

> *"A core assumption of best practice in housing policy-making takes into consideration that housing is more than shelter".*
> (WHO, 2011)

The Department of Ethics, Equity, Trade, and Human Rights, WHO also summarised the eight policy goals for the Government's involvement in the housing sector. One of the most salient goals was the issue of safety and security[2]. They indicate that

[2] Safety means the state of being protected from danger and random incidents. Security means protection against intended incidents or wanted incidents happening due to a result of a deliberate and planned act. (Marcuse, 2006, Albrechtsen, 2003)

> *“Housing ensures personal and household privacy, safety and security as well as housing should allow occupants to live without fear of intrusion, provide safety, and allow safe entry and exit. Well-designed, accessible housing, and adequate community services address some of the most fundamental determinants of health for disadvantaged individuals and communities”.* (WHO, 2011)

Concerning the psychological interpretation of home mentioned above, the theoretical congruence led to the conclusion of the elementary psycho-domains, which should be set forth as the properties of a place called home. The table below explains the intersection and attunement between the three selected concepts, which are pertinent to this issue. (See Table 2.3.)

Table 2.3 The literature congruency of psychological meaning of home

The Predictive Fundamental Psychological Sense of Home	The Literature Congruency of Psychlogical Meaning of Home		
	Interpreted by Ann Dupuis and David C. Thorns, 1991	Interpreted by Carole Després, 1998	Interpreted by UN and WHO, 2010-2011
SAFETY AND SECURITY	"The meanings of home are, therefore, not just about material possessions or identity but a complex interweaving of the quest for security and identity with the accumulation of assets and other markers of achievement and the transfer of these to subsequent generations."	"A shelter' answering human needs for physical security and health. Home provides psychological comfort in terms of quietness as well as the place for maintaining interpersonal& social relationships"	"Housing policy-making takes into consideration that housing is more than shelter" "Housing ensures personal and household privacy, safety and security as well as housing should allow occupants to live without fear of intrusion, provide safety, and allow safe entry and exit."
PRIVACY NEEDS	"Home building and home ownership develop initiative, self-reliance, thrift and other good qualities, which go to make up the moral strength of the nation."	"Psychological need for privacy is among the most powerful theoretical concept that have been used to explain the meaning of the home as a refuge, for controlling intrusions from neighbors in terms of surveillance, noise and property control for freedom of action as well as for solitude within the home"	"Housing ensures personal and household privacy, safety and security as well as housing should allow occupants to live without fear of intrusion, provide safety, and allow safe entry and exit."
SOCIAL NEEDS AND SENSE OF COMMUNITY	"The meanings attached to "home" are shaped by the particular social and historical experiences of groups of individuals and families."	"Social recognition and empowering or social status, is also a psychological need that can be partially fulfilled by the home."	"Well-designed, accessible housing, and adequate community services address some of the most fundamental determinants of health for disadvantaged individuals and communities"

Source: (Dupuis and Thorns, 1998, Després, 1991, WHO, 2011)

According to the above table, three psychological key issues involving the homeyness of a place were extracted from the literature. These three topics are: 1) safety and security, 2) privacy needs, and 3) social needs and sense of community. Theoretically, these three feelings not only can simply and straightforwardly explain

a place as a person's home but also give an all-inclusive psychological atmosphere that one can expect from home. Consequently, these three domains were further developed as a set of independent variables in this study. (See Figure 2.11)

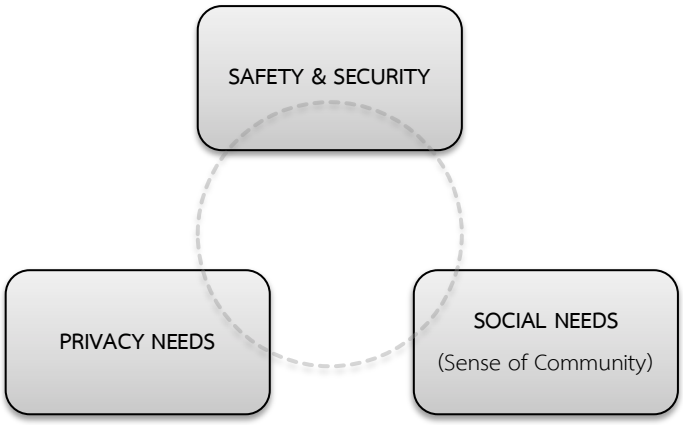


Figure 2.11 The developed psychological properties of homeyness
Source: (Després, 1991, Dupuis and Thorns, 1998, WHO, 2011)

As a result of the above-mentioned conceptual structure, the investigation on the determinants that potentially dominate the alteration of safety, privacy, and sense of community in the peculiar context of high-rise housing was continued.

When retracing the traumatisation of mass high-rise housing during the post-WWII period, it appeared that the safety and security issues had been considered as a premier concern amongst residents as well as a primary cause of the decision to stay in or move out of the property. In the United States, the crime-infested environment, the failure of building's mechanism (i.e. elevators), and the behavioural disorder of residents, for example, vandalism, domestic violence including the demoralised segment of the population, had fabricated the inhabited conditions of public high-rise housing. (Bristol, 2015) In Scotland, the chronological health-trauma for high-rise dwellers encompassed the structural problems, for example, dysfunctional heater and substandard double glazing, mould, and insect and rodent infestation. (Mitchell, H., 2015)

The previous studies involved the privacy aspect amongst high-rise dwellers pointed out that besides the communal facilities and mechanical systems of the building, the physical features of high-rise force the occupants to "share walls, ceilings, and floors with neighbours adjacent, above, and below them".(Kennedy,

Buys, et al., 2015) In the 1960s, the tenantry of the tenements in Glasgow who were architecturally forced to share lavatories and toilets with neighbours reported that it was the disappointed living condition. (Mitchell, H., 2015) Such ordinary incidence was an example reflecting the cruciality of privacy in the daily routine of contemporary people as well as the influence of built-environment on occupants' satisfaction. People can live in shared environment yet to some extent. Besides sharing issue, the tightened physical proximity between high-rise residents also hardens their achievement of controlling privacy especially the aural privacy -more than visual privacy-. In this case, the quality of construction materials and the soundproofing wall system was also pointed out as one of the major factors as well as the building's territorial control. (Kennedy, Buys, et al., 2015)

Nevertheless, providing privacy for high-rise residents needs to be balanced. A level of anonymity enhanced by high-rise housing environment can separate dwellers from each other and deter their community spirit. (Leslie, 2015, Kennedy, Buys, et al., 2015) “When people do not interact with each other, it is impossible of sense of community to develop.” (Kloos, Hill, et al., 2012) Previous research indicated that the social withdrawal amongst residents of apartment and high-rise buildings was reported. (Gifford, 2007, Chatterjee, 2009, Kennedy, Buys, et al., 2015) Besides architectural features, another reason of lacking sense of community amongst high-rise residents in Southeast Asia, for instance, Singapore, suggested by researchers was "density". The argument and assumption around this issue indicated that an increase of density could lead to an increased sense of loneliness, whereas, a decreased sense of belonging to a socially rewarding neighbourhood. (Ng, 2009)

The next section continues to investigate and extract the determinants that potentially dominate the alteration of safety, privacy, and sense of community in the peculiar context of high-rise housing.

2.2.1 Safety and security issue in high-rise housing context

Regarding the congruence amongst literature, the feeling of safety and free from harm is the most fundamental psyche required for making a dwelling into a home. This phrase sounds simple and basal, yet the dimension of feeling safe is

quite intricate. The feeling of safety involves two dimensions, 1) psychological safety, and 2) actual safety. At a certain time, one might feel secure even if in reality she or he is not, and vice versa. (Schneier, 2010) Individually, each person possesses a different cognitive bias and heuristics. As Maslow explained the "safety needs" of human in his work, he proposed that the degree of safety needs and reaction to threats of an individual depends on an accumulation of childhood's neurotic experience. "Confronting the average child with new, unfamiliar, strange, unmanageable stimuli or situations will too frequently elicit the danger or terror reaction", meanwhile, the expression of safety needs will be inhibited when the person becomes an adult. (Maslow, 1943, McLeod, 2007, DeMartino and Stacey, 1958)

It is clear that a person's experience can create various levels of concern about safety and multiple models of reactions to threats. Noteworthy, the environment of home and neighbourhood are also the jigsaw pieces of his or her cognition as well. Based on these theoretical concepts, in this study, the dweller's experience of threats and the defensible characteristics of a high-rise complex were taken into account for the furtherance of constructing the indicators measuring safety concerns.

Under the contemporary context of urban and the limitations of a high-rise building, the perspective projected the threats to safety and security in the tall buildings was considered differently from the past. Back in the 1970s, after the Pruitt Igoe was torn down to the ground, the research and studies involving safety and security of residential high-rises were enhanced. For instance, the idea of the defensible space proposed by Oscar Newman, the practice of crime prevention through environmental design (CPTED) by C. Ray Jeffrey, and the concept of situational crime prevention (SCP) developed by the British criminologists, Ronald Clarke and Patricia Mayhew, in the 1980s. (Jeffery, 1971, Clarke, R. V., 1997, Rujibhong, Koorutanapisan, et al., , 2015) All mentioned theories are arranged comparatively in the Table 2.4.

Table 2.4 The comparison of the theoretical concepts involving safety concern in context of housing

Defensible Space by Oscar Newman, 1972	**Crime Prevention Through Environmental Design CPTED** by C. Ray Jeffrey, 1971	**Situational Crime Prevention SCP** by Ronald Clarke, 1997
The concept of defensible space proposes that the neighbourhood is safer when people feel a sense of ownership and responsibility for that piece of a community. The four components of defensible space are as follows: • Territoriality • Natural Surveillance • Image • Milieu and Juxtaposition (Newman, 1972)	CPTED concept focuses on the issues related to the biology of crime and the physical environment which build up pleasurable and painful experiences for the offender that would have the capacity to alter behavioural outcomes. (Jeffery, 1971)	The main concept is to reduce the criminal opportunities which arise from the routines of everyday life in any kind of setting. This concept focuses on the relationship between crime and environmental opportunities. In brief, there are 25 strategies to support the four main objectives which are: • to increase the perceived difficulty of crime; • to increase the perceived risks of crime; • to reduce the anticipated rewards of crime • to remove excuses for crime. (Clarke, 1997)

Source: (Newman, 1972, Jeffery, 1971, Clarke, R. V., 1997)

These theoretical concepts have been broadly applied and testified amongst international researchers and practitioners in many countries, such as Australia, Singapore, Korean, Malaysia, etc. (Minnery and Lim, 2005b, Newman, 1972, Jeffery, 1971, Clarke, R. V., 1997)

Concerning the relationship between the physical environmental context and the psychological effect, the defensible space seems to be the most robust and practical theory for the high-rise housing environment. Its four principles, which were ***1) territoriality, 2) natural surveillance, 3) image, and 4) milieu and juxtaposition,*** are considered as the relevant architectural features that dominated the security of the building and the safety concern of the residents. However, these concepts engage with crime more than any other kinds of safety threats. The next section describes the further investigation of the contemporary threats of the tall building which were developed from the factual information.

2.2.1.1 <u>The modern security threats in high-rise building</u>

The modern-day high-rise security has been pinpointed after the 9-11 attack in New York in 2001. The destruction of the World Trade Center caused the number of 2,996 deaths and 6,000 injuries (CBC News, 2011), has awakened the reconsidering of the security policy for tall buildings especially in the United States. Later years Gifford (2007) concluded the six fears of high-rise residents from the research conducted in the different parts of the world as mentioned earlier. (Gifford, 2007) A more comprehensive analysis of the security threats for high-rises was defined in the report published by the U.S. Department of Justice. In this report, Challinger (2008) categorised security threats of high-rise buildings into three groups as follows:

- "***Crimes***, for instance, theft and burglary, property damage, offences against persons, etc.
- ***Behavioural Disorder***, which means behavioural issues including drug dealing from the building, hostage taking, trespassing, suicide risks, protests, and drunk or drug-affected behaviour.
- ***Emergencies***, both
  - Human-caused or related crises including fire, infrastructure and elevator failures, electricity blackouts, biochemical attacks, terrorist attacks, and
  - Natural disasters including severe weather events such as earthquakes, floods, tsunamis, hurricanes, tornados, and snowstorms." (Challinger, 2008)

In Thailand, the prior studies, which were relevant to the safety issue and high-rise settings, paid more attention to the fire protection and evacuation plan, whereas, the in-depth academic research involving the feeling of safety and security amongst the dwellers was still indistinct.

2.2.2 Privacy issue in high-rise housing context

The psychological need for privacy is another dominant component of the mental property of homeyness. Privacy need is also intertwining with the vulnerability of safety and security and the desire for controlling an intrusion from

other persons. (Després, 1991) The absence of privacy leads to several negative feelings and asocial behaviour, such as fear of crime, lower property value, and social withdrawal, etc. (Newell, 1994) Although the privacy need is one of the major psychological well-being domains, its definition remains diversified, and the individual's privacy needs are difficult to be measured.

The definition of privacy based on social psychological notion requires to be explored due to the research objectives and hypotheses. From the literature, there are a few influencing psychologists whose theoretical concepts of privacy have become the essences of much psychological research afterwards.

In 1979, Darhl M. Pedersen defined that privacy may be viewed as a boundary control process, in which the individual regulates with whom contact will occur and how much and what type of interaction it will be. He gave importance to the boundary control involving "both restricting and seeking interaction to achieve a desired degree of access to the self or one's group by others at a particular time and in a given set of circumstances". (Pedersen, 1979) A person may not always be successful in obtaining the preferred amount of interaction. Pedersen also delineated that there are six different psychological types of privacy comprised ***1) solitude, 2) isolation, 3) anonymity, 4) reserved, 5) intimacy with friends, and 6) intimacy with family*** as shown in Table 2.4.

The renewal summary of a psychologist, Stephen T. Margulis published in 2005, is somewhat a contemporary elastic explanation and pertinent to this research. Margulis proposed that privacy represents control over the transaction between a person and other, the ultimate aim which to enhance autonomy and/ or to minimise vulnerability. He also added that such control over transaction usually entails limits on or regulation of access to self, and that others can include individuals, both real and imagined, as well as small groups. (Margulis, 2005) Another theoretical concept of privacy adopted in this study is the dimensions of privacy proposed by Judee K. Burgoon in 1989. This approach focuses on the tangible and intangible assets whoever possessing wants to keep them in privacy. The four dimensions of privacy: ***1) psychological privacy, 2) informational privacy, 3) physical privacy, and 4) social or interactional privacy***, (Burgoon, Parrott, et al., 1989) are demonstrated in the table below. (See Table 2.6)

Table 2.5 The comparative context of the theoretical concept involving privacy in context of high-rise

Six Different Psychological Types of Privacy by Darhl M. Pedersen, 1979	**Psychological Definition of Privacy** by Stephen T. Margulis, 2005	**Four Dimensions of privacy** by Judee K. Burgoon, 1989
1) **"Solitude** refers to placing yourself in a situation where other people can not see or hear what you are doing 2) **Isolation** involves using physical distance to separate oneself from others to obtain privacy 3) **Anonymity** means seeking privacy by going unnoticed in a crowd of strangers. 4) **Reserve** refers to controlling verbal disclosure of personal information to others especially to strangers. 5) **Intimacy with Friends** refers to being alone with members of one's family to the exclusion of other people. 6) **Intimacy with Family** refers to being alone with friends to the exclusion of other people." (Pedersen, 1997)	This definition was renewed in 2005 based on the works of Altman, 1975 and Westin, 1967 "Privacy, as a whole or in part, represents control over transactions between person(s) and other(s), the ultimate aim of which is to enhance autonomy and/or to minimize vulnerability." "Control over transactions usually entails limits on or regulation of access to self and that others can include individuals, both real and imagined as well as small groups" (Margulis, 2005)	1) **"Physical privacy** is the freedom from surveillance and unwanted intrusions upon one's space by the physical presence, touch, sights, sounds, or odors of others. 2) **Social or Interactional privacy** refers to individuals or groups experience interactional privacy when they can control the 'who, what, when and where' of encounters with others so as to achieve a manageable number of social relationships-enough to satisfy security, affiliation and intimacy needs while limiting interpersonal annoyances and avoiding unwanted conversations or involvements. 3) **Psychological privacy** protects the individual from intrusions upon one's thoughts, feelings, attitudes and values. 4) **Informational privacy** is the ability to control who gathers and disseminates information about one's self or group and under what circumstances." (Burgoon, et al., 1989)

Source: (Pedersen, 1979, Margulis, 2005, Burgoon, Parrott, et al., 1989)

All above-quoted concepts clearly indicate that the feeling of privacy is complicated and embedded in the multi-dimensional way of life constituted by the individual's personality. This complexity is considered as a cause of conflicts appeared amongst the results of privacy surveys in high-rise housing studies. Such contradiction was stated in the work of Belinda Yuen in 2005; she defined that the high-rise living owned the value of quietness, sheer sensation of height, view, prestige, and privacy, somehow there was the reported dissatisfaction because of vandalism, the lack of privacy and feelings of isolation and loneliness. (Yuen, 2005) The results of the high-rise housing survey conducted in Singapore showed that the majority of dwellers were satisfied with their privacy, whereas, the high-rise residents

in India considered their home unsafe and inappropriate for their living.(Yuen, Yeh, et al., 2006b, Chatterjee, 2009)

Regarding research conducted in Thailand, the privacy need was also confirmed as one of the important factors affecting a decision of renting the serviced-apartments in urban areas of Bangkok and the student dormitory in Chiangmai, the second largest city in Thailand. (Sodchuenjit, 2011, Wutthisukhum, 2011) These phenomena have brought up a requirement for further study based on the presumption that the physical features of high-rise housing including the urban and social context are the influential factors that create the various ambience of privacy in the building.

When examining these privacy dimensions through the lens of physical features of high-rise housing and its capability in satisfying privacy, the integrated dimension can be rearranged by the inside-out/ outside-in perspective as illustrated in the below diagram. (See Figure 2.12)

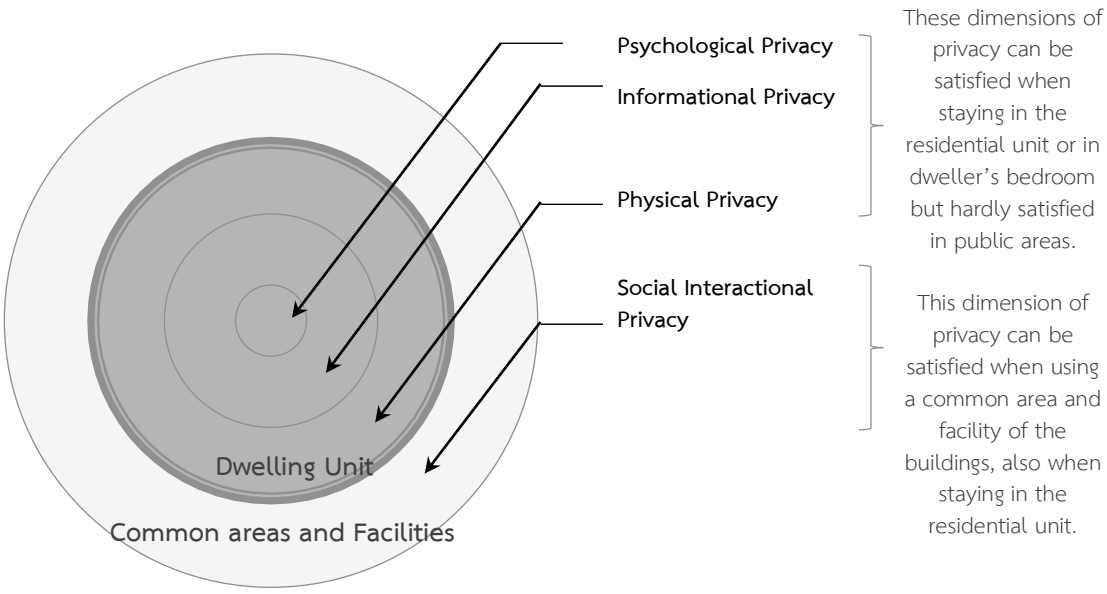


Figure 2.12 The dimension of privacy in comparison with the physical capability in fulfilling privacy of high-rise housing diagram

Source: Adapted from Burgoon, et al., 1989

However, due to the dialectic and non-monotonic nature of privacy, that means individual can achieve or cannot achieve the optimum level of privacy at a given time. People can sometimes have too much privacy (isolation) or sometimes

too little (crowding). (Altman, 1975) The high-rise dwellers can also maintain their privacy control in the different boundaries and in different situations from the above prediction model.

In this study, the psychological privacy as one of the mental qualifications of a home was separately considered in two distinct manners. These two approaches are ***1) level of privacy need*** as a casual factor (independent variable), and ***2) privacy satisfaction*** as a receptor (dependent variable). Based on these two manners of privacy, the operationalisation was further developed in the context of high-rise housing environment.

2.2.3 Sense of community Issue in high-rise housing context

The conceptual territory of home can be extended beyond the dwelling unit to the scale of community, city, or nation. (Appleyard, 1979) This psycho-boundary is depending on an individual's recognition, selection, and modification to create their own territory of home. As long as privacy is a crucial state of mind allowing a human to contemplate and self-discovery (Pedersen, 1997), Social recognition and empowering are the keys to help strengthen the sense of home as well. Appleyard pointed in his work that it is essential for a citizen to participate in an environmental decision because this is a way in which people can become identified to reduce their alienation. (Appleyard, 1979) And one of the psychological processes behind social participation enthusiasm is the sense of community.

In consideration of community, the two components: 1) territorial (geographical notion), and 2) relational (quality of human relationship) must be referred. (Gusfield, 1975) Needs of belongingness or sense of community is a higher need of human being. (Maslow, 1958, DeMartino and Stacey, 1958) To build a strong sense of community, particularly in the residential context, the safety and privacy needs of the occupants are required to be satisfied as a priority. On the other hand, the sense of community embedded in residents' mindset can reinforce the effectiveness of security and constrain them from dissocial behaviours.

In 1986, McMillan and Chavis proposed a Sense of Community Index (SCI-1) based on a conceptual model, in which four principles of the sense of community could be comprehended as follows: (Bess, Fisher, et al., 2002)

1) Membership:

Membership is the feeling of being or not being a part of the community. It comprises five attributes that work together: 1) boundaries, 2) emotional safety, 3) a sense of belonging and identification, 4) personal investment, and 5) a common symbol system.(McMillan and Chavis, 1986)

2) Influence:

Influence is a bi-directional concept, which can be drawn under four conditions. (Chavis and Pretty, 1999)

- Members feel more attracted to their community in which they feel that they are influential.
- The cohesiveness and significant positive relationship between members and their community are required. The community influence and conformity can indicate the strength of the bond.
- Both conformity and uniformity driving force have to come from the consensual validation between individuals and community.
- The conformity can act as a force for closeness and an indicator of cohesiveness.
- The reciprocal influence between community and members operate concurrently.

3) Integration and Fulfilment of Needs (Reinforcement):

Reinforcement is referred to a motivator of behaviour. It is playing many roles in building the sense of community as follows. (McMillan and Chavis, 1986, Chavis, Lee, et al., , 2008)

- Reinforcement and need fulfilment is a primary function of a strong community.
- The rewards such as a status of membership, a success of a community, and competence or capability of other members, are the effective reinforcers of the community.
- Although there are many undocumented needs in the community, individual's values are the source of these needs. The person's values shared with the community will lead to the community's

ability to prioritise and organise its reinforcing activities.

- A strong community is able to attune people together so that people meet others' needs while they meet their own.

4) Shared Emotional Connection:

This attribute is composed of seven subcomponents as follows: 1) contact hypothesis: the more contact, the closer people are, 2) quality of interaction: the more positive relationship, the greater bond is built, 3) closer to events, 4) shared valent events, 5) investment, 6) the effect of honour and humiliation on community members, and 7) spiritual bond

(McMillan and Chavis, 1986)

Chavis proposed the SCI-2 again in 2008 yet based on the same four components. The SCI index was reported by Chipuer and Pretty in 1999, as the most used and broadly validated measure of sense of community. The broad scope of the McMillan and Chavis model enables substantive community theory building and the establishment of conceptual linkages with concepts from other disciplines of community research. It had been associated with predicted relations across different types of communities, age groups, and cultures. (Chipuer and Pretty, 1999, Chavis and Pretty, 1999, Chavis, Lee, et al., , 2008) Both SCI-1 index and SCI-2 are demonstrated in Table 2.6 below.

Table 2.6 The Sense of Community Index I, and II (SCI-1, 2) in comparison

Item	**Sense of Community Index - I** McMillan and Chavis, 1986	Item	**Sense of Community Index - II** Chavis, D.M., Lee, K.S., & Acosta J.D. (2008).
Q1	I think my block is a good place for me to live.	Q1	I get important needs of mine met because I am part of this community.
Q2	People on this block do not share the same values.	Q2	Community members and I value the same things.
Q3	My [neighbors] and I want the same things from the block.	Q3	This community has been successful in getting the needs of its members met.
Q4	I can recognize most of the people who live on my block.	Q4	Being a member of this community makes me feel good.
Q5	I feel at home on this block.	Q5	When I have a problem, I can talk about it with members of this community.
Q7	Very few of my [neighbors] know me.	Q7	People in this community have similar needs, priorities, and goals.
Q7	I care about what my neighbors think of my actions.	Q7	I can trust people in this community.
Q8	I have no influence over what this block is like.	Q8	I can recognize most of the members of this community.
Q9	If there is a problem on this block people who live here can get it solved.	Q9	Most community members know me.
Q10	It is very important to me to live on this particular block.	Q10	This community has symbols and expressions of membership such as clothes, signs, art, architecture, logos, landmarks, and flags that people can recognize.
Q11	People on this block generally don't get along with each other.	Q11	I put a lot of time and effort into being part of this community.
Q12	I expect to live on this block for a long time.	Q12	Being a member of this community is a part of my identity.
		Q13	Fitting into this community is important to me.
		Q14	This community can influence other communities.
		Q15	I care about what other community members think of me.
		Q16	I have influence over what this community is like.
		Q17	If there is a problem in this community, members can get it solved.
		Q18	This community has good leaders.
		Q19	It is very important to me to be a part of this community.
		Q20	I am with other community members a lot and enjoy being with them.
		Q21	I expect to be a part of this community for a long time.
		Q22	Members of this community have shared important events together, such as holidays, celebrations, or disasters.
		Q23	I feel hopeful about the future of this community.
		Q24	Members of this community care about each other.

Source: (McMillan and Chavis, 1986, Chavis, Lee, et al., , 2008)

The issue of cultivating the sense of community and social participation has been in concerns of researchers from around the globe including Thailand. The SCI tool was applied to the multi-disciplinary quantitative research, for instance, the field of public health, political science, educational science, etc. Kraithaworn and Piasue (2013) defined in their comparative study that the urban population of Bangkok had a lower perception of the sense of community than those who live in a suburb area of Samutprakarn. (Kraithaworn and Piasue, 2013) Moreover, they also concluded that amongst the senior respondents living in slums in Bangkok, a sense of belonging to their community positively associated with the perception of neighbourhood environment and facilities as well as years of dwelling in the community significantly variated their sense of community. (Kraithaworn and Piasue, 2013) These mentioned results evidently reassert that the driving force of sense of community comes from multiple dimensions.

Regarding community psychology, the importance of social capital to the functioning and quality of community life seems to be indisputable. In the United States, the empirical research and discussion on the importance of social capital by Putnam confirmed that social capital was significantly related to citizen's behaviour in participating society, for instance, community participation and absence, political activities, crime rates, and so on. (Long and Perkins, 2007, Putnam, 2000) Meanwhile, the empirical studies, which are relevant to the sense of community amongst high-rise housing dwellers in Thailand, are still outnumbered compared to the Western countries and the developed countries in Asia.

2.3 Measurement and Indicators Implementation in Environmental psychological Research

Based on the quantitative standpoint of this research, this part of the literature review contributes to paving the way to build the potent variable construct as well as to design the effective research instruments.

2.3.1 Fundamental measurement scales

Brownson et al. (2009) indicated in their work that to understand the effect

of the built environment on human's physical activities, the development of high-quality research instrument is paramount. The three categories of built-environmental information frequently used are as follows:

- ***Perceived measurement***, which is obtained by self-administered questionnaires or telephone interview
- ***Observational measurement***, which is achieved by using systematic observational methods (audits)
- ***Archival data sets*** that are often layered and analysed with geographic information system(Brownson, Hoehner, et al., 2009)

In considering of inventing research tools, researchers need to determine which aspects of the built environment are most likely to influence physical activities. (Brownson, Hoehner, et al., 2009)

Also, researchers need to realise the diversity of measuring scales that might seem similar and easily replaceable by each other. There are over twenty different types of scale that are used by researchers in online surveys. These types of scale can be categorised into two classes 1) comparative scales, and 2) non-comparative scales. (Taylor, I., 2012) The details of these two scaled-classes are described as follows:

2.3.1.1 Comparative scales: in comparative scaling, the respondent is asked to compare one thing against another. The comparative scales are often used in marketing research. There are several scales as follows: 1) paired comparison, 2) Dollar-metric comparisons, and 3) the unity-sum-gain technique.

2.3.1.2 Non-comparative scaling: is frequently referred to as a monadic scaling. This type of scale is more widely used in the multi-disciplined research and studies. The four primary scales in this category are the followings: "Continuous rating scales: The respondents are asked to give a rating by placing a mark at the appropriate position on a continuous line. (Taylor, I., 2012)

- ***Line marking scale***: The line marked scale is typically used to measure perceived similarity differences between products, brands or other objects.
- ***Itemised rating scales***: with this scale, the respondent is provided with a scale containing numbers and (or) a brief description

associated with each category. Then she/ he is asked to select one of the limited numbers of categories that ordered concerning scale position that best describes the product, brand, company or product attribute being studied.

- ***Semantic scales***: This scale makes an extensive application for words rather than numbers. Respondents are allowed to describe their feelings about the objects, products, or brands on scales with semantic labels.
- ***Likert scales***: a Likert-scale is a composite of the itemised scales. The items making up a Likert scale are finally summed to generate a total score. In general, each scale item has five categories with scale values that ranges from -2 to +2, whereas, 0 acts as a neutral response. (Crawford, 1997)

2.3.2 Measurement scale implemented in psychological research

In considering of obtaining the psychological data of respondents, the psychometrical instrument needs to be designed elastically and allow the respondents to self-report their mental status. The measuring scale frequently adopted in this type of research is the non-comparative scale mentioned earlier, especially the Likert-type scale. For instance, the Copenhagen Psychosocial Questionnaire, which was known as "COPSOQ" developed by Kristensen, in 2005 and "COPSOQ version2", both applied the Likert-type scale (from 1 to 5) as shown in Figure 2.15. (Kristensen, Hannerz, et al., 2005)

B.9: Are you worried about…. (Please give an answer on each line)

	to a very large extend	to a large extend	somewhat	to a small extent	to a very small extent
1. ...becoming unemployed?	☐	☐	☐	☐	☐
2. ...new technology making you redundant?	☐	☐	☐	☐	☐
3. ...it being difficult for you to find another job if you became unemployed?	☐	☐	☐	☐	☐
4. ...being transferred to another job against your will?	☐	☐	☐	☐	☐

Figure 2.13 The sample of COPSOQ Version1

Source: Kristensen, et al. in 2005

The Ryff's Psychological Well-Being Scales (PWB) developed by Ryff C.D. in 1989 also applied the Likert-type scale (from 1 to 6) as well as the Sense of Community Index version 2 (SCI-II) that applied the 1 to 4 Likert-type scale. The examples of both questionnaire models were shown in Figure 2.16 and 2.18 consecutively. (Chavis, Lee, et al., , 2008, Ryff and Singer, 2008)

Meanwhile, the original version of SCI was designed by adapting the nominal scale (True or False) as shown in Figure 2.17(McMillan and Chavis, 1986)

Please indicate your degree of agreement (using a score ranging from 1-6) to the following sentences.

		Strongly disagree					Strongly agree
1.	I am not afraid to voice my opinions, even when they are in opposition to the opinions of most people.	1	2	3	4	5	6
2.	In general, I feel I am in charge of the situation in which I live.	1	2	3	4	5	6
3.	I am not interested in activities that will expand my horizons.	1	2	3	4	5	6

Figure 2.14 The sample of Ryff's Psychological Well-Being Scales (PWB)

Source: Kristensen, et al. in 2005

I am going to read some statements that people might make about their [block]. Each time I read one of these statements, please tell me if it is mostly true or mostly false about your [block] simply by saying "true" or "false"

True = 1 False =0

Q1. I think my [block] is a good place for me to live.

Q2. People on this [block] do not share the same values.

Figure 2.15 The sample of SCI version 1

Source: McMillan and Chavis, 1986

		Not at All	Somewhat	Mostly	Completely
1.	I get important needs of mine met because I am part of this community.	❍	❍	❍	❍
2.	Community members and I value the same things.	❍	❍	❍	❍
3.	This community has been successful in getting the needs of its members met.	❍	❍	❍	❍
4.	Being a member of this community makes me feel good.	❍	❍	❍	❍

Figure 2.16 The sample of SCI version 2

Source: McMillan and Chavis, 1986

Another interesting measuring scale was found in the environmental psychological study. To operationalise the conceptual of Crime Prevention Through Environmental Design (CPTED), Minnery and Lim created the CPTED scale based on the theoretical concept to evaluate the environmental psychological features of houses related to the safety perception of the dwellers in their research. The CPTED scale adapted the approach of itemised scaling in three levels, which were 1, 3, and 5 points. (See Figure 2.19)

CPTED Principle	CPTED Measure	Performance Measures	Scale Measure
Surveillance	Clear visibility	Clear route from gate to door	1 - None of route visible from street 3 - 5 - Whole route visible from street
		Doors and windows visible from street	1 - No doors or windows visible from street 3 - 5 - All doors and windows visible from street

Figure 2.17 The sample of CPTED scale measures

Source: Minnery and Lim, 2005

In summary, the implementation of the scales of measurement and indicators applied in the environmental psychological research are diverse. It depends on the research question and predictive types of data. Thus far the most practical approaches to the psychological question items must relate to the research setting and the specific condition of the study. Concerning the literature addressed in this review, the non-comparative type scale, mainly the Likert-type scale was considered as the most proper unit of measurement of this environmental psychological study.

2.4 The Theoretical Framework and Variables Constructs

Subsequently, to conclude the theoretical analysis based on the literature reviewed in this chapter, the entire set of variables including the assumptive relations and effects are synthesised and depicted in the form of the conceptual diagram demonstrated below. (See Figure 2.18.)

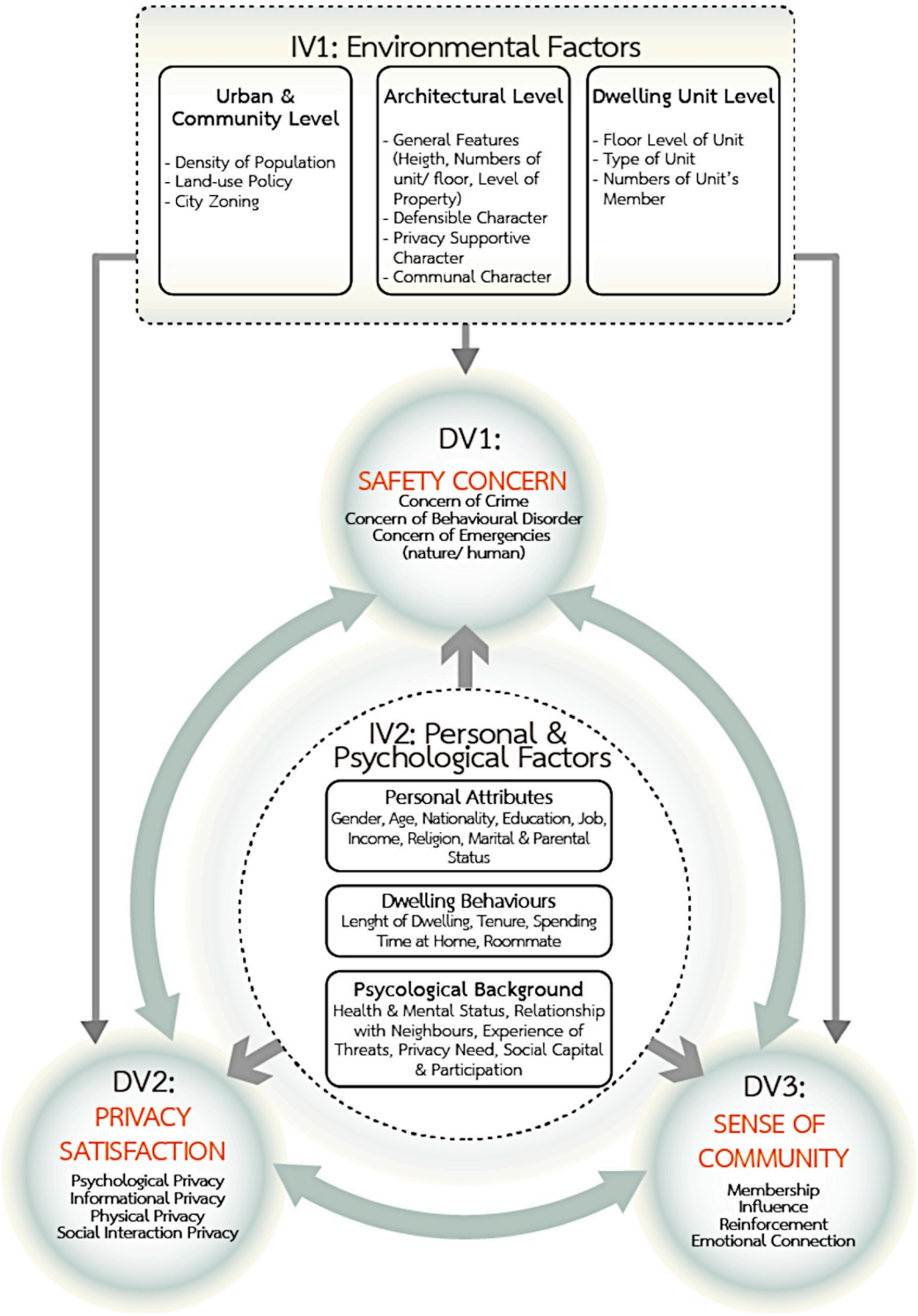


Figure 2.18 The theoretical framework of research

The above variables construct diagram is assembled based on the core contents extracted from the literature and previous research mainly to support the essential research questions and hypotheses mentioned in Chapter 1.

Firstly, in connection with the assumption that the independent variables have impacts on the psychological dependent variables; the IV1 and IV2 are representing the environmental factors and the personal and psychological factors consecutively. The IV1 is categorised into three levels of environment, namely, 1) urban and community level, 2) architectural level, and 3) dwelling unit level. Meanwhile, the assembly of the IV2 comprises the three components, namely, 1) personal attributes, 2) dwelling behaviours, and 3) psychological background of the respondents. The psychological dependent variables are symbolised by three green spheres, the DV1 representing the safety concern, the DV2 representing the privacy satisfaction, and the DV3 representing the sense of community. In more detail, the DV1 contains four safety components: 1) crime concern, 2) behavioural disorder concern, and 3) emergency concern, the DV2 contained four privacy's dimensions: 1) psychological privacy, 2) informational privacy, 3) physical privacy, and 4) social interactional privacy, the DV3 composed of four bonds: 1) membership, 2) influence, 3) reinforcement, and 4) shared emotional connection. The paths projected from the IV1 and IV2 to the DV1, DV2, and DV3 symbolise the prospective effects of the independent variables on the dependent variables.

Secondly, referring to the hypothesis expecting that the internal association between the three psychological dependent variables, the two-directional green arrows are drawn in a circular pathway to connect the DV1, DV2, and DV3 together. As well, these two-way arrows are implying the prospective reciprocal interrelationships between the dependent variables.

CHAPTER 3
RESEARCH METHODOLOGY

Chapter Summary

This chapter contributes to delineating the research procedures and methodological structure that were systemised to be consistent with the quantitative approach and the objectives of the study. According to the schematic plan, there are seven steps of conducting this study of which the details are clarified in the following section. Correspondingly, this chapter also elucidates the rationalisation of the proper sampling size, the multi-stage sampling technique, as well as the research setting criterion operated in the field survey. After that, the operationalisation from theoretical framework to the variables construct and the design of two major research instruments -the Physical-Environmental Assessment (PE) and the Personal and Environmental Psychological Questionnaire (PEP)- are also explicated. In the last part of the chapter, the data analysis approaches are exemplified to give a connecting explanation to the analytical stage, which is further discussed in the next chapters.

3.1 Research Procedures

As stated in Chapter 1, the first research objective is to examine the three psychological senses of home -safety concern, privacy satisfaction, and sense of community- amongst the dwellers of high-rise buildings located in six different urban areas of Bangkok. The second objective is to analyse the significant influence of the essential independent variables: 1) personal factor and 2) environmental factor on the three dependents variables, in furtherance of synthesising and providing the causal analysis and explanation of the results retrieved from the field survey. The third objective is to summarise the pattern and the interrelationship between these three environmental psychological domains. The conclusion of the study is expected to validate the mental well-being indices that are generalisable for high-rise housing

assessment in the urban context of Bangkok and to concise the recommendation for bettering the environment of high-rise habitat and community. To achieve all objectives, the procedure of this research was divided into seven stages as follows:

Table 3.1 The table of research procedures

Stage		Population of Study	Method/ Tool	Dataset	Benefit for research
1	LITERATURE AND SECONDARY DATA REVIEW	Secondary data, i.e. literatures, news, statistical data, online sources	• Contents analysis	Secondary data, i.e. literatures, news, statistical data, online sources	To refine and categoised the relevant contents from the reliable sources
2	OPERATIOALISING VARIABLES AND RESEARCH INSTRUMENTS	Categorised secondary data	• Make assumptions • Draw conceptual diagram	Categorised secondary data	To build the research indicators and instruments
3	EVALUATING RESEARCH INSTRUMENTS	Specialists, architects, urban planners, etc.	• Index of item-objective congruence (IOC)	Specialists, architects, urban planners, etc.	To evaluate indicators and instruments
4	PILOT STUDY: Physical-environmental observation (PE)	Residential high-rise buildings in Bangkok urban area	• Non-participant observation • Physical environmental assessment	At least one residential high-rise building	To test validation and reliability of the indicators
	Environmental Psychological survey (PEP)	Residential high-rise dwellers in Bangkok urban area	• Questionnaire	Residential high-rise dwellers of the targeted building	To test validation and reliability of the questionnaire
5	FIELD SURVEY: Performing Physical environmental observation	Residential high-rise buildings in Bangkok urban area	• Non-participant observation • Physical environmental assessment	18 residential high-rise buildings from 6 zones of Bangkok	To obtain the physical environmental data
	FIELD SURVEY: Administrating field survey	Residential high-rise dwellers in Bangkok urban area	• Questionnaire (expected number of participants between 1,111 and 1,222)	Residential high-rise dwellers living in 18 buildings from 6 zones of Bangkok	To obtain the essential data of the research
6	DATA ANALYSIS	Entire data collection	• Contents analysis • Descriptive statistic • Inferential statistic	Entire data collection	To conclude and discuss the research results
7	SUMMING-UP AND WRITNG REPORT				

3.1.1 Stage 1: Literature and secondary data review

The essential purpose of this step was to collect the relevant literature and secondary data from all reliable and available sources, such as textbook, academic journals, empirical and non-empirical studies, published statistical data, etc.

The contents of the investigation, for instance, the theoretical multidisciplinary concepts, the research core and gap, and the academic arguments including recommendations were for building the effective research instruments.

In this stage, the essence derived from all contents was also compared, analysed, and then transformed into the research framework and the variables construct after all. Regarding the literature review in Chapter 2, the reviewed contents were divided into three broad categories as follows:

3.1.1.1 The environmental psychology of high-rise housing related to to urban context

3.1.1.2 The psychological properties of home

3.1.1.3 The measurement and indicators implementation in environmental psychological research

3.1.2 Stage 2: Operationalising variables and research instruments

In this stage, the core contents summarised in the previous stage were simplified and applied for the conceptualising process in order to build the research hypotheses and conceptual diagram including variables and construct as shown in the diagram in Chapter 2.

According to the theoretical framework, the research questions and hypotheses of this study were built based on the fundamental assumption that the physical environment which comprises the urban and architectural context of high-rise housing along with the personal attributes and the psychological background of the inhabitants fostered by social mechanism, have significant influences on the individuals' psychological senses of home as the dependent variables. Besides, the existence of interrelationship between these three dependent variables -safety concern, privacy satisfaction, and sense of community- is assumed as well. The sets of the research question and hypothesis are identified below.

3.1.2.1 **Research question one (RQ1):**

How are the three fundamental psychological senses of home, namely, 1) safety concern, 2) privacy satisfaction, and 3) sense of community amongst high-rise dwellers in Bangkok urban area affected significantly by the physical environmental factor composed of urban and

architectural context and the personal factor composed of attributes, personality, and experiences?

Null hypothesis one ($H1_0$): The safety concern, privacy satisfaction, and sense of community are not significantly affected by the physical and personal factors.

Alternate hypothesis one ($H1_1$): The safety concern, privacy satisfaction, and sense of community are significantly affected by the physical and personal factors.

3.1.2.2 **Research question two (RQ2):**

How do the safety concern, privacy satisfaction, and sense of community associate with each other?

Null hypothesis two ($H2_0$): The safety concern, privacy satisfaction, and sense of community do not associate with each other.

Alternate hypothesis two ($H2_1$): The safety concern, privacy satisfaction, and sense of community associate with each other.

Before building the research instruments, all variables needed operationalisation and transformation into the measurable indicators. The sets of dependent and independent variables are elucidated in Table 3.1, Table 3.2, and Table 3.3.

3.1.3 Stage 3: Evaluating Research Instruments

Before the pilot test and field survey were performed, a content validity of the research instrument needed to be evaluated. An Index of Item-Objective Congruence (IOC) procedure was brought up to assess the validity of each item of the questionnaire and the association between items and the research objectives and the operational definitions during the development stage. In the IOC process, the questionnaire as an essential research instrument was evaluated by a group of five specialists comprising three social science researchers and two high-rise housing professionals. The experts independently assessed the questionnaire and rated a score of congruence for each question item as described in the table below.

Table 3.2 The table of I.O.C. evaluation criteria

Evaluating Score	Description
Scoring +1	Certain that the question is congruent with the operational definitions or objectives
Scoring 0	Uncertain that the question is congruent with the operational definitions or objectives
Scoring -1	Certain that the question is **NOT** congruent with the operational definitions or objectives

After the IOC scoring had been completed, the IOC values were calculated with regard to the equation below.

$$\text{IOC} = \frac{\Sigma R}{N}$$

$$\Sigma R = \text{Sum of scores graded by at least three specialists}$$
$$N = \text{Number of specialists}$$

The question items that earned the value of IOC higher than 0.6 were considered acceptable due to their congruence between the item's content and the operational definitions or objectives. Meanwhile, the question items that earned IOC value lower than 0.5 were considered unacceptable due to a lack of congruence, and then the items were further removed from the questionnaire or readjusted based on the descriptive comments and recommendations made by the experts during the scoring process. The entire results from the IOC process were considered and adopted for improving the questionnaire before launching the pilot study. The result of IOC is demonstrated in the Appendix.

3.1.4 Stage 4: Pilot study

The primary goal of this juncture was to conduct a preliminary survey before launching the full-scale field study. The result of pilot study helped examine the feasibility of recruiting respondents and evaluate the coefficient of reliability of the questionnaire (Cronbach's Alpha coefficient value) as well as the eigenvalue of the each item. Amongst the eighteen condominiums participating in this survey, the pilot study was conducted at one randomly selected condominium which was the condominium SB03. The pilot study was administered to assess two research instruments, which were 1) the Physical Environmental Assessment (PE), and 2) the Personal Attributes and Environmental Psychological Questionnaire (PEP).

To measure an internal consistency of the questionnaire, the results derived from the pilot study were statistically calculated to obtain the coefficient of internal consistency (Cronbach's alpha = α) before administrating the full-scale field survey. The formula for the standardised Cronbach's alpha is defined as the lines below

$$\alpha = \frac{N \times \overline{C}}{\bar{v} + (N-1) \times \overline{C}}$$

$$N = \text{Number of items}$$
$$\overline{C} = \text{Average inter} - \text{item covariance}$$
$$\bar{v} = \text{Average variance}$$

Regarding the PEP questionnaire, there were three different parts measured by the Likert-scale type, which were Part 4.1, 4.2, and 4.3. The calculated Cronbach's alpha coefficients derived from the pilot study are shown in the table below.

Table 3.3 Summary of the calculated Cronbach's alpha coefficients derived from the pilot study Part 4.1, 4.2, and 4.3

Section	Psychological Question Items	Pilot Study N	Number of Items	Cronbach's alpha Coefficient
Part 4.1	Safety Concern	65	8	.932
Part 4.2	Privacy Satisfaction	65	8	.883
Part 4.3	Sense of Community	65	8	.847

3.1.5 Stage 5: Field Survey

3.1.5.1 Performing physical environmental observation

After the final adjustment of research instruments, the physical environmental inspection was conducted along with the PE assessment. As already stated, the multi-stage cluster sampling technique was implemented for this study. Overall, eighteen residential high-rise buildings were targeted as the field of survey. Each condominium represented the group of low-selling price condominiums, middle-selling price condominiums, and high-selling price condominiums, located in six different zones of Bangkok as shown in Figure 3.2. During this stage, the architectural drawings of the buildings, for example, a master plan, a typical floor plan, etc., were collected as well as a photo-documentation for the furtherance of the architectural and environmental analysis.

3.1.5.2 Administrating field survey

After the permission was given by the condominium's committees, the further step was to perform the full-scale field survey. For recruiting the participants, the simple random sampling technique was latterly applied in this stage. The inhabitants of the selected eighteen high-rise residential buildings were requested to respond the PEP questionnaire on their willingness. The importance of this juncture was the agreement between the researcher and the respondents that all data derived from this survey will be contributed for the academic purpose only as well as the published research findings will demonstrate the aggregate of statistics and interpretation allowing no allusion to any particular individual.

3.1.6 Stage 6: Data analysis

Afterwards, the entire collection of data was categorised and analysed by several approaches depending on each type of data to test the primary hypothesis and sub-hypotheses. The decisive analytical methods applied in this stage are as follows:

Quantitative information: for the numerical or statistical data, the prospective analytical approaches are 1) descriptive statistics, and 2) inferential statistics.

Qualitative information: for the descriptive data, the decisive analytical approach is the typological analysis in the scope and categories planned at the beginning of research design.

3.1.7 Stage 7: Summing-up Research Report

In this final stage, the results of the study were discussed along with the acceptance and rejection of hypotheses and sub-hypotheses were also summarised and reported in the form of a document. The overall viewpoint for creating the better vertical housing environment as well as developing the efficient mental well-being indices for high-rise residents in the urban context of Bangkok was also proposed in this stage eventually.

3.2 Population and Sampling Group

Regarding the objectives of the research, the decisive population of this study was the dwellers of high-rise residential buildings located in the urban area of Bangkok. Due to the fact that the entire population of high-rise dwellers in Bangkok had not been census recently, the estimation of population size in this study was computed based on the decennial population and housing census reported in 2010 by the National Statistical Office Thailand (NSOT) and the annual report published by the Real Estate Information Center (REIC). In 2010, NSOT indicated that the numbers of condominium/ flat/ mansion residents in Bangkok was approximately 231,000 (2.8% of 8,250,000 Bangkok's population). (Population Statistics Group, 2010) Meanwhile, the REIC reported that, from 2011 to 2016, the number of high-rise dwelling units only in Bangkok metropolis transferred to their owners was 400,695 units. (REIC, 2010) Hence, it was confident to say that more than 200,000 people were living high-rise residential building in Bangkok urban area.

The sample size of this study was calculated based on the Taro Yamane's sample size table for the number of the population more than 100,000. (Israel, 1992) (See Table 3.4) The desired sample size was between 1,111 and 1,222 participants (with a ±3.0 % margin of error, a 95% confidence interval plus 10% compensate for nonresponse). The survey respondents were randomly recruited amongst the inhabitants living in the eighteen selected high-rise residential buildings as mentioned earlier.

Table 3.4 The table of Taro Yamane's sample size for ±1%, ±2%, ±3%, ±4%, ±5%, and ±6% precision levels, where confidence level is 95%

Size of Population	Sample Size (n) for Precision (e) of:					
	±1.0 %	±2.0 %	**±3.0 %**	±4.0 %	±5.0 %	±6.0 %
100,000	9,010	2,439	1,099	621	398	100
∞	10,000	2,500	***1,111***	625	400	100

Source: G. D. Israel, 1992

3.3 Research Setting

The setting of this research was confined to the residential high-rise buildings located in Bangkok, Thailand. To facilitate the survey and ensure that the collected samples represented the entire population throughout the city, the Bangkok Metropolitan area was clustered into six different zones categorised by the urban sprawling trend of the city defined by the City Planning Department (CPD). The six zones were as follows: 1) Northern Bangkok, 2) Central Bangkok, 3) Southern Bangkok, 4) Eastern Bangkok, 5) Northwestern Bangkok (Northern Thonburee), and 6) Southwestern Bangkok (Southern Thonburee). (See Figure 3.1) From each zone, three residential high-rise buildings higher than twenty-three metres were purposively selected. Each building represented the low-selling price condominiums, middle-selling price condominiums, and the high-selling price condominiums consecutively. The total number of selected residential high-rises then became eighteen.

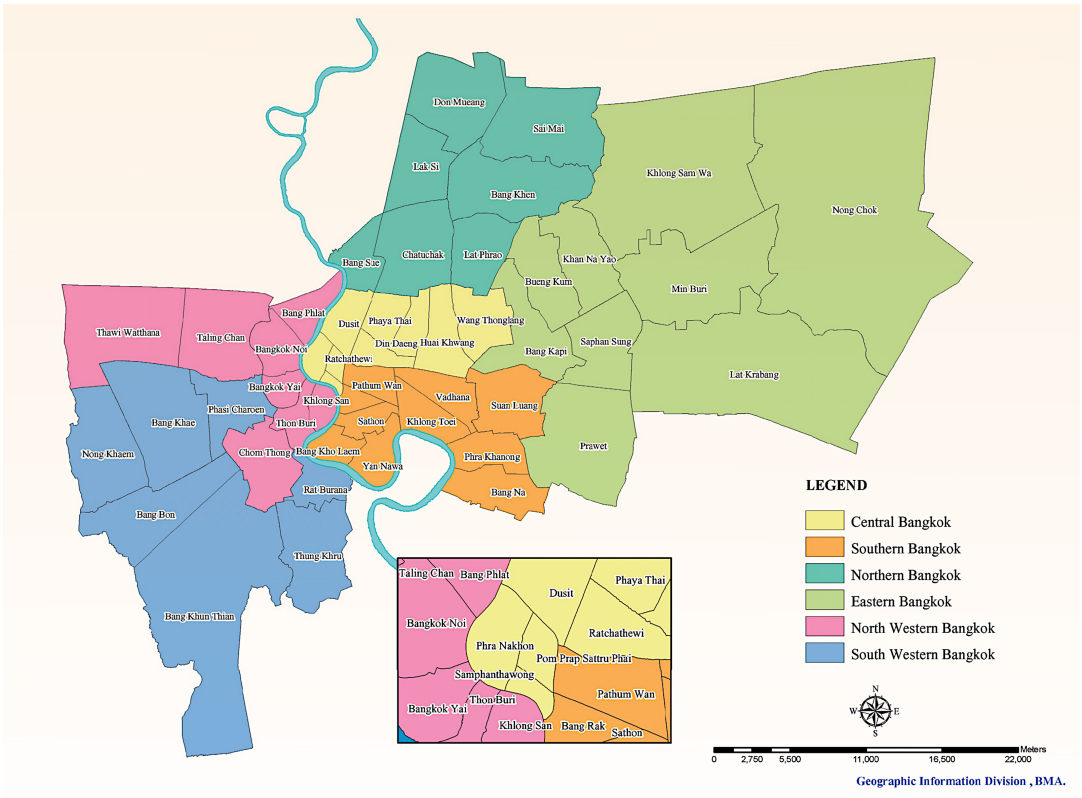


Figure 3.1 Graphical Map of Bangkok Metropolitan Area, source: Statistical Profile of Bangkok Metropolitan Administration 2015

3.4 Sampling Technique

With respect to the quantitative approach and the scope of this research as mentioned earlier, the multi-stage sampling technique is therefore applied.

3.4.1 Stage 1: Cluster sampling technique:

This sampling method was implemented to generate the sampling frame and ensure that the sampling group was recruited throughout in the vast area of urban Bangkok. The hierarchy of cluster is demonstrated in Figure 3.2.

Geographical Cluster: as illustrated in Figure 3.1, Bangkok Metropolitan area was clustered into six different zones categorised according to the City Planning Department, Thailand (CPD). These zones were 1) Northern Bangkok, 2) Central Bangkok, 3) Southern Bangkok, 4) Eastern Bangkok, 5) Northwestern Bangkok (Northern Thoburee), and 6) Southwestern Bangkok (Southern Thonburee).

Economic Sub-cluster: the sub-cluster of each zone was further defined by the criteria of the selling price of the condominiums. According to the condominium price index reported by REIC, these residential high-rises were categorised into three groups based on their prices and the actual proportion of the market as follows:

- Low-selling price: less than 50,000 Baht (~€1,250) / m2
- Middle-selling price: 50,000 - 79,999 Baht (~€1,250-1,999) / m2
- High-selling price: greater than or equal to 80,000 Baht (~€2,000) / m2 (REIC, 2010)

3.4.2 Stage 2: Purposive sampling technique:

The further step of building selection was based on the set forth criteria as follows:

- The selected buildings need to be a residential high-rise building, which is higher than 23 metres.
- The selected buildings need to be operated and occupied more than five years.

At the end of this stage, the eighteen high-rise residential buildings from six zones of Bangkok were selected for the further physical environmental observation and the survey.

3.4.3 Stage 3: Simple random sampling technique:

A random sample selection was implemented at the final stage. In the end, the total numbers of 1,206 inhabitants, who were living in the selected eighteen condominiums, were recruited. The proportion of respondents categorised by eighteen condominiums is described in Chapter 5, Table 5.11.

By their willingness, they were asked to answer the psychological assessment questionnaire related to their current residential buildings.

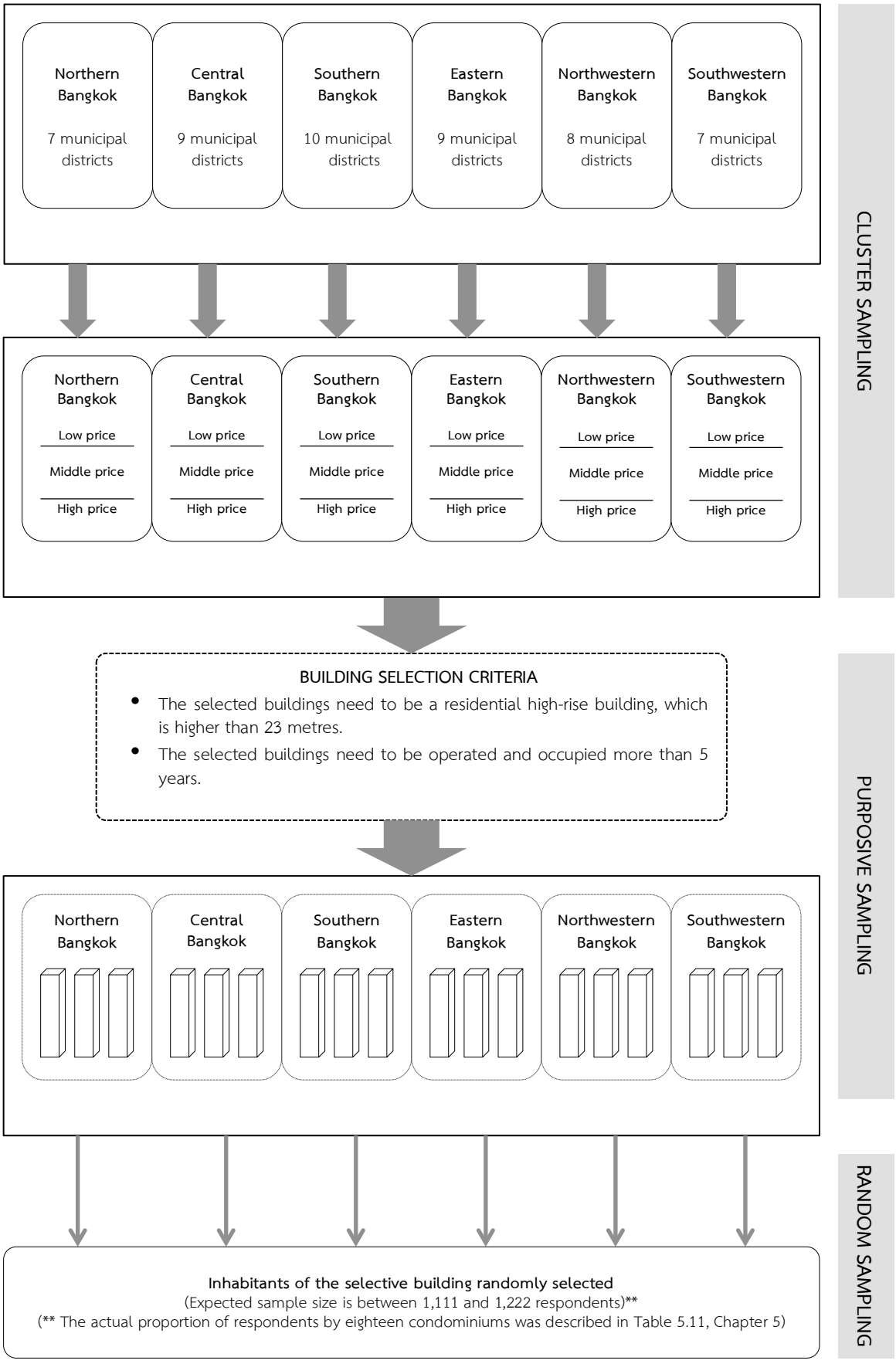


Figure 3.2 The research sampling technique hierarchy

3.5 Research Instruments

Due to the fact that this study aims to assess and collect both the environmental physical conditions of the condominiums and the personal data of the respondents, the research tools were systematically designed and assembled to be appropriate for the manners of the variety of information including the practicality during the field survey. Likewise, the units of measurement of each indicator were well-planned precedently. The two instruments initiated in this research are described as follows:

3.5.1 Physical-Environmental Assessment (PE)

The PE assessment is the research tool designed for evaluating the physical environment of the selective residential high-rise including its surroundings context as framed in the scope of the study. This tool was implemented during the non-participant observation by the researcher. In fulfilling the PE assessment criterion, some indicators need answers from the secondary data, for example, population density by districts, the typical floor plan of the condominiums.

3.5.2 Personal and Environmental Psychological Questionnaire (PEP)

The PEP questionnaire was designed to collect the personal information from the sampling group. The PEP assessment allowed respondents to self-report their personal background information and the three domains of psychological status namely safety concern, privacy satisfaction, and sense of community while living in the environment of the high-rise housing.

3.6 Design and Development of Research Instruments

3.6.1 Physical-Environmental Assessment (PE)

Concerning the evaluation of the physical environment of the condominium and its surrounding contexts, the PE assessment was separated into two parts depending on the physical environmental spans, which are the followings:

3.6.1.1 PE part 1: Community level

This section of the assessment focused on the community and surrounding contexts of the targeted condominium within a 500 metres radius as follows:

- Density of population by district (person/ sq.km.) derived from secondary data
- Land use policy applying the criteria of DCP, which are 1) low-density residential zone, 2) medium-density residential zone, 3) high-density residential zone, 4) commercial zone, 5) industrial zone, 6) warehouse zone, 7) rural and agricultural conservation zone, 8) rural and agricultural zone, 9) Thai art and cultural conservation zone, and 10) government institutes, public utilities and amenities zone.
- City zoning criteria referring to the six zones of Bangkok

3.6.1.2 PE part 2: Building level

This section of the assessment accentuated the architectural features of the residential buildings comprising the following aspects:

- General physical condition of the condominium
- Defensible characteristics composed of 1) access control, 2) surveillance, 3) territoriality, and 4) milieu and juxtaposition.
- Privacy supportive characteristics consisted of 1) number of units per floor, 2) type of typical floor plan, and 3) number of unit's member.
- Communal characteristics composed of 1) variety of common and recreational area and 2) exposure & ease of accessibility

3.6.2 Personal and Environmental Psychological Questionnaire (PEP)

This questionnaire was to collect the personal information and the psychological status of the respondents. The PEP survey was divided into five parts as follows:

3.6.2.1 PEP part 1: Personal attributes

This section contained the questions about personal information that are relevant to the psychological status of the respondents, for example, gender, ages, religion, income, education, etc.

3.6.2.2 PEP part 2: Dwelling unit and living behaviour

Since the inside of dwelling unit was not able to be observed, this part then contained questions about the condition of respondent's dwelling unit, such as the density of housing unit and type of room. Moreover, the dwelling behaviours of respondents were inquired, such as the length of residence, spending time in the building, etc.

3.6.2.3 PEP part 3: Personality and experience

This section contained the in-depth questions about personality and psychological background of the respondents, for example, the physical and mental health while living in the building, privacy needs, experience of facing threats, social capital and community participation.

3.6.2.4 PEP part 4: Environmental psychological status

This section allowed the respondents to self-report their mental state. The three groups of psychological question items that were relevant to the participants were placed separately in the three different parts 1) safety concern part, 2) privacy satisfaction part, and 3) sense of community part.

3.6.2.5 PEP part 5: Suggestion and expectation

In this section, the respondents were enquired to give their opinion about the aspect of which they thought it was a priority to be improved followed by the open-ended questions for further suggestion.

3.7 Variable Constructing and Operationalising Process

According to the theoretical framework of the research illustrated below (See Figure 3.3), transforming conceptual variables to operational variables, scales of measurement, and the implementing tool are described in detail as shown in the tables below (See Table 3.4, 3.5)

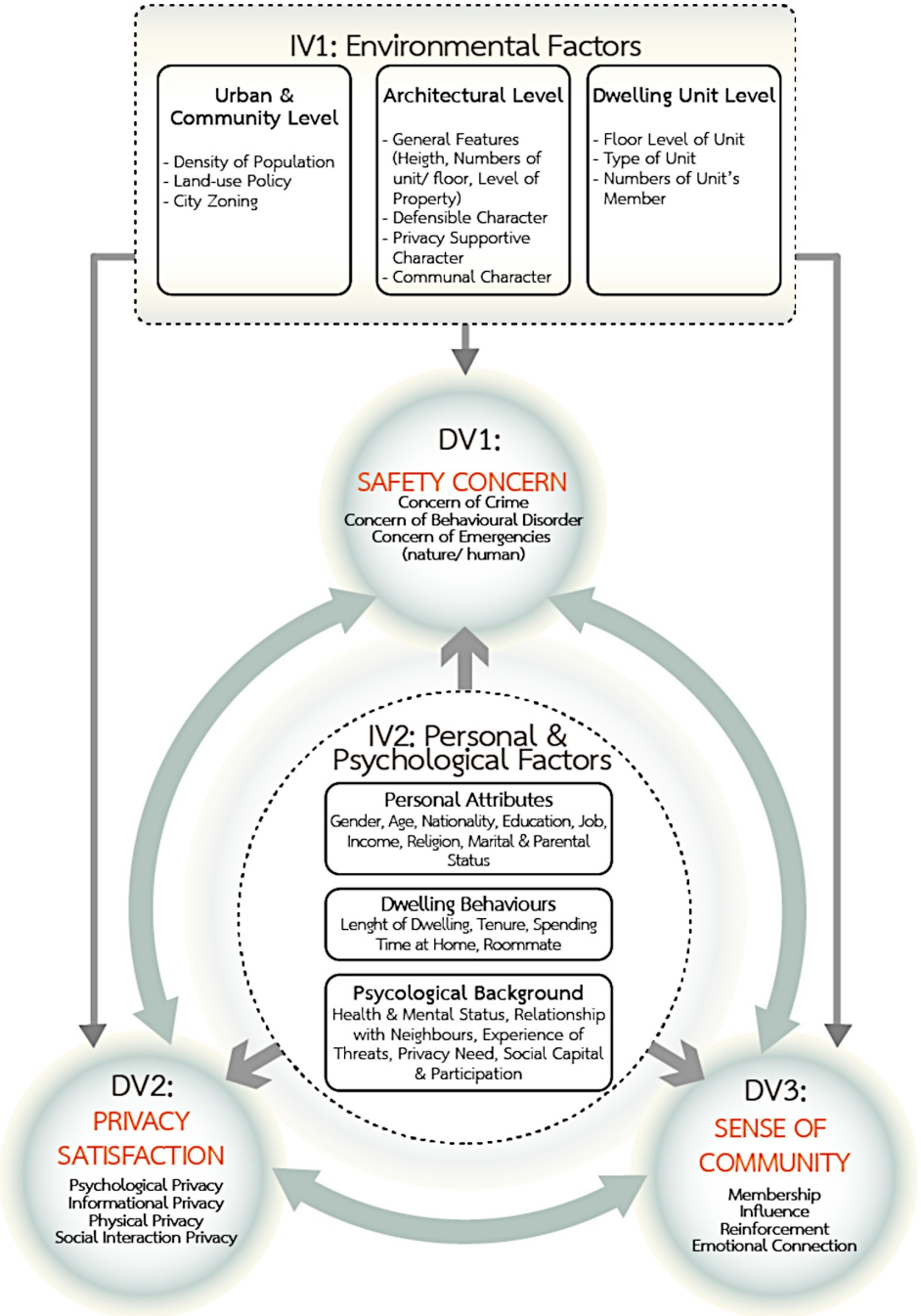


Figure 3.3 The research theoretical framework

3.7.1 Dependent Variables

As mentioned earlier, the set of dependent variables comprise three psychological senses of home. Meanwhile, each domain is composed of its own sub-categories as follows:

3.7.1.1 Safety concern

The safety concern is the variable reflecting the feeling concerned of being harmed by different kind of threats. In this research, the high-rise building's threats were categorised into three types, which are 1) crime, 2) behavioural disorder, and 3) emergency (caused by human and nature).

3.7.1.2 Privacy satisfaction

The privacy satisfaction is the variable reflecting the condition that the dwellers were being satisfied to control and manage their privacy in several situations happening in the setting of the residential building. For covering all aspects of privacy, the whole privacy dimensions needed to be measured are as follows: 1) psychological privacy, 2) informational privacy, 3) physical privacy, and 4) social interactional privacy.

3.7.1.3 Sense of community

The sense of community is the variable reflecting the connectedness between the dwellers and their home environment in the aspects of both physical and social contexts. Theoretically, to measure the sense of community, these following feelings needs to be contained in the question items: 1) feeling of membership, 2) feeling of influence, 3) feeling of reinforcement, and 4) feeling of shared emotional connection.

Table 3.5 The table of an operationalising process of the dependent variables: safety concern, privacy satisfaction, sense of community, and scales of measurement

Conceptual Variables	Operational Variables	Indicators	Scales of Measurement	Instruments	
				PE Asmnt.	PEP Qtn.
DV1 Safety Concern	Concern of crime	Level of crime concern	Interval (Likert scale 1-5)		✓
	Concern of behavioural disorder	Level of behavioural disorder concern			✓
	Concern of emergency	Level of human-caused emergency			✓
		Level of nature-caused emergency			✓
DV2 Privacy Satisfaction	Satisfaction of psychological privacy	Level of psychological privacy satisfaction	Interval (Likert scale 1-5)		✓
	Satisfaction of informational privacy	Level of informational privacy satisfaction			✓
	Satisfaction of physical privacy	Level of physical privacy satisfaction			✓
	Satisfaction of social interactional privacy	Level of social interactional privacy satisfaction			✓
DV3 Sense of Community	Feeling of membership	Level of feeling of membership	Interval (Likert scale 1-5)		✓
	Feeling of Influence	Level of feeling of Influence			✓
	Feeling of Reinforcement	Level of feeling of reinforcement			✓
	Feeling of shared emotional connection	Level of shared emotional connection			✓

3.7.2 Independent Variables

The set of independent variables was categorised into two groups: 1) factors associated with the physical environmental context, and 2) factors associated with the personal context.

3.7.2.1 Factors associated with physical environmental context

This set of independent variables was considered related to the environmental context of the respondent's condominiums. These factors were categorised into three sub-scales, namely, 1) urban and community level, 2) architectural level, and 3) dwelling unit level.

3.7.2.2 Factors associated with personal context

This type of factor was considered related to the demographic and personality and intra-psychic of the participants in this study. These factors were classified into the following aspects: 1) personal attributes, 2) personal dwelling behaviours, 3) physical and mental health condition, 4) experience of threats, 5) privacy needs/ introvert personality, and 6) social capital and participation.

Table 3.6 The table of an operationalising process of independent variables: factors associated with personal context, and factors associated with physical-environmental context, and scales of measurement

Conceptual Variables	Operational Variables	Indicators	Scales of Measurement	Instruments	
				PE Asmnt.	PEP Qtn.
IV1 Environmental Factors	Factors involved Urban and Community	Density of population	Ratio	✓	
		Land use policy	Nominal	✓	
		Municipal Zoning	Nominal	✓	
	Factors involved Architecture	Building features & Height	Ratio	✓	
		General information of building	Nominal	✓	
		Defensible characteristics			
		1 Access Control	Interval Scoring 1-5 pts	✓	
		2 Surveillance		✓	
		3 Territoriality		✓	
		4 Milieu & Juxtaposition		✓	
		Privacy Supportive characteristics			
		1 Numbers of unit per floor	Interval Scoring 1-5 pts	✓	
		2 Typical floor plan		✓	
		Communal characteristics			
		1 Variety of recreational facility	Interval Scoring 1-5 pts	✓	
		2 Exposure & Ease of accessibility		✓	
	Factors involved Dwelling unit	Density of dwelling unit	Ratio		✓
		Type of unit and floor	Nominal		✓
IV2 Personal Factors	Personal attributes	Gender	Nominal		✓
		Age	Ratio		✓
		Stage of life	Nominal		✓
		Religion	Nominal		✓
		Marital status	Nominal		✓
		Parental status	Nominal		✓
		Nationality	Nominal		✓
		Education	Nominal		✓
		Occupation	Nominal		✓
		Monthly income of family	Ratio		✓
	Personal dwelling behaviours	Length of dwelling	Nominal		✓
		Tenure	Nominal		✓
		Spending time at home	Nominal		✓
		Number of unit's member	Ratio		✓
		Type of roommate	Nominal		✓
	Physical and mental health conditions	Relationship with neighbours	Interval Scoring 1-5 pts		✓
		Health condition after moving-in			✓
		Mental health condition after moving-in			✓
	Experience of threats	Experience of crime	Interval Scoring 1-5 pts		✓
		Experience of behavioural disorder			✓
		Experience of emergency (human & nature caused)			✓
	Social capital and participation	Sharing	Interval Scoring 1-5 pts		✓
		Voluntary			✓
		Civic duty			✓
	Privacy needs (Introvert personality)	Level of isolation need	Interval Likert-scale 1-5		✓
		Level of solitude need			✓
		Level of anonymity need			✓
		Level of reservation need			✓
		Level of intimacy with friends/ family			✓

3.8 Prospective Association between Independent and Dependent Variables

The associations between independent and dependent variables were presumed based on the research question and hypotheses as demonstrated in Table 3.7 and 3.8 below.

Table 3.7 The table of prospective associations between independent and dependent variables

RQ1:	*How are the three fundamental psychological senses of home affected significantly by the physical-environmental factors and the personal factors?*
$H1_0$:	The safety concern, privacy satisfaction, and sense of community are not significantly affected by the physical and personal factors
$H1_1$:	The safety concern, privacy satisfaction, and sense of community are significantly affected by the physical and personal factors

Independent Variable		**Dependent Variable**	
Variables	**Scales of measurement**	**Variables**	**Scales of measurement**
Density of population Municipal Zoning Age Monthly income of family	Ratio	Safety Concern • Level of crime concern • Level of behavioural disorder concern • Level of human-caused emergency concern • Level of nature-caused emergency concern	Interval (Likert scale 1-5)
Land use policy Gender Health condition after moving-in Mental health condition after moving-in	Nominal		
Defensible characteristics Experience of Threats	Interval Scoring1-5pts		
Density of dwelling unit	Ratio	Privacy Satisfaction • Level of psychological privacy satisfaction • Level of informational privacy satisfaction • Level of physical privacy satisfaction • Level of social interactional privacy satisfaction	Interval (Likert scale 1-5)
Type of unit Marital status & Parental status Type of Roommate Typical floor plan	Nominal		
Level of Privacy needs	Interval Scoring1-5pts		
Variety of recreational facility Exposure and ease of access	Interval Scoring1-5pts	Sense of Community • Level of feeling of membership • Level of feeling of Influence • Level of feeling of reinforcement • Level of shared emotional connection	Interval (Likert scale 1-5)
Relationship with neighbours Stage of life Education Religion Occupation Tenure Spending time at home	Nominal		
Length of dwelling	Ratio		
Social capital and community participation	Interval Scoring1-5pts		

Table 3.8 The table of prospective associations between dependent variables

RQ2:	*How do the safety concern, privacy satisfaction, and sense of community associate with each other?*
$H2_0$:	The safety concern, privacy satisfaction, and sense of community do not associate with each other
$H2_1$:	The safety concern, privacy satisfaction, and sense of community associate with each other

Variables	Scale	Variables	Scale	Variables	Scale
Safety Concern • Level of crime concern • Level of behavioural disorder concern • Level of human-caused emergency concern • Level of nature-caused emergency concern	Interval (Likert scale 1-5)	Privacy Satisfaction • Level of psychological privacy satisfaction • Level of informational privacy satisfaction • Level of physical privacy satisfaction • Level of social interactional privacy satisfaction	Interval (Likert scale 1-5)	Sense of Community • Level of feeling of membership • Level of feeling of Influence • Level of feeling of reinforcement • Level of shared emotional connection	Interval (Likert scale 1-5)

3.9 Data Collecting and Strategy

Firstly, the pilot study was conducted at one of the eighteen high-rise residential buildings. The setting of pilot field survey was selected randomly for trial the two research instruments, which were 1) Physical Environmental Assessment (PE), and 2) Personal and Environmental Psychological Assessment Questionnaire (PEP). As mentioned earlier, the pilot study helped evaluate the feasibility of the full-scale survey recruitment along with the research instruments that achieved the good coefficient of reliability, namely, Cronbach's Alpha coefficient, and the eigenvalue that confirmed the unidimensional of the questionnaire.

After adjusting the research tools, the list of the selective residential high-rises was finalised based on the permission granted by each buildings' juristic committee. The full-scale field survey was administered at the rest of all selected buildings. The field research techniques and equipment adopted in this study are as follows:

3.9.1 Non-participant observation

Non-participant observation was performed as priory to collect the qualitative information of the physical environment of the building. The PE

assessment was implemented in association with the observation to ensure that every indicator of the environmental factors was being explored and measured.

3.9.2 Interviewing

Interviewing was one of the data collecting techniques applied in this field survey along with the non-participant observation due to some necessary information that could not acquire via the visual observation per se. The interviewees were the manager or the committees of each condominium. The set of questions was confined within the physical environmental context of the compound as defined in PE assessment from which the subjective data and opinion were excluded. The question items involved the general information of the condominium in the following aspects: 1) How many stories does this condominium have?, 2) How many units does this condominium contain?, 3) How many units per floor does this condominium provide?, 4) How long has this condominium been occupied?, and 5) What were the recreational facilities provided for the residents?

3.9.3 Photo documentation and architectural drawings

Photo documentation and architectural drawings were collected during the non-participant observation if allowed. These primary and secondary data helped researcher analysing the details of the physical environment as well as help memorising and preparing for the unexpected situation at the sites.

3.9.4 Questionnaire administration

The questionnaire administration was planned to distribute after the physical environmental observation. Since the field survey was conducted during the day from 9.00 to 18.00, the morning session between 9.00-12.00 contributed to the physical environmental observation, whereas, the questionnaire administration was carried out in the afternoon and in the evening between 14.00-18.00 when the dwellers came back from their daily routines.

Regarding the sample size calculation in section 3.2, the acceptable number of respondents was between 1,111 and 1,222. At the end of the field survey, the numbers of 1,206 questionnaires completed by the respondents were retrieved back from the field.

3.10 Data Analysis Approaches

The data derived from the field survey was categorised into two groups as follows:

3.10.1 Qualitative Data:

The analytical approach selected for this type of data was the typological analysis, which was the method for ordering and classifying the descriptive and non-numerical information derived from the observation and PE assessment. The urban and architectural contents of each condominium were classified based on the theoretical framework set at the beginning of the research.

3.10.2 Quantitative Data:

For the numerical information derived from the field survey, the statistical analysis was planned to perform the causal analysis between independent and dependent variables. Due to the variety of the units of measurement of each indicator, several statistical methods were applied to match the four different types of data -1) nominal data, 2) ordinal data, 3) interval data and 4) ratio data- as well as to validate and robust the findings of the field survey. The statistical approaches adopted in this study were described as follows.

3.10.2.1 Descriptive Statistic

The descriptive statistical analysis was applied to narrate the demographical features of the data as well as provide the general summary about the sampling group. The three types of univariate analysis: 1) distribution, 2) central tendency and 3) dispersion, were also implemented with the data set derived from sampling group. The categorical variables measured in nominal unit, for example, the personal attributes of high-rise inhabitants, such as age, gender, etc. were examined. The frequency and distribution of the data then depicted in the form of a percentage. The quantitative variables measured in ordinal, interval, and ratio units, such as monthly income, the level of safety concern, etc. were examined to reveal their central tendency, namely, mean, median, and

mode along with the dispersion analysis of the standard deviation and variance, which were also applied to these types of data.

3.10.2.2 Inferential Statistic

The inferential statistical analyses were employed to test the research hypotheses and interpret the causality amongst variables. For analysing the significant influences of the independent variables on the dependent variables in this study, the multiple inferential statistical methods were practised regarding the multi-scales of measurement as mentioned earlier. The implemented inferential statistics are as follows:

To find the answers to the first research question (***RQ1:*** *How are the three fundamental psychological variables significantly affected by the physical environmental factors and the personal factors?*), the following statistical methods were implemented.

- **Independent Samples t-test**

  This type of statistical analysis was implemented for comparing the means between two unrelated groups on the same continuous dependent variables. Based on the dataset of this field survey, the independent sample t-test was performed to investigate the significant psychological differences between two different categorical groups of independent variables, for example, to compare the distinctive degree of mental status between gender (female and male), between access control (gated and non-gated territory), etc.

- **One-way Analysis of Variance (ANOVA)**

  This method was applied for determining whether there were any statistically significant differences of means amongst three or more independent (unrelated) groups. To illustrate, in this study, the ANOVA was performed to compare the level of mental status of the respondents from six different zones of Bangkok, to compare the psychological differences amongst the respondents with different marital status (bachelor, married, and

divorced/widow), etc.

- **Pearson's Movement Correlation Coefficient (PMC)**

  This statistical method was used for examining the strength of association between the core dependent variables (safety concern, privacy satisfaction, and sense of community) and their sub-variables. The PMC was run to test multiple variables at a time. Primarily, the result of PMC was for scrutinising the multicollinearity conditions amongst the variables before furthering the process of causality analysis employing simple linear regression analysis, multiple linear regression analysis, and structural equation modelling. Therefore, the detail of PMC was not included as a part of the major results' interpretation.

- **Linear Regression**

  By definition, this statistical approach was applied for modelling the relationship between a scalar dependent variable and one or more explanatory variables (independent variables).

  In this study, the simple linear regression analysis (SLR) was to examine the influential analysis for the case of one independent variable (explanatory variable/ predictor) versus one dependent variable (response variable). For instance, the SLR was performed to examine the influence of age (measured in continuous unit) on the level of safety concern.

  Meanwhile, the multiple linear regression analysis (MLR) was for the case of multiple independent variables versus one dependent variable. For instance, the MLR was conducted to investigate the influences of the three types of threats' experience 1) crime, 2) behavioural disorder, and 3) emergency (scored one to five) on the safety concern of the respondents (scored one to five). Moreover, in this research, the MLR was also applied along with the structural equation modelling to lineally redefine and enhance the robustness of the predictive modelling at the last part of the analytical procedures.

To find the answers to the second research question (**RQ2**: *How do the safety concern, privacy satisfaction, and sense of community associate with each other?),* the following statistical methods were implemented.

- **Structural Equation Modelling**

  Mainly, this multivariate statistical analysis technique was carried out to investigate the structural relationships between the three psychological dependent variables -safety concern, privacy satisfaction, and sense of community- as the latent constructs. In this study, the SEM allowed the researcher to analyse the statistical association of all variables at the same time. It was the statistical method that was closest to the conceptual model hypothesised at the beginning of the study. As mentioned earlier, the MLR was also performed along with the SEM to re-confirm the reliability of the statistical associations amongst these three dependent variables and to finalise and propose all dominant factors influencing each dependent variable based on the linear perspective.

After defining the variable construct and the approach of data analysis, the operationalised diagram produced for the field survey is illustrated in Figure 3.4.

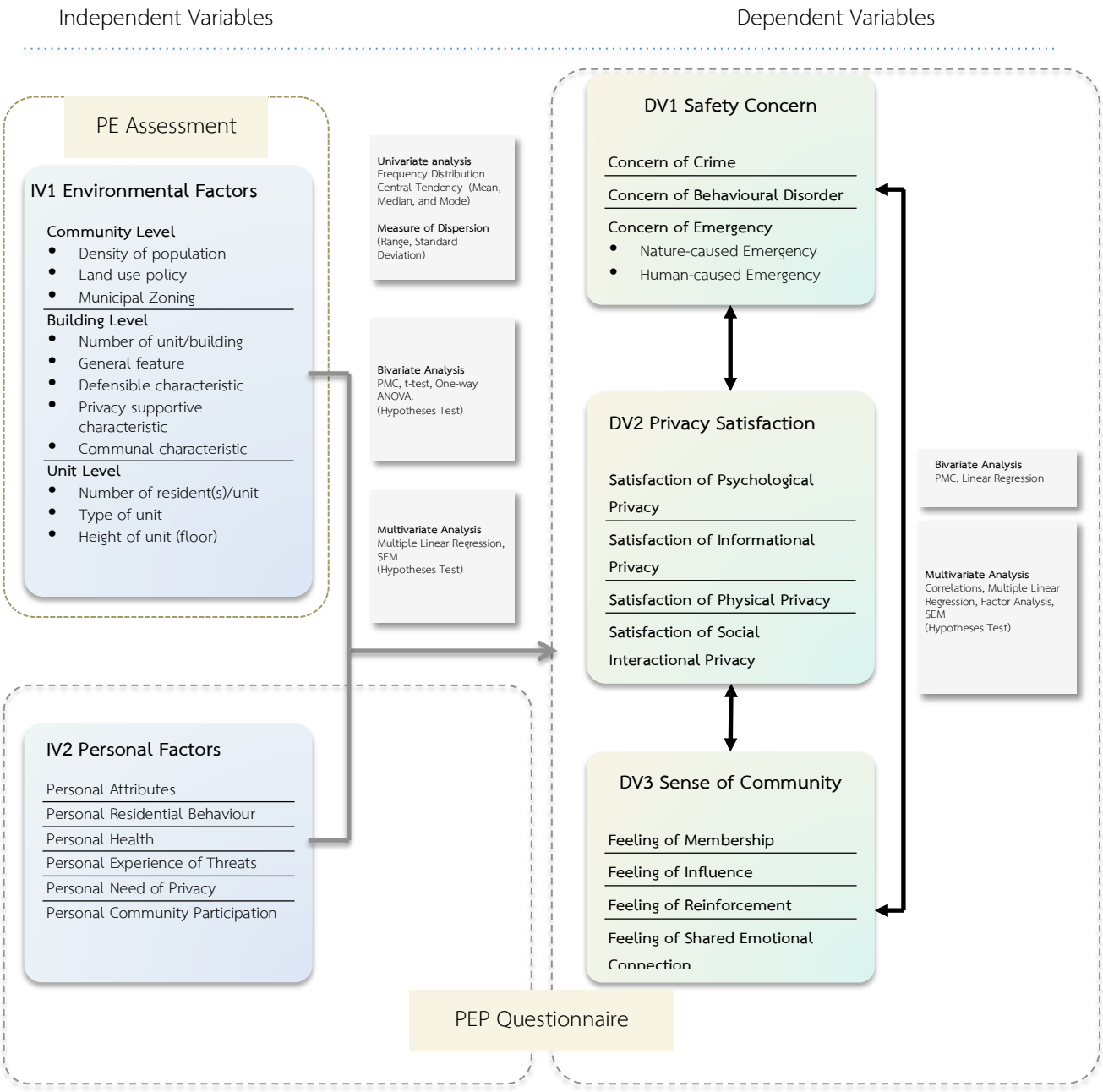


Figure 3.4 The diagram of operationalised variables construct and analytical approach

CHAPTER 4

HIGH-RISE HOUSING IN CONTEXT OF BANGKOK

Chapter Summary

Prior to reporting the results of the field survey, this chapter illustrates the macro-context of Bangkok interweaving the contemporary situation of high-rise housing. The background and revolution of condominiums in Bangkok are revealed in pursuance of the thorough apprehension of the circumstances. As well, the legal provision and trajectory of high-rise estate development are clarified and exemplified for paving the better comprehension linked to the results derived from the field survey.

4.1 Historical Background of High-rise Housing in Thailand

The Thai high-rise housing schemes has been developed and promoted since 1970 in the business districts of Ratchadamri and Sathorn, yet never been constructed because of the conflicts of law provision and the economic recession after the Second Indochina War (Vietnam War) ended in 1975. (Boonkajai, 1993) The residential high-rise business has revived again after the passaging of the Condominium Act in 1979. Thenceforward, many residential high-rise projects known as “condominium” or “condo”, which mostly have been operated by the private entrepreneurs, have been launched and played a significant role in Thai property market. At the beginning of Thai high-rise housing, the very first condominiums were constructed in the urban fringe area of Bangkok, for example, Klongton, and Sukhumvit districts, where have been transformed into a business area in later decades. During the year of 1979 to 1985, the three pioneer condominiums, namely, Siam Penthouse, Grandville House, and Klongton Condominium were completed and occupied. (Boonkajai, 1993)

All through four decades, the high-rise housing development in Thailand has faced several major economic crises, impacts of political, and social shifting. Nevertheless, the residential high-rises' demand and supply in Bangkok urban area have been enlarged gradually due to the characteristics of extreme primate city generating the influx of people seeking for economic opportunities and the behindhand development of infrastructures in other parts of the country. The land value in Bangkok urban area has been continually increasing in so much that the majority of the urban population cannot afford to buy their own piece of land. Thus far, the typical low-rise housing in Bangkok metropolitan area has been transfigured into residential high-rises. Since the end of 2010, the number of population living in high-rise housing had reached more than 200,000. The expected number of occupied high-rise dwelling units in Bangkok urban area up until now is at least 350,000. (Population Statistics Group, 2010, The Nation, 2015, Rujibhong, Koorutanapisan, et al., , 2015)

Despite the enormous volume of condominium's demand and supply, there are only a few high-rise housing projects for low and middle-income people in Bangkok metropolitan area operated by the Government enterprise. Since 1973, the National Housing Authority (NHA) has initiated several low-rise condominium compounds so called “Flat”. (Siriyothipan, 2011) However, the three well-known high-rise condominiums in Bangkok operated by NHA had been developed 22 years later since 1995. One of these projects is a residential complex composed of three 16-story buildings located in Jatujak district, the northern part of Bangkok. The other two condominiums (which do not allow the research team to conduct this survey) are located in the eastern and southern part of Bangkok.

4.2 Geographical Information of Bangkok Urban Area

Bangkok, the capital city of Kingdom of Thailand, is the world’s 15th largest metropolitan and the business hub of Southeast Asia. Regardless of an effective urban planning policy, the urban area of Bangkok has been expanding haphazardly. At present, Bangkok occupies 1,568.737 square kilometres in the Chao Phraya River delta, Central Thailand. The eastern bank is called Pranakorn side, and

the western bank is called Thonburee side. The city is divided into 50 districts serving as administrative subdivisions under the authority of Bangkok Metropolitan Administration (BMA). By urban condition, Bangkok has been classified into six zones as illustrated in Figure 4.1 below.

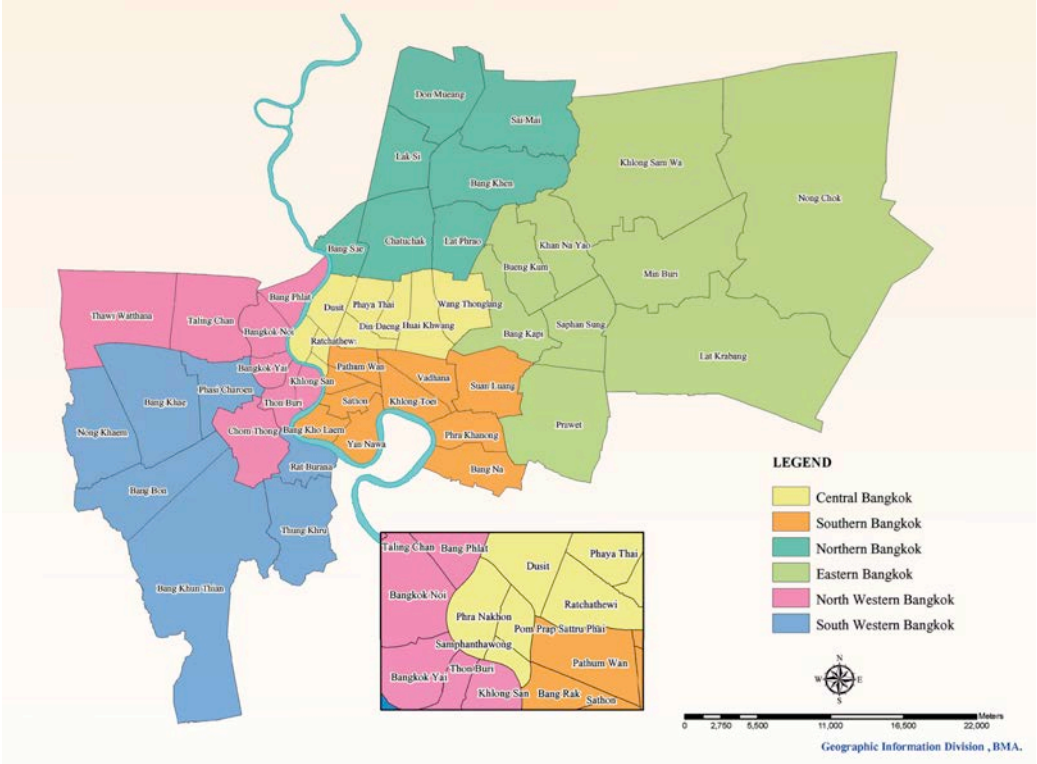


Figure 4.1 Graphical map of Bangkok metropolitan area

Source: Statistical Profile of Bangkok Metropolitan Administration 2015

4.2.1 Northern Bangkok

The northern part of Bangkok has a population of 1,072,206 (18.82% of Bangkok population) with a boundary of 212.29 square kilometres and the population density of 5,657.71 people/km^2. It comprises seven districts as follows 1) Bangkaen, 2) Bangsue, 3) Jatujak, 4) Donmuang, 5) Ladproa, 6) Laksi, and 7) Sai-Mai. Most of the areas are the low and medium-density residential neighbourhoods, and a few areas are the government's institutes, public utilities and amenities zones. As well, the Donmuang international airport is also located in this zone. The most various land use area in northern Bangkok is Jatujak district, where the low, medium, and high-density residential zones including the clusters of residential high-rise

neighbourhoods, and commercial zones are mixed in one territory. (CPD, 2013, Strategy and Evaluation Department, 2014)

4.2.2 Central Bangkok

The central area of Bangkok has a population of 695,435 (12.208 % of Bangkok population) with the boundary of square 52.530 kilometres and the population density of 12,929.29 people/km^2. This zone comprises nine districts, namely, 1) Dusit, 2) Phayathai, 3) Dindaeng, 4) Huaykwang, 5) Wangthonglang, 6) Ratchathewee, 7) Pranakorn, 8) Sampanthawong, and 9) Pomprapsattrupai. Central Bangkok is well known as the central business district (CBD) of Bangkok and Thailand. This zone is mixed with the low, medium, and high-density residential neighbourhoods including the commercial areas, a few parts of the Government's institutes, public utilities and amenities, and the conservation zone of Thai art and cultures. (CPD, 2013, Strategy and Evaluation Department, 2014)

4.2.3 Southern Bangkok

The southern part of Bangkok has a population of 846,888 (14.867% of Bangkok population) with the boundary of 77.794 square kilometres and the population density of 7,317.43 people/km^2. This region comprises ten districts, namely, 1) Bangrak, 2) Pathumwan, 3) Bangkholaem, 4) Sathorn, 5) Yannawa, 6) Wattana, 7) Klongtoey, 8) Suanluang, 9) Prakhanong, and 10) Bangna. The Southern Bangkok is combined with the low, medium, and high-density residential neighbourhoods including the commercial areas. (CPD, 2013, Strategy and Evaluation Department, 2014)

4.2.4 Eastern Bangkok

The eastern part of the city has a population of 1,311,430 (23.022% of Bangkok population) with the boundary of square 555.069 kilometres and the population density of 3,187.43 people/km^2. There are nine districts encompassed in this zone, namely, 1) Buengkum, 2) Bangkapi, 3) Prawet, 4) Kannayao, 5) Sapansoong, 6) Klongsamwa, 7) Meenburee, 8) Ladkrabang, and 9) Nongchok. This zone is the largest territory compared to the other zones of Bangkok. It is composed of the low-

density residential neighbourhoods, and the rural and agricultural conservation areas as the majority. Also, some parts of the area are the medium and high-density residential area. The freight and logistic stocks and industrial arcades are located in this zone due to its location linked to the Suvarnabhumi international airport. (CPD, 2013, Strategy and Evaluation Department, 2014)

4.2.5 Northwestern Bangkok (Northern Thonburee)

The northwestern part of Bangkok located on the western bank of Chao Praya River is known as Thonburee area. It contains a population of 806,428 (14.157% of Bangkok population) with the boundary of 99.830 square kilometres and the population density of 9,196.14 people/km^2. There are eight districts encompassed in this zone, namely, 1) Taweewattana, 2) Talingchan, 3) Bangplad, 4) Bangkoknoi, 5) Bangkokyai, 6) Talingchan, 7) Thonburee, and 8)Jomthong. This zone is a combination of the medium and high-density residential neighbourhoods, the industrial arcade, and the rural and agricultural conservation areas. (CPD, 2013, Strategy and Evaluation Department, 2014)

4.2.6 Southwestern Bangkok (Southern Thonburee)

The southwestern part of Bangkok is also located on the western bank of Chao Praya River. This region contains a population of 964,022 (16.923 % of Bangkok population) with the boundary of 300.070 square kilometres and the population density of 4,235.57 people/km^2. There are seven districts encompassed in this zone, namely, 1) Nong Kham, 2) Bangkae, 3) Paseecharoen, 4) Bangbon, 5) Ratburana, 6) Bangkhuntien, and 7) Thungkru. This zone is a combination of the low, medium, and high-density residential neighbourhoods, the rural and agricultural conservation areas, and the industrial arcade. (CPD, 2013, Strategy and Evaluation Department, 2014)

The inner city Bangkok is the primarily concentrated zone of business, commercial, education, entertainment, residential neighbourhoods, and historic conservation area. The urban fringe is the newly developed business zone accommodating outward increasing numbers of business activities. The suburban is

the outer part of Bangkok, where most of the areas are the agricultural region, the factory and freight stock arcades, and derelict lands. (Jiamchaisri, 2006)

According to the decennial population and housing census in 2010, National Statistical Office, Ministry of Information and Communication of Thailand, Bangkok reported a population of 8,305,218 or 12.6 percent of the national population. The density of population is approximately 5,800 persons/km^2 Bangkok is the most cosmopolitan city in Thailand. Regarding the 2010 census, it showed that Bangkok was housing 63,069 Japanese and 71,024 Chinese, 433,027 expatriates from other Asian countries, 88,177 Europeans, 32,241 Americans, 4,830 Australians and 5,758 Africans, and immigrants from neighbouring countries including 216,528 Burmese, 72,934 Cambodians and 52,498 Laos.

By the size of household and the type of dwelling place, there were 2,869,224 households living in Bangkok urban area. The 266,959 households were living in the high-rise buildings, for example, condominium, and mansion, meanwhile 632,497 households are living in flat, apartment, and hostel which some of them were high-rises.

4.3 Dispersion Trend and Law Provisions of High-rise Housing

In accordance with the housing demand and supply analysis from 2013 to 2015 reported by Government Housing Bank (GHB), all through three years, the condominium supply in Bangkok metropolitan and peripheral areas had become the largest proportion of housing types available in the market. The high-rise real estate market ratio was the largest at averagely 55.7% followed by the single house and the semi-detached house consecutively. (Boonyoung, 2015) At the end of June 2015, the condominium supply available in the market had reached up 362,697 units. (The Nation, 2015) Although the annual survey of housing demand from 2012 and 2016 reported that condominium was the second highest demanded-housing type after the single house except in 2013 (See Table 4.2), the volume of new ownership conveyances of the condominium was still the highest one amongst other types of the house both in 2014 and 2015. (Boonyoung, 2015)

Regarding the number of the newly completed and registered high-rise dwelling units in Bangkok Metropolis from 2011 to 2016 reported by the Real Estate Information Centre (REIC), the statistics indicated that there were more than 360,000 high-rise housing units legitimately available in the market. Moreover, the volume of new ownership conveyances from 2011 to 2016 suggested that until now the number of high-rise dwellers is more than 400,000 people (See Table 4.1.)

Table 4.1 The newly completed and registered high-rise dwelling units and the Volume of new ownership conveyances of high-rise dwelling units in Bangkok Metropolitan Area from year 2011 to 2016

Supply Side Information	Dispersion by Year						
	2011	2012	2013	2014	2015	2016	ΔYoY* (%)
Newly completed and registered high-rise dwelling units	45,738	41,250	78,391	69,532	67,516	64,252	-4.83
Volume of new ownership conveyances	59,152	60,291	66,964	75,144	67,311	71,833	6.72

* ΔYoY = % Change which compares 2016 with 2015
Source: Government Housing Bank 2011-2016

The following table reports the results of the surveys from 2012 to 2016, which are relevant to the supply side of the housing market in Bangkok.

Table 4.2 The survey results of the buyers' demanding types of house: 1) Single house, 2) Condominiums, 3) Townhouse, 4) Commercial-rowhouse, and 5) Semi-detached house in the Thai Housing Expo during 2012 to 2016

Buyers' Demanded Types of House	Dispersion by Year				
	2012	2013	2014	2015	2016
Single House	30%**	36%	38%**	39%**	42%**
Condominium	23%	41%**	37%	36%	34%
Townhouse	21%	16%	17%	17%	16%
Commercial-Rowhouse	15%	4%	4%	5%	5%
Semi-detached house	1%	1%	3%	3%	3%

** = The largest proportion each year
Source: Government Housing Bank 2011-2016

When considering the geographical dispersion trend, in 2011, the City Planning Department (CPD) reported that there were the construction permits for 95 buildings or 3,834,128.52 m^2 requested. By zoning, the report also defined that most of the requested building construction sites, 63 buildings 2,743,627.44 m^2 (71.56%)

were in the Eastern inner Bangkok area. The second most area was the Western inner city, 22 buildings, 475,820.90 m^2 (12.41%), following by the third, the Eastern fringe of the city, 446,695.18 (11.65%).

The district, in which the highest number of construction permission requests (19.02%) located, was Huaykwang District. Most of the new constructions were built along the MRT line of Ratchadapisek road. By building height, the 33 buildings or total area of 1,637,280.17 m2, were the 30-39-story buildings. Next on down, 29 buildings (796,524.35 m^2) were 20-29-story buildings, 22 buildings (312,089.22 m2) were 9-19 -story buildings, and 7 buildings (733,475 m^2) were 40-49 -story building. There were two highest buildings requested for construction permits in 2011. One was a 72-story building (109,813 m^2) located in Bangrak district. Another one was a 71-story building (181,062.189 m^2) located in Klongsan district as shown in Figure 4.1 below. (CPD, 2012)

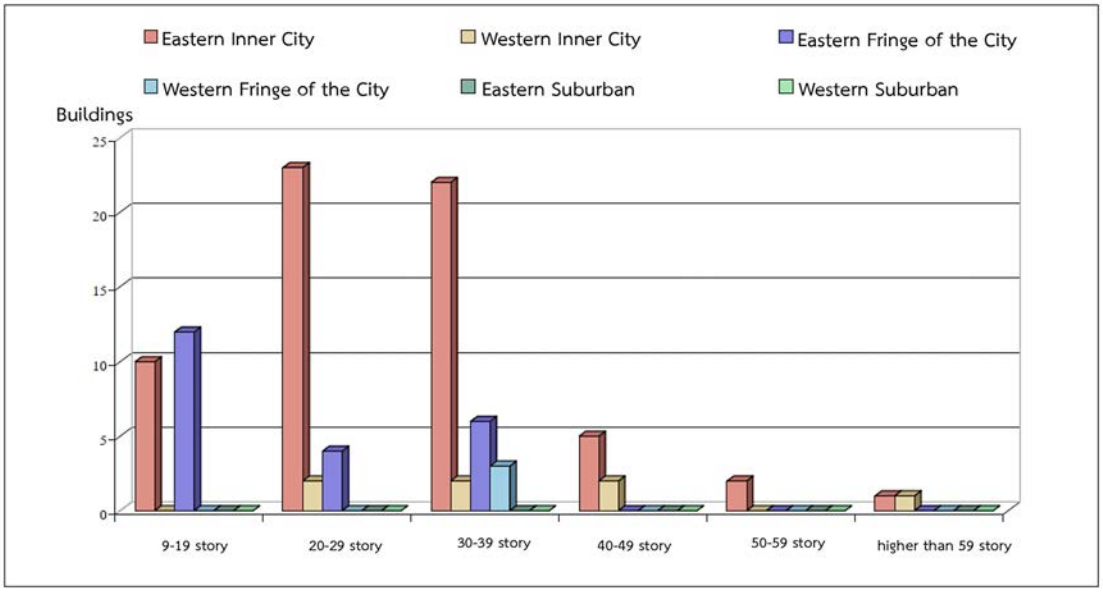


Figure 4.2 The bar chart showing the numbers of construction permit request

Source: City Planning Department (CPD), Bangkok Metropolitan Administer, 2011

Additionally, CPD had made an extended analysis and stated in their report that in the future there would be more residential high-rises sprawl along the Bangkok mass transportation lines, which were under construction at the moment. The mass transportation lines, namely, the Metropolitan Rapid Transit (MRT): Purple line (from Bangsue to Bangyai), Blue line (from Bangsue to Tapra-Hualumpong), and

the Bangkok Mass Transit System (BTS): Light-green line (from On-nut to Bearing), and Green line (extended Silom line). The new transportation routes not only were the primary cause of the massive population daily commuting inbound and outbound, but also the increase of the demand for accommodation, infrastructure, and the safety and security needs. (CPD, 2012)

4.4 Law Provisions Related to High-rise Housing

According to the Building Control Act B.E. 2522 (1979), high-rise residential building refers to the building built for serving temporary or permanent dwelling purpose both in the day-time and night-time, higher than 23 metres, and comprising multi-dwelling units within which bedroom, living room, kitchen, and bathroom are contained.

In Thailand, particularly in Bangkok, there are several codes and acts enacted for the high-rise buildings. In concerning the research questions, the considered law provisions mostly are enforced the building's safety issue. There is no any law provision that imposes the issues of privacy and community for high-rise housing found. The major building codes applied to Thai high-rises' safety are, for example, the Ministerial Regulation Building Act No.33 B.E.2535 (1992), and the Ministerial Regulation Building Act No.48 B.E.2540 (1997) covering the contents below. (CPD, 2012)

4.4.1 Safety control for High-rise building

4.4.1.1 Minimum scope for the fire protection system requires the high-rise building and the sizeable building to install the systems and equipment for safety inside the buildings. These systems and equipment encompass, for instance, fire escape stair and fire exit; sign and illuminated exit sign; smoke control and exhausting smoke system. Moreover, they include the emergency and the generator system; fireman lift; fire alarm system; water supply for fire fighting system; fire hydrant; fire hose and fire pump system; sprinkler system; lightning protection system, etc. (CPD, 2012, Condominium Act B.E. 2522 (1979), 1979)

4.4.1.2 Minimum scope for the safety of building system requires the high-rises to install the building systems to be bearable the effect due to the extension; the modification; and the alteration of building's core. It also includes the change of building load; the change of building usage; the change of construction materials or decoration materials; the wearing and tearing of building; the failure of building's structure; and the subsidence of building foundation, etc. (CPD, 2012, Condominium Act B.E. 2522 (1979), 1979)

4.4.1.3 Minimum scope for the building transportation system and equipment includes facility system; elevator system; escalator system; electrical system; heating and ventilating air conditioning system, and hygiene and environment system. It also includes cold water system; drainage system and sewage treatment system; storm sewer system; solid waste management system; air ventilation system; air and noise pollution control system, etc. (CPD, 2012, Condominium Act B.E. 2522 (1979), 1979)

4.4.2 Ownership of high-rise dwelling unit and common property

According to the Condominium Act B.E. 2522 (1979) as amended 2008, the ownership of the dwelling unit or apartment is indivisible as well as the owner of the apartment has the ownership of the personal property including the joint-ownership in the common property of the building. The owner of the dwelling unit shall not do anything, which might damage the building. It is also a commitment for the unit's owner to be responsible for the price of the common property and the maintenance fee outlined in the application for registration of condominium. (Condominium Act B.E. 2522 (1979), 1979)

4.4.2.1 Condominium manager

Enforcing by law that the juristic condominium shall have one manager who may be an ordinary person or a juristic person. In the case where a manager is a juristic person, such juristic person shall appoint an average ordinary to be the person acting for the juristic person in the capacity as the manager. The condominium's manager has to perform the fundamental duties as follows:

- Resolutely carrying out of the joint-owners general meeting

- In the case of necessity and urgency, the manager has power by his initiative to achieve the business for the safety of condominium as a prudent person should do to his property
- Providing security operations or taking actions in maintaining peace and order within the condominium
- Acting as a representative of the condominium corporate
- Arranging to have a monthly receipt and expenditure account prepared and post it on the bulletin board to inform the joint-owners within fifteen days from the end of the month and that such relevant announcement shall be posted at least for a consecutive period of fifteen days
- Suing for compulsory performance from a joint-owner for overdue payment of expenses more than six months and over (Condominium Act B.E. 2522 (1979), 1979)

4.4.2.2 Condominium corporate committee

According to the Section 37 of the Condominium Act, each condominium must appoint a condominium corporate committee consisting of members of not less than three persons but not exceeding nine persons appointed during the joint-owner general meeting. The members of the committee shall be on duty for two years each term.

On the appointments of the representatives, the manager shall officially register such appointments within thirty days from the date on which the joint-owner general meeting has passed a resolution on such appointments. The board of committee shall elect a member as the board chairman as well as the board vice chairman who have power to perform the following duties:

- Monitoring control over the condominium corporate management,
- Appointing a member acting as the manager in the case of manager's unavailability,

- Arranging the board meeting to be convened at least once every six months. (Condominium Act B.E. 2522 (1979), 1979)

4.4.3 Law provisions for control the urban density and height of building

The City Planning Department (CPD) had defined the regulations for control the urban density and the height of buildings in Bangkok Metropolitan area since 1979. The condominiums participating in this study were constructed based on these laws, which were amended in 2006. The two major urban planning regulations currently applied in Bangkok urban planning for the city's bulk control are as follows: 1) Floor Area Ratio (FAR), 2) Open Space Ratio (OSR). These are the major factors that explain the reason that the residential high-rise building cannot be built in every district of the city. These urban ratios are also differentiated relatively with the land use planning defined by the CPD. (CPD, 2013)

4.4.3.1 Floor Area Ratio (FAR)

FAR refers to the ratio of a building's total floor area to the size of the piece of land, upon which it is built. In general, the FAR value can be calculated by the below formula.

$$\text{FAR} = \frac{\text{Total amount of usable floor area}}{\text{Total plot area}}$$

According to the 2006 land use planning, the restricted FAR ratio of the low-density residential area is various between 1.5 and 3, the medium-density residential area is diverse between 4 and 5, the high-density residential area is various between 6 and 8, and the commercial area is varied between 5 and 10.

4.4.3.2 Open Space Ratio (OSR)

OSR refers to the ratio of an open-space land area to the total area of the entire developed land area. It is to control the required open space according to the floor area and density of a particular area. The following formula can calculate the OSR value.

$$\text{OSR} = \frac{\text{Total amount of open land area}}{\text{Total developed area}}$$

According to the 2006 land use planning, the restricted OSR ratio of the low-density residential area is various between 40% and 10%, the medium-density residential area is diverse between 7.5% and 6%, the high-density residential area is various between 5% and 4%, and the commercial area is varied between 6% and 3%.

The newest provision of the city planning adjusted in 2013 added another urban ratio for securing the green area of the city. This factor is called the Biotope Area Factor (BAF). The formula of BAF is described below. (CPD, 2013)

$$\text{BAF} = \frac{\text{Ecologically} - \text{effective surface areas}}{\text{Total plot area}}$$

CHAPTER 5
THE PHYSICAL ENVIRONMENTAL ASSESSMENT

Chapter Summary

This chapter aims to interpret the information of the physical environment of all residential high-rises participating in this research. By means of the non-participant observation, the Physical Environmental (PE) assessment was applied along with the field survey in order to retrieve the qualitative data related to the context of the urban neighbourhoods and the existing conditions of the condominiums under the predefined conceptual framework of the research as mentioned in the previous chapters. Based on the typological analysis, the physical information of each building was typified into three broad series of 1) defensible characteristic of the building, 2) privacy-supportive characteristic of the building, and 3) communal characteristic of the building.

Afterwards, the narrative data obtained from the field was described along with the photo documents, whereas the physical qualifications of the residential buildings were evaluated and transformed into a psychometric scaled data. At the end of this chapter, the numerical results of the condominiums' physical conditions scoring with the systematic scale (one to five) are explained in comparison with each other to introduce and extensively link to the inferential statistical analysis in the next chapter.

5.1 Conditions and Agreements of Field Survey

During the purposive sampling stage, the residential high-rises participating in this study were selected under the two major criteria stated in the previous chapter. Besides, the last noteworthy condition was that before administrating the field survey, the formal permission from the condominiums' juristic persons must be given and informed to the researcher. The principal terms of the agreement between the researcher and the condominiums' juristic persons are as follows:

- The research team is allowed to administer the questionnaire survey within the perimeter of the property and to perform the non-participant observation in the common area of the property without intrusion towards the private floor and private dwelling units.
- The identifiable information that refers to the condominiums or the residents remains confidential and discloses only to the condominiums' juristic persons and the owner of the information.
- The information provided by the condominiums and their residents is kept confidential and used only for the academic purpose.

5.2 Criteria, Indicators, and Interpretation of the PE Assessment

The Physical Environmental (PE) assessment was operated during the non-participant observation by the researcher. The following items of assessment were theoretically predefined in order to evaluate the physical environment of the purposive sampled buildings including their surroundings context.

5.2.1 Criterion 1: Urban and Community Context

This criterion focuses on the descriptive information about the urban context of each zone including the surrounding and neighbourhood of the condominium. However, some parts of the information serving this criterion were the secondary data obtained from different sources.

Table 5.1 Table of legend for Bangkok city map

No.	Codes	Labels	Descriptions
1.	Yellow Zone		Low-density residential zone
2.	Orange Zone		Medium-density residential zone
3.	Brown Zone		High-density residential zone
4.	Red Zone		Commercial zone
5.	Purple Zone		Industrial zone
6.	Violet Zone		Warehouse zone

No.	Codes	Labels	Descriptions
7.	White and Green Diagonal Zone		Rural and agricultural conservation zone
8.	Green Zone		Rural and agricultural zone
9.	Light Brown Zone		Thai art and cultural conservation zone
10.	Blue Zone		Government institutes, public utilities and amenities zone
11.	Locations		Residential High-rise Buildings
12.	Zoning Line		Six zones of Bangkok

- *Indicator 1: Density of population*

This indicator considers the density of population in the scale of the municipal district. The type of data was the ratio measurable scale and the unit of measurement was persons per square kilometre (persons/ km^2).

- *Indicator 2: City planning and land use zoning*

This indicator considers the urban context and zoning categories of each zone and each municipal district. The type of data is the nominal measurement scale. According to the City Planning Department, Bangkok Metropolitan Administration, the zoning codes and labels are as follows:

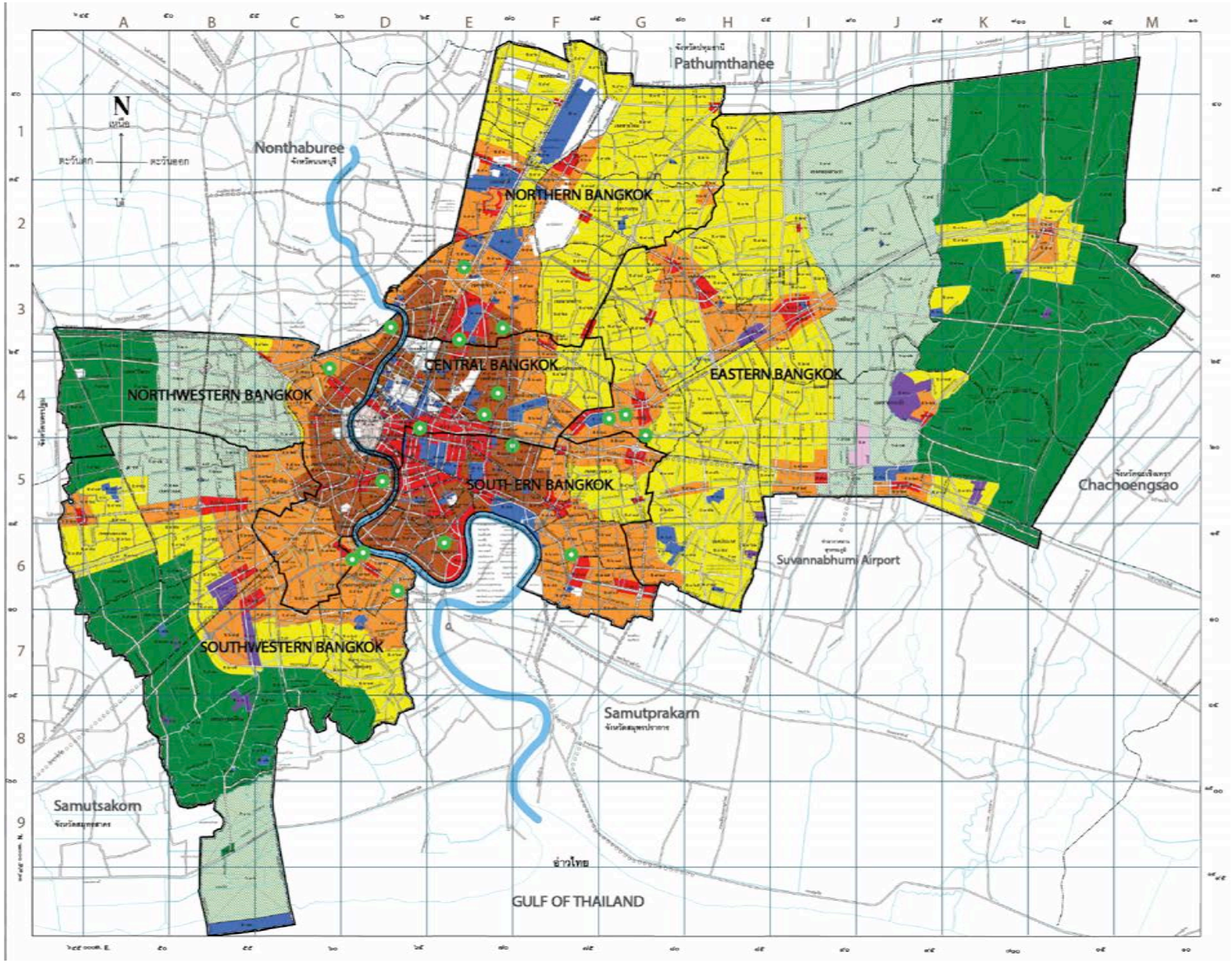


Figure 5.1 The map of Bangkok land used policy, source: The City Planning Department (CP

5.2.2 Criterion 2: Architectural Context

5.2.2.1 Defensible characteristics of the building

This criterion concentrates on the architectural features of the building involving the capacity of maintaining security and safety for its occupants. There are four main indicators to evaluate the existing conditions of the building as follow:

- *Indicator DF01: Access control*

The access control was developed as the indicator for evaluating the capacity of the perimeter securing the condominium's gate, tower, and the dwelling units. The sub-indicators are 1) number of gates, 2) frequency of security check-point, and 3) number of vehicle barriers. The data measured by these indicators was scored and converted to the interval and ratio measurement scales as illustrated in the table below.

Table 5.2 The scoring table of the defensible characteristic's indicators: Indicator DF01: Access control

Sub-indicators	Categories	Scores
• ***Number of gates***	One gate	5
	Two gates	3
	More than two gates	1
• ***Frequency of security check point(s)*** At the following positions: 1) at the gate, 2) at the building entrance, 3) at the elevator, and 4) at the unit door	Have all of them	5
	Have at least 2 check-points	3
	Have at least 1 check-point	1
• ***Number of vehicle barriers***	More than 2 vehicle barriers	5
	1 to 2 vehicle barriers	3
	None	1

- *Indicator DF02: Surveillance*

This indicator refers to 1) manpower surveillance such as security guards, and 2) electronic surveillance devices such as the closed circuit television (CCTV) systems installed for monitoring and recording the visual evidence. The sub-indicators are defined in the table below.

Table 5.3 The scoring table of the defensible characteristic's indicators: Indicator DF02: Surveillance

Sub-indicators	Categories	Scores
• *Number of security guards* (per building)	More than 2 guards	5
	1 to 2 guards	3
	None	1
• *CCTV Installation* At the following position: 1) gate, 2) building entrance, 3) parking space, 4) lobby area, and 5) outdoor area	Have all of them	5
	Have at least 3	3
	Have at least 1 or 2	1

- *Indicator DF03: Territoriality*

This indicator focuses on the clarity of boundary between residents and non-residents. The sub-indicators are 1) level of the barricade and 2) allowance of sharing common and recreational facilities. The scoring is defined in the table below.

Table 5.4 The scoring table of the defensible characteristic's indicators: Indicator DF03: Territoriality

Sub-indicators	Categories	Scores
• *Level of barricade*	Gated community	5
	Semi-gated community	3
	Non-gated community	1
• *Allowance for non-residents to share recreational facilities*	Residents with permission only	5
	Residents and guests no permission needed	3
	Non-residents also allowed	1

- *Indicator DF04: Milieu and juxtaposition*

This indicator considers two issues. The first one is the distance from the condominium to the main road and public transportation, which is advantageous in getting assistance in case of emergency. The second issue involves the chaotic surrounding and heterogeneity of neighbourhoods, which increase safety vulnerability for the residents. The sub-indicators are defined in the table below.

Table 5.5 The scoring table of the defensible characteristic's indicators: Indicator DF04: Milieu and juxtaposition

Sub-indicators	Categories	Scores
• *Walking distance to public transport*	Less than 200 metres	5
	200-500 metres	3
	More than 500 metres	1
• *Chaotic surrounding and heterogeneity*	Low or medium density residential neighbourhood	5
	High density residential neighbourhood	3
	Mix used area & business centre	1
• *Building's Condition Maintenance*	Good	5
	Medium	3
	Bad	1

5.2.2.2 Privacy Supportive characteristics the building

This criterion concentrates on the architectural features of the condominium involving the capacity of supporting the everyday life privacy of the occupants. There are three leading indicators to evaluate this physical condition as follows:

- *Indicator PV01: Number of units per floor*

Table 5.6 The scoring table of the privacy supportive characteristic's indicators: Indicator PV01: Number of units per floor

Indicators	Categories	Scores
• *Number of units per floor*	Less than 15 units per floor	5
	Between 15-24 units per floor	4
	Between 25-34 units per floor	3
	Between 35-44 units per floor	2
	More than 45 units per floor	1

- *Indicator PV02: Typical floor plan*

Table 5.7 The scoring table of the privacy supportive characteristic's indicators: Indicator PV02: Typical floor plan

Indicators	Categories	Scores
• *Typical floor plan*	Single-loaded corridor	5
	Double-loaded corridor	3
	Atrium/ non-corridor	1

- *Indicator PV03: Number of occupants per unit**

Table 5.8 The scoring table of the privacy supportive characteristic's indicators: Indicator PV03: Number of occupant(s) per unit

Indicators	Categories	Scores
• *Number of occupants per unit*	1 person	5
	2-3 persons	3
	More than 3 persons	1

*Personal data separately derived from the PEP questionnaire

5.2.2.3 Communal Characteristic of the building

This criterion concentrates on the architectural features of the condominium involving the capacity of creating the communal atmosphere amongst the occupants. There are two main indicators to evaluate the physical conditions as follows:

- *Indicator CM01: Variety of common and recreational area*

Table 5.9 The scoring table of the communal characteristic's indicators: Indicator CM01: Variety of common and recreational area

Indicators	Categories	Scores
• *Variety of common and recreational areas:* *1) Convenience store, 2) gym room, 3) swimming pool, 4) lobby lounge, 5) garden, 6) library, 7) playground, and 8) others*	Have all of them	5
	Have 6 to 7	4
	Have 4 to 5	3
	Have 1 to 3	2
	Have none	1

- *Indicator CM02: Exposure & Ease of accessibility*

Table 5.10 The scoring table of the communal characteristic's indicators: Indicator CM02: Exposure & Ease of accessibility

Indicators	Categories	Scores
• *Exposure & Ease of accessibility*	Front, middle, or atrium locations	5
	Separated zone or backyard	3
	Private rooftop	1

5.3 Results and Analysis of the PE Assessment

According to the conditions and the agreement of authorisation mentioned above, the final list of the eighteen condominiums participating in this field survey is

defined in the below table. The name of each residential building is systematically coded in order to refer to Bangkok urban zoning and the level of the condominium.

Table 5.11 The table of the coding system for the participating condominiums and number of respondents

Zoning Code		Level of Property Code		Condominium Code	Number of respondents
Northern Bangkok	NB	Low-selling Price	01	**NB01**	70
		Middle-selling Price	02	**NB02**	77
		High-selling Price	03	**NB03**	68
Central Bangkok	CB	Low-selling Price	01	**CB01**	70
		Middle-selling Price	02	**CB02**	71
		High-selling Price	03	**CB03**	59
Southern Bangkok	SB	Low-selling Price	01	**SB01**	62
		Middle-selling Price	02	**SB02**	68
		High-selling Price	03	**SB03**	65
Eastern Bangkok	EB	Low-selling Price	01	**EB01**	60
		Middle-selling Price	02	**EB02**	70
		High-selling Price	03	**EB03**	48
Northwestern Bangkok	NWB	Low-selling Price	01	**NWB01**	71
		Middle-selling Price	02	**NWB02**	70
		High-selling Price	03	**NWB03**	66
Southwestern Bangkok	SWB	Low-selling Price	01	**SWB01**	71
		Middle-selling Price	02	**SWB02**	69
		High-selling Price	03	**SWB03**	71

5.3.1 Zone 1: Northern Bangkok

Urban Characteristics of Northern Bangkok:

The northern part of Bangkok had a population of 1,072,206 (18.82% of Bangkok population) with a boundary of 212.992 square kilometres. It comprised seven districts as follows 1) Bangkaen, 2) Bangsue, 3) Jatujak, 4) Donmuang, 5) Ladproa, 6) Laksi, and 7) Saimai. Most of the areas are the low and medium-density residential neighbourhoods. A few areas are the Government's institutes, public utilities and amenities zones. (CPD, 2013, Strategy and Evaluation Department, 2014)

The map of the Northern Bangkok with land use planning and the locations of the condominiums NB01, NB02, and NB03 are demonstrated in Figure 5.1 page 98, the map of Bangkok and land use policy Section E-3.

5.3.1.1 *Condominium NB01*

Condominium NB01 represented the population of the low selling price condominiums located in Jatujak district, the Northern Bangkok of where the density of population was 4,847 persons/ km^2. This residential compound was located on Prachaniwet Road. The Condominium NB01 was the only one high-rise residential project in the northern area of Bangkok initiated by National Housing Authority. The construction was completed in 1999. The complex comprises three high-rise residential buildings, one 16-storey building, and two 15-storey buildings. The total number of dwelling units was 800. There was also a 9-storey parking building for serving the residents located in the middle of the property. There were two types of dwelling units in this condominium: one-bedroom unit, and two-bedroom unit. The utility space of each unit was varied between 51 - 83 square metres. Although, the original purpose of the project was to support the middle and high-income people in the area, nowadays the selling price of second-hand residential unit of this condominium was decreased.

Figure 5.2 The location and layout plan of Condominium NB01

- *Defensible characteristics of the residential compound*

The location of the Condominium NB01 was more than 15 minutes walking distance from mass transportation. It was adjacent to school, low-rise housing communities and streets. The complex was the semi-gated community, which had five gateways, two gates for vehicle and pedestrian, and three gates for pedestrian, which allowed non-residents to pass through the complex. A supermarket, swimming pool, parking space, and shops were open to public. There was no keycard or residency proof needed to reach its common areas. The security checkpoint and guards were stationed at each building's entrance.

Figure 5.3 The pictures of defensible characteristics of Condominium NB01
(Left) the keycard checkpoint, (Middle) the protection curved steel, (Right) the vehicle barrier

Table 5.12 The defensible characteristic scoring table of the Condominium NB01

NB01				
No.	**Sub-indicators**	**Categories and Scores**		**Results**
Indicator DF01: Access Control				
1.	*Number of gates*	More than 2 gates	1	1
2.	*Frequency of security check point(s)*	Have at least 2 check-points	3	3
3.	*Number of vehicle barriers*	1 to 2 vehicle barriers	3	3
Indicator DF02: Surveillance				
4.	*Number of security guards* (per bldg.)	1 to 2 guards	3	3
5.	*CCTV Installation*	Have at least 3	3	3
Indicator DF03: Territoriality				
6.	*Level of barricade*	Semi-gated community	3	3
7.	*Allowance for non-residents' access*	Non-residents also allowed	1	1
Indicator DF04: Milieu and Juxtaposition				
8.	*Walking distance to public transport*	More than 500 metres	1	1
9.	*Chaotic surrounding and heterogeneity*	Medium or High-density residential ngbhd.	3	3
10	*Building maintenance*	*Medium*	*3*	*3*
			Total Defensible Characteristic Score	**24**
			Average Defensible Characteristic Score	**2.4**

- *Privacy supportive characteristics of the residential compound*

The typical floor plan of the Condominium NB01 was double-loaded corridor type. The number of units per floor was 20.

Figure 5.4 The pictures of privacy supportive characteristics of Condominium NB01 (Left) the building's floor stacking, (Right) the typical floor plan

Table 5.13 The privacy supportive characteristic scoring table of the Condominium NB01

NB01				
No.	Sub-indicators	Categories and Scores		Results
Indicator PV01: Number of units per floor				
1.	*Number of units per floor*	Between 15-24 units per floor	4	4
Indicator PV02: Typical Floor Plan				
2.	*Typical floor plan*	Double-loaded corridor	3	3
		Total Privacy Supportive Score of NB01		**7**
		Average Privacy Supportive Score of NB01		**3.5**

- *Communal characteristics of the residential compound*

The Condominium NB01 had provided various common areas and recreational facilities for the residents, namely, swimming pool, small gym-rooms, garden, playground, retail shops, and supermarket. However, these facilities allowed accessibility by non-residents and the condominium also generated income from letting parking space, and collecting swimming pool fee from non-resident customers. Although, this residential project was initiated and constructed by the National Housing Authority at the beginning, the Condominium NB01 was managed and maintained by its own juristic persons composed of the residential committees and building manager according to the condominium act.

Figure 5.5 The pictures of communal characteristics of Condominium NB01
(Left) the exposure and accessibility of swimming pool, (Right) the restaurant and clubhouse

Table 5.14 The communal characteristic scoring table of Condominium NB01

NB01				
No.	Sub-indicators	Categories and Scores		Results
Indicator CM01: Variety of common and recreational areas				
1.	*Variety of common and recreational areas*	Have 6 to 7	4	4
Indicator CM02: Exposure & Ease of accessibility				
2.	*Exposure & Ease of accessibility*	Front, middle, or atrium locations	5	5
		Total Communal Characteristic Score of NB01		**9**
		Average Communal Characteristic Score of NB01		**4.5**

5.3.1.2 *Condominium NB02*

Condominium NB02 represented the population of the middle selling price condominiums located in Jatujak district, the Northern Bangkok of where the density of population was 4,847 persons/ km^2. This residential compound was located on Sapankwai road. The condominium NB02 was the high-rise residential project operated by a private real estate company. The construction was completed in 2007. The building had two towers sharing the same foundation and low zone platform. Both towers are 29-storey high and the total number of dwelling units was 1,093. There were four types of dwelling units in this project: studio, one-bedroom unit, two-bedroom unit, and three-bedroom unit. The utility space of each unit was varied between 30-90 square metres. The selling price of residential unit was approximately 76,090 baht (approximately €1,902) per square metre.

Figure 5.6 The location and layout plan of Condominium NB02

- *Defensible characteristics of the residential compound*

The opened-front of Condominium NB02 was adjacent to the main road where the city buses were available. The other boundaries were adjacent to low-rise residential neighbourhoods and three-star hotels. The main gateway was to control vehicle's access only while non-residents were allowed to walk into their property. This residential compound is semi-gated community. No keycard or residency proof was needed for getting into retail space and common areas on the ground level. The security checkpoints were at the elevator halls of tower A and tower B. The security guards were stationed at both buildings' entrances.

Figure 5.7 The pictures of defensible characteristics of Condominium NB02
(Left) the vehicle barrier in front of parking space, (Middle) the semi-gated territory, (Right) the green fence

Table 5.15 The defensible characteristic scoring table of the Condominium NB02

NB02				
No.	**Sub-indicators**	**Categories and Scores**		**Results**
Indicator DF01: Access Control				
1.	*Number of gates*	1 gate	5	5
2.	*Frequency of security check point(s)*	Have at least 2 check-points	3	3
3.	*Number of vehicle barriers*	1 to 2 vehicle barriers	3	3
Indicator DF02: Surveillance				
4.	*Number of security guards* (per bldg.)	1 to 2 guards	3	3
5.	*CCTV Installation*	Have all of them	5	5
Indicator DF03: Territoriality				
6.	*Level of barricade*	Semi-gated community	3	3
7.	*Allowance for non-residents' access*	Residents and guests no permission needed	3	3
Indicator DF04: Milieu and Juxtaposition				
8.	*Walking distance to public transport*	Less than 200 metres	5	5
9.	*Chaotic surrounding and heterogeneity*	Medium or High-density residential ngbhd.	3	3
10	*Building maintenance*	Good	5	*5*
		Total Defensible Characteristic Score of NB02		38
		Average Defensible Characteristic Score of NB02		3.8

- *Privacy supportive characteristics of the residential compound*

The typical floor plan of the Condominium NB02 was double-loaded corridor type. The number of units per floor is 22. The I-shape of the building somehow created the long and narrow corridor space on each floor.

Figure 5.8 The pictures of privacy supportive characteristics of Condominium NB02 (Top) the typical floor plan, (Left Below) the semi-gated entrance, (Right Below) the private elevator from the parking floor

Table 5.16 The privacy supportive characteristic scoring table of the Condominium NB02

NB02				
No.	**Sub-indicators**	**Categories and Scores**		**Results**
Indicator PV01: Number of units per floor				
1.	*Number of units per floor*	Between 15-24 units per floor	4	4
Indicator PV02: Typical Floor Plan				
2.	*Typical floor plan*	Double-loaded corridor	3	3
		Total Privacy Supportive Score of NB02		**7**
		Average Privacy Supportive Score of NB02		**3.5**

- *Communal characteristics of the residential compound*

The Condominium NB02 had provided various common areas and recreational facilities for its residents only, namely, swimming pool, gym-rooms, gardens, and playground. Meanwhile, the retail shops, and mini-mart on the ground floor were accessible for non-residents. The condominium also generated income from letting retail spaces to the private investors. According to the law, the juristic person of the Condominium NB01 was composed of the residential committees and the building manager.

Figure 5.9 The pictures of communal characteristics of Condominium NB02
(Left) the daily exercising of the staffs, (Middle) The exclusive swimming pool and clubhouse, (Right) the common area

Table 5.17 The communal characteristic scoring table of Condominium NB02

NB02				
No.	Sub-indicators	Categories and Scores		Results
Indicator CM01: Variety of common and recreational areas				
1.	*Variety of common and recreational areas*	Have all of them	5	5
Indicator CM02: Exposure & Ease of accessibility				
2.	*Exposure & Ease of accessibility*	Separated zone or backyard	3	3
		Total Communal Characteristic Score of NB02		**8**
		Average Communal Characteristic Score of NB02		**4**

5.3.1.3 *Condominium NB03*

Condominium NB03 represented the population of the high selling price condominiums located in Jatujak district, the Northern Bangkok of where the density of population was 4,847 persons/ km^2. This residential compound was located on Ladpro road. The condominium was also the high-rise residential project administered by a private real estate company. The construction was completed in 2011. This condominium was a 32-storey tower, which its low zone was functioning as a parking space. The total number of dwelling units was 457. There were three types of the dwelling units: 1) studio, 2) one-bedroom unit, and 3) two-bedroom unit. The utility space of each unit was varied between 35-70 square metres. The selling price of residential unit was approximately 105,027 baht (approximately €2,625) per square metre.

Figure 5.10 The location and layout plan of Condominium NB03

- *Defensible characteristics of the residential compound*

The front gate of the Condominium NB03 was adjacent to the main road where the city buses were available. The metro station was in three-minute walking distance. The building surrounded by the low-rise housing neighbourhoods and the commercial-residential row houses. This compound was gated property. There were two gateways. Both gates were serving vehicle and in/out walking. The security guards were stationed at every gateway. Residents' guests needed to inform the room number to the guards and to temporarily exchange their identification card in order to get access passes to the lobby. The security checkpoints were at the gateway, entrance of the lobby lounge, and the entrance of elevator hall.

Figure 5.11 The pictures of defensible characteristics of Condominium NB03 (Left) the finger print scanner, (Middle) the reception counter, (Right) the front yard behind the vehicle barrier

Table 5.18 The defensible characteristic scoring table of the Condominium NB03

NB03				
No.	**Sub-indicators**	**Categories and Scores**		**Results**
Indicator DF01: Access Control				
1.	*Number of gates*	2 gates	3	3
2.	*Frequency of security check point(s)*	Have all of them	5	5
3.	*Number of vehicle barriers*	More than 2 vehicle barriers	5	5
Indicator DF02: Surveillance				
4.	*Number of security guards* (per bldg.)	More than 2 guards	5	5
5.	*CCTV Installation*	Have all of them	5	5
Indicator DF03: Territoriality				
6.	*Level of barricade*	Semi-gated community	3	3
7.	*Allowance for non-residents' access*	Residents with permission only	5	5
Indicator DF04: Milieu and Juxtaposition				
8.	*Walking distance to public transport*	Less than 200 metres	5	5
9.	*Chaotic surrounding and heterogeneity*	Medium or High-density residential ngbhd.	3	3
10	*Building maintenance*	Good	5	5
		Total Defensible Characteristic Score of NB03		**46**
		Average Defensible Characteristic Score of NB03		**4.6**

- *Privacy supportive characteristics of the residential compound*

The typical floor plan of this condominium was the double-loaded corridor type. The number of units per floor was 19.

Figure 5.12 The pictures of privacy supportive characteristics of Condominium NB03 (Left) the typical floor plan, (Right) the building's floor stacking

Table 5.19 The privacy supportive characteristic scoring table of the Condominium NB03

NB03			
No.	**Sub-indicators**	**Categories and Scores**	**Results**
Indicator PV01: Number of units per floor			
1.	*Number of units per floor*	Between 15-24 units per floor 4	4
Indicator PV02: Typical Floor Plan			
2.	*Typical floor plan*	Double-loaded corridor 3	3
		Total Privacy Supportive Score of NB03	**7**
		Average Privacy Supportive Score of NB03	**3.5**

- *Communal characteristics of the residential compound*

The Condominium NB03 had provided a few common areas and recreational facilities for the residents only, namely, the rooftop swimming pool, gym-room, and roof garden. According to the condominium act, the juristic person of this condominium was composed of the residential committees and the building managing staffs.

Figure 5.13 The pictures of communal characteristics of Condominium NB03
(Left) the exclusive roof top swimming pool, (Right) the exclusive gym-room

Table 5.20 The communal characteristic scoring table of Condominium NB03

NB03			
No.	**Sub-indicators**	**Categories and Scores**	**Results**
Indicator CM01: Variety of common and recreational areas			
1.	*Variety of common and recreational areas*	Have 4 to 5 3	3
Indicator CM02: Exposure & Ease of accessibility			
2.	*Exposure & Ease of accessibility*	Private floor/ rooftop 1	1
		Total Communal Characteristic Score of NB03	**4**
		Average Communal Characteristic Score of NB03	**2**

5.3.2 Zone 2: Central Bangkok

Urban Characteristics of Central Bangkok:

The central part of Bangkok has a population of 569,471 (12.208% of Bangkok population) with a boundary of 78.921 square kilometres. It comprises of nine districts as follows: 1) Dusit, 2) Payathai, 3) Dindaeng, 4) Huaykwang, 5) Wangtonglang, 6) Pranakorn, 7) Ratchatewee, 8) Pomprabsatrupai, and 9) Sampantawong. Most of the areas are the high-density residential neighbourhoods and the commercial areas. Moreover, a few areas are the locations of the historical and architectural preservation areas and the government's institutes. (CPD, 2013, Strategy and Evaluation Department, 2014)

The map of the Central Bangkok with land use planning and the locations of the condominiums CB01, CB02, and CB03 were demonstrated in Figure 5.1 page 98, the map of Bangkok and land use policy Section D-4 and E-4.

5.3.2.1 *Condominium CB01*

Condominium CB01 represented the population of the low selling price condominiums located in Dindaeng district, of where the density of population was 15,078 persons/ km^2. This residential compound was located on Natong Street, Ratchadapisek road. The Condominium CB01 was the high-rise housing project operated by private real estate companies. The construction was completed in 1992. The complex comprises of two residential buildings. Both buildings were 25-storey buildings. The total number of dwelling units was 1,064. Each building managed by different juristic persons and had its own recreational facilities. Both buildings shared the same main and sub gates. There were three types of dwelling units in this condominium: studio, one-bedroom unit, and two-bedroom unit. The utility space of each unit was varied between 40-70 square metres. The price was approximately 46,250 baht (approximately €1,190) per square metre.

Figure 5.14 The location and layout plan of Condominium CB01

- *Defensible characteristics of the residential compound*

The Condominium CB01 was located amongst the high-density area of low-rise housing neighbourhoods and behind the shopping mall. The front gate of

this compound was adjacent to a narrow street, which was about 7-minute walking distance from the main road. Most of the residents normally walk or ride the motorcycle taxi to connect to the public transport. The compound was semi-gated property. There were three gateways, one gate was for vehicle and pedestrian, two gates were for pedestrian only. The non-residents did not need keycard or residency proof to walk through the compound. The security guards were stationed at the ground floor of each building including the parking space. The security checkpoint was at the entrance of elevator hall.

Figure 5.15 The pictures of defensible characteristics of Condominium CB01
(Left) the semi-gated territory, (Right) the mailbox area

Table 5.21 The defensible characteristic scoring table of the Condominium CB01

CB01				
No.	**Sub-indicators**	**Categories and Scores**		**Results**
Indicator DF01: Access Control				
1.	*Number of gates*	More than 2gates	1	1
2.	*Frequency of security check point(s)*	Have at least 2 check-points	3	3
3.	*Number of vehicle barriers*	1 to 2 vehicle barriers	3	3
Indicator DF02: Surveillance				
4.	*Number of security guards* (per bldg.)	1 to 2 guards	3	3
5.	*CCTV Installation*	Have at least 3	3	3
Indicator DF03: Territoriality				
6.	*Level of barricade*	Semi-gated community	3	3
7.	*Allowance for non-residents' access*	Residents and guests no permission needed	3	3
Indicator DF04: Milieu and Juxtaposition				
8.	*Walking distance to public transport*	200-500 metres	3	3
9.	*Chaotic surrounding and heterogeneity*	Mix used area & business centre	1	1
10	*Building maintenance*	Bad	1	1
		Total Defensible Characteristic Score of CB01		**24**
		Average Defensible Characteristic Score of CB01		**2.4**

- *Privacy supportive characteristics of the residential compound*

The typical floor plan of this condominium was the double-loaded corridor type. The number of units per floor was 26.

Figure 5.16 The pictures of privacy supportive characteristics of Condominium NB03 (Left) the typical floor plan, (Right) the building's floor stacking

Table 5.22 The privacy supportive characteristic scoring table of the Condominium CB01

CB01			
No.	Sub-indicators	Categories and Scores	Results
Indicator PV01: Number of units per floor			
1.	*Number of units per floor*	Between 25-34 units per floor 3	3
Indicator PV02: Typical Floor Plan			
2.	*Typical floor plan*	Double-loaded corridor 3	3
		Total Privacy Supportive Score of CB01	**6**
		Average Privacy Supportive Score of CB01	**3**

- *Communal characteristics of the residential compound*

The condominium CB01 provided a few recreational facilities and common zones for the residents and their guests, namely, swimming pool, gym room, and restaurants, small garden. According to the condominium act, the juristic person of this condominium was composed of the residential committees and the building managing staffs. However, each tower had its own juristic committee.

Figure 5.17 The pictures of communal characteristics of Condominium CB01 (Left) the small garden, (Right) the swimming pool on the fifth floor

Table 5.23 The communal characteristic scoring table of Condominium CB01

CB01			
No.	**Sub-indicators**	**Categories and Scores**	**Results**
Indicator CM01: Variety of common and recreational areas			
1.	*Variety of common and recreational areas*	Have 4 to 5 3	3
Indicator CM02: Exposure & Ease of accessibility			
2.	*Exposure & Ease of accessibility*	Private floor/ rooftop 1	1
		Total Communal Characteristic Score of CB01	**4**
		Average Communal Characteristic Score of CB01	**2**

5.3.2.2 *Condominium CB02*

Condominium CB02 represented the population of the middle selling price condominiums located in Dindaeng district of where the density of population was 15,078 persons/ km^2. This residential compound was located on Dindaeng road. The Condominium CB02 was the high-rise housing project operated by a private real estate company. The construction was completed in 2010. This residential compound comprises of ten residential buildings, six 14-storey buildings, and three 8-storey buildings. The total number of dwelling units was 2,177. There was also a parking building for serving the residents located at the front of the property. There were three types of dwelling units in this condominium: studio, one-bedroom unit, and two-bedroom unit. The utility space of each unit was varied between 35-52.5 square metres. The price was approximately 70,834 baht (approximately €1,837) per square metre.

Figure 5.18 The location and layout plan of Condominium CB02

- *Defensible characteristics of the residential compound*

The Condominium CB02 was located amongst the high-density area of low-rise housing neighbourhoods. The front gate of this compound was adjacent to the main road. This compound was the gated property. There was one gateway, which was for serving vehicle and pedestrian. The non-residents did not need keycard or residency proof to walk into the compound but vehicle drivers needed to temporarily exchange their identification card for the access passes. The security guards were stationed at the main gate ground and walk around the complex. The security checkpoint was at the entrance of elevator hall.

Figure 5.19 The pictures of defensible characteristics of Condominium CB01

(Top Left) the elevator lobby and the keycard checkpoint, (Right) the 15 minutes drop off area for non-resident, (Below) the eastern fence separating the property from neighbourhood

Table 5.24 The defensible characteristic scoring table of the Condominium CB02

CB02				
No.	**Sub-indicators**	**Categories and Scores**		**Results**
Indicator DF01: Access Control				
1.	*Number of gates*	1 gate	5	5
2.	*Frequency of security check point(s)*	Have at least 2 check-points	3	3
3.	*Number of vehicle barriers*	1 to 2 vehicle barriers	3	3
Indicator DF02: Surveillance				
4.	*Number of security guards* (per bldg.)	1 to 2 guards	3	3
5.	*CCTV Installation*	Have at least 3	3	3
Indicator DF03: Territoriality				
6.	*Level of barricade*	Gated community	5	5
7.	*Allowance for non-residents' access*	Residents and guests no permission needed	3	3
Indicator DF04: Milieu and Juxtaposition				
8.	*Walking distance to public transport*	Less than 200 metres	5	5
9.	*Chaotic surrounding and heterogeneity*	Medium or High-density residential ngbhd.	3	3
10	*Building maintenance*	Medium	3	3
		Total Defensible Characteristic Score of CB02		**36**
		Average Defensible Characteristic Score of CB02		**3.6**

- *Privacy supportive characteristics of the residential compound*

The typical floor plan of this condominium was the double-loaded corridor type. The number of units per floor was 18.

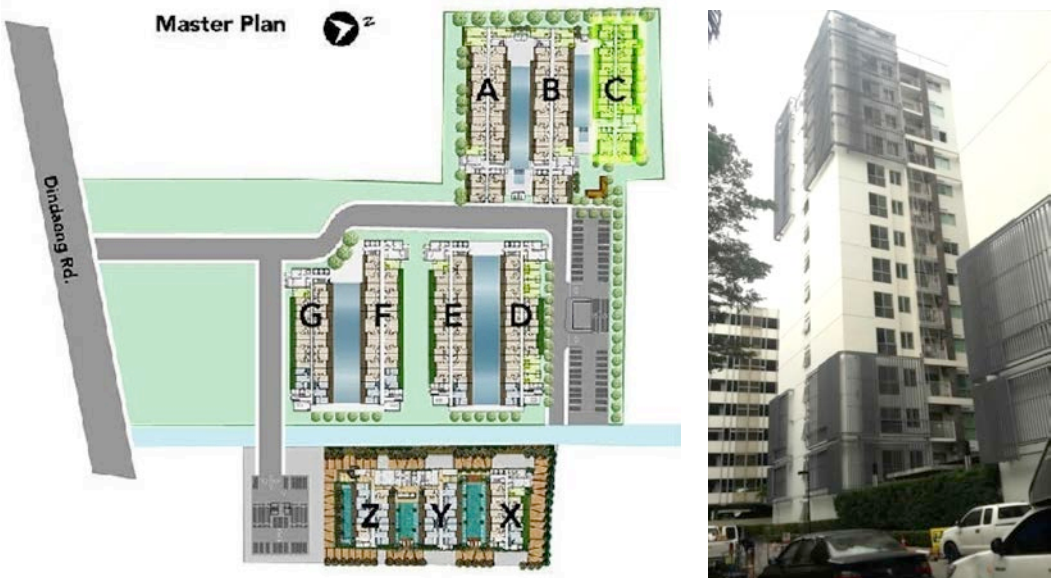


Figure 5.20 The pictures of privacy supportive characteristics of Condominium NB03 (Left) the typical floor plan, (Right) the building's floor stacking

Table 5.25 The privacy supportive characteristic scoring table of the Condominium CB02

CB02				
No.	Sub-indicators	Categories and Scores		Results
Indicator PV01: Number of units per floor				
1.	*Number of units per floor*	Between 15-24 units per floor	4	4
Indicator PV02: Typical Floor Plan				
2.	*Typical floor plan*	Double-loaded corridor	3	3
			Total Privacy Supportive Score of CB02	**7**
			Average Privacy Supportive Score of CB02	**3.5**

- *Communal characteristics of the residential compound*

The Condominium CB02 had provided various common areas and recreational facilities for its residents only, namely, swimming pool, gym-rooms, gardens. Meanwhile, the retail shops, and mini-mart on the ground floor were accessible for non-residents. According to the law, the juristic person of the Condominium CB02 was composed of the residential committees and the building managing staffs.

Figure 5.21 The pictures of communal characteristics of Condominium CB02
(Left) the traffic circulation, (Right) one of the swimming pools located between two towers

Table 5.26 The communal characteristic scoring table of Condominium CB02

CB02				
No.	**Sub-indicators**	**Categories and Scores**		**Results**
Indicator CM01: Variety of common and recreational areas				
1.	*Variety of common and recreational areas*	Have 4 to 5	3	3
Indicator CM02: Exposure & Ease of accessibility				
2.	*Exposure & Ease of accessibility*	Front, middle, or atrium locations	5	5
		Total Communal Characteristic Score of CB02		**8**
		Average Communal Characteristic Score of CB02		**4**

5.3.2.3 *Condominium CB03*

Condominium CB03 represented the population of the high selling price condominiums located in Ratchatewee district of where the density of population was 10,328 persons/ km^2. This residential compound was located on Petchaburee road. The Condominium CB03 was the high-rise housing project operated by a private real estate company. The construction was completed in 2008. There was only one 24-storey building and the total number of dwelling units was 224. The low platform of this building is functioning as a parking space. There were four types of dwelling units in this condominium: studio, one-bedroom unit, two-bedroom unit, and three-bedroom unit. The utility space of each unit was varied between 40-99 square metres. The price was approximately 136,953 baht (approximately €3,533) per square metre.

Figure 5.22 The location and layout plan of Condominium CB02

- *Defensible characteristics of the residential compound*

The front gate of the Condominium CB03 was adjacent to the main road where the city buses were available. The sky-train station was in three-minute walking distance. The building was located amongst the business areas and residential high-rises. This residential compound was gated property. There was only one gateway for serving both vehicle and pedestrian. The security guards were stationed at the gateway and the parking space. The guests with vehicles needed to inform the room number to the guards and to temporarily exchange their identification card in order to get a parking spot, which was quite limited. The guest without vehicle could access to the lobby lounge only. The security checkpoints were at the gateway, the entrance of elevator hall, and inside the elevator.

Figure 5.23 The pictures of defensible characteristics of Condominium CB03

(Top Left) the only one entrance and exit and the 24 hours security guard, (Top Right) the CCTV installed lobby area accessed by non-residents, (Below) the vehicle barrier 24 hrs. Security guard

Table 5.27 The defensible characteristic scoring table of the Condominium CB03

CB03				
No.	**Sub-indicators**	**Categories and Scores**		**Results**
Indicator DF01: Access Control				
1.	*Number of gates*	1 gate	5	5
2.	*Frequency of security check point(s)*	Have all of them	5	5
3.	*Number of vehicle barriers*	1 to 2 vehicle barriers	3	3
Indicator DF02: Surveillance				
4.	*Number of security guards* (per bldg.)	1 to 2 guards	3	3
5.	*CCTV Installation*	Have at least 3	3	3
Indicator DF03: Territoriality				
6.	*Level of barricade*	Gated community	5	5
7.	*Allowance for non-residents' access*	Residents with permission only	5	5
Indicator DF04: Milieu and Juxtaposition				
8.	*Walking distance to public transport*	Less than 200 metres	5	5
9.	*Chaotic surrounding and heterogeneity*	Mix used area & business centre	1	1
10	*Building maintenance*	Good	5	5
		Total Defensible Characteristic Score of CB03		**40**
		Average Defensible Characteristic Score of CB03		**4**

- *Privacy supportive characteristics of the residential compound*

The typical floor plan of this condominium was the double-loaded corridor type. The number of units per floor was 14.

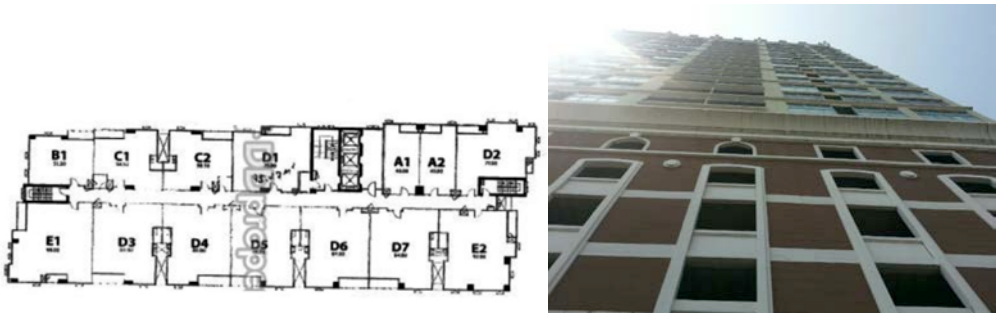


Figure 5.24 The pictures of privacy supportive characteristics of Condominium CB03 (Left) the typical floor plan, (Right) the building's floor stacking

Table 5.28 The privacy supportive characteristic scoring table of the Condominium CB03

CB03			
No.	**Sub-indicators**	**Categories and Scores**	**Results**
Indicator PV01: Number of units per floor			
1.	*Number of units per floor*	Less than 15 units per floor 5	5
Indicator PV02: Typical Floor Plan			
2.	*Typical floor plan*	Double-loaded corridor 3	3
		Total Privacy Supportive Score of CB03	**8**
		Average Privacy Supportive Score of CB03	**4**

- *Communal characteristics of the residential compound*

The Condominium CB03 had provided a few common areas and recreational facilities for the residents only, namely, swimming pool, gym-rooms, and lobby lounge. According to the law, the juristic person of the Condominium CB03 was composed of the residential committees and the building managing staffs.

Figure 5.25 The pictures of communal characteristics of Condominium CB03 (Left) the ground floor common lounge, (Right) the exclusive roof top swimming pool

Table 5.29 The communal characteristic scoring table of Condominium CB03

CB03			
No.	**Sub-indicators**	**Categories and Scores**	**Results**
Indicator CM01: Variety of common and recreational areas			
1.	*Variety of common and recreational areas*	Have 1 to 3 2	2
Indicator CM02: Exposure & Ease of accessibility			
2.	*Exposure & Ease of accessibility*	Private floor/ rooftop 1	1
		Total Communal Characteristic Score of CB03	**3**
		Average Communal Characteristic Score of CB03	**1.5**

5.3.3 Zone 3: Southern Bangkok

Urban Characteristics of Southern Bangkok:

The southern part of Bangkok has a population of 846,888 (14.87% of Bangkok population) with a boundary of 132.776 square kilometres. It comprises of ten districts as follows: 1) Patumwan, 2) Bangrak, 3) Sathorn, 4) Bangkolaem, 5) Yannawa, 6) Klongtoey, 7) Wattana, 8) Suanluang, 9) Prakanong, and 10) Bangna. This zone comprises of the high, medium, and low-density residential neighbourhoods and the areas. Besides, the business areas and the government's institutes are located in some areas of this zone. (CPD, 2013, Strategy and Evaluation Department, 2014)

The map of Southern Bangkok area along with land use planning and the locations of the condominiums SB01, SB02, and SB03 were demonstrated in Figure 5.1 page 98, the map of Bangkok and land use policy Section E-6, F-5, and F-6.

5.3.3.1 *Condominium SB01*

Condominium SB01 represented the population of the low selling price condominiums located in Yannawa district of where the density of population was 4,814 persons/ km^2. This residential compound was located on Bagonganusorn 3 street, Nonsee road. The Condominium SB01 was the high-rise housing project operated by private real estate companies. The construction was completed in 1992. This residential building is 22-storey high. The total number of dwelling units was 814. There were three types of dwelling units in this condominium: studio, one-bedroom unit, and two-bedroom unit. The utility space of each unit was varied between 29.5-83 square metres. The price was approximately 36,220 baht (approximately €934) per square metre.

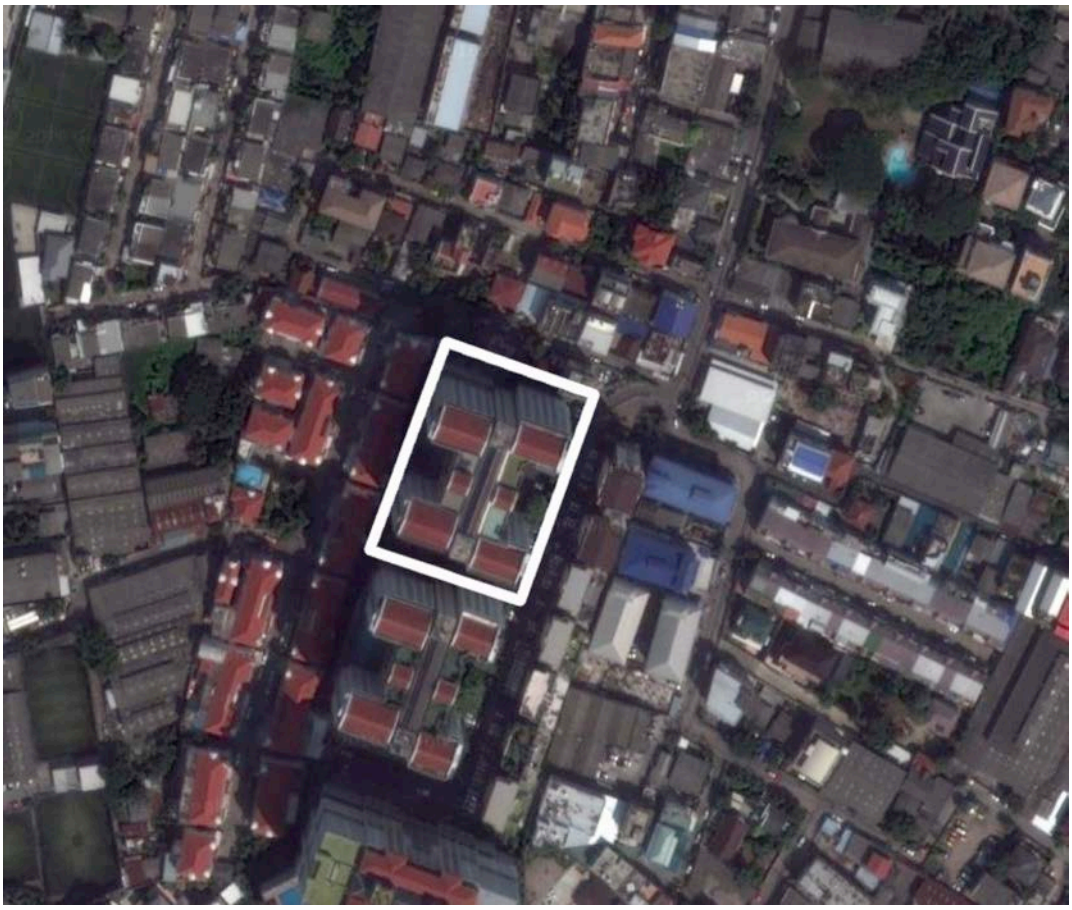


Figure 5.26 The location and layout plan of Condominium SB01

- *Defensible characteristics of the residential compound*

The Condominium SB01 was gated residential complex located on the small street amongst the high-density residential areas. The condominium was ten-minute walking distance from the main road. Most of the residents normally walked or rode the motorcycle taxi to connect to the public transportation. The boundaries of this building were adjacent to office buildings, condominium, and low-rise and row houses. This residential compound was gated property. There was only one gateway for serving both vehicle and pedestrian. The security guards were stationed at the gateway, the parking space, and the front-desk of both elevator lobbies. The guests with vehicles needed to inform the room number to the guards and to temporarily exchange their identification card in order to get a parking spot. The guest without vehicle could access to the lobby lounge only. The security checkpoints were at the gateway, and the entrance of elevator lobby.

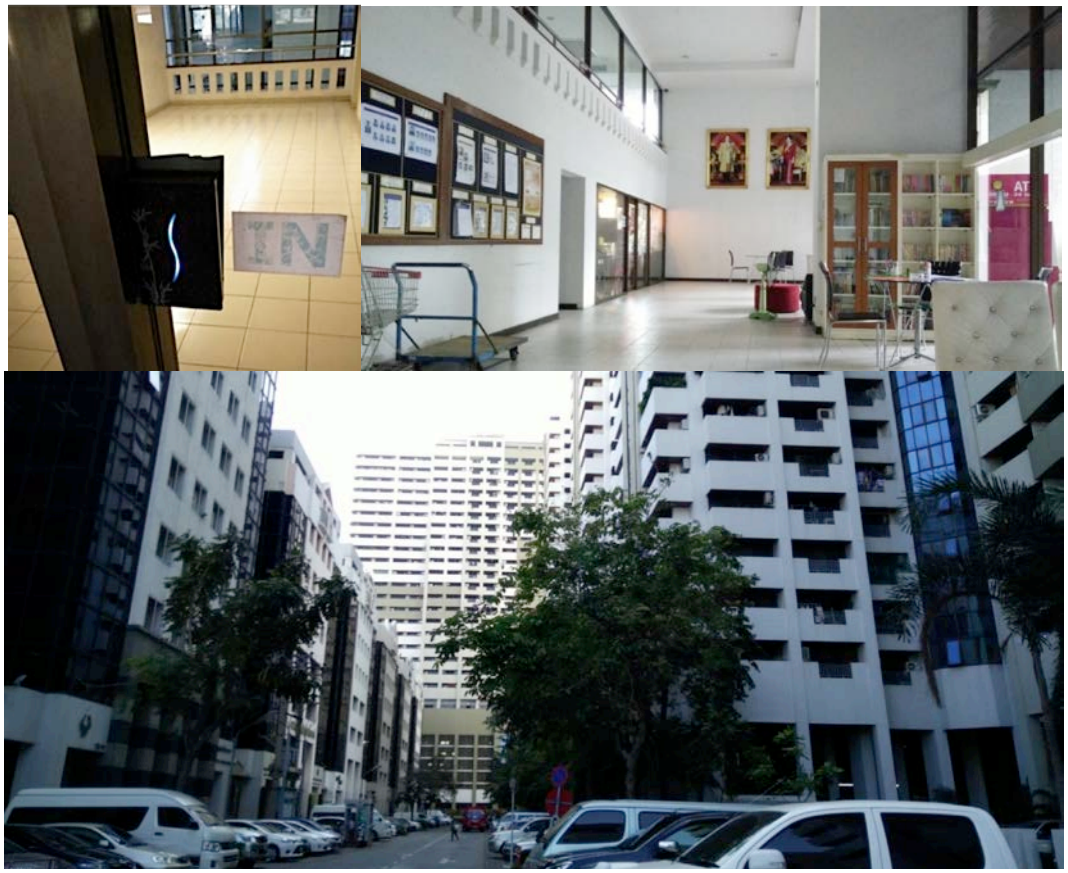


Figure 5.27 The pictures of defensible characteristics of Condominium SB01
(Top Left) the elevator lobby and keycard checkpoint, (Top Right) Lobby area allowed non-residents' accessibility with the 24 hrs. security guard in position, (Below) Gated area adjacent to office buildings and other condominium

Table 5.30 The defensible characteristic scoring table of the Condominium SB01

SB01				
No.	**Sub-indicators**	**Categories and Scores**		**Results**
Indicator DF01: Access Control				
1.	*Number of gates*	1 gate	5	5
2.	*Frequency of security check point(s)*	Have at least 2 check-points	3	3
3.	*Number of vehicle barriers*	1 to 2 vehicle barriers	3	3
Indicator DF02: Surveillance				
4.	*Number of security guards* (per bldg.)	1 to 2 guards	3	3
5.	*CCTV Installation*	Have at least 3	3	3
Indicator DF03: Territoriality				
6.	*Level of barricade*	Gated community	5	5
7.	*Allowance for non-residents' access*	Residents and guests no permission needed	3	3
Indicator DF04: Milieu and Juxtaposition				
8.	*Walking distance to public transport*	More than 500 metres	1	1
9.	*Chaotic surrounding and heterogeneity*	Medium or High-density residential ngbhd.	3	3
10	*Building maintenance*	*Medium*	*3*	3
			Total Defensible Characteristic Score of SB01	**32**
			Average Defensible Characteristic Score of SB01	**3.2**

- *Privacy supportive characteristics of the residential compound*

The typical floor plan of this condominium was the double-loaded corridor type. The number of units per floor was 18.

Figure 5.28 The pictures of privacy supportive characteristics of Condominium NB03 (Left) the building's floor stacking, (Right) the mailbox area

Table 5.31 The privacy supportive characteristic scoring table of the Condominium SB01

SB01				
No.	Sub-indicators	Categories and Scores		Results
Indicator PV01: Number of units per floor				
1.	*Number of units per floor*	Between 15-24 units per floor	4	4
Indicator PV02: Typical Floor Plan				
2.	*Typical floor plan*	Double-loaded corridor	3	3
			Total Privacy Supportive Score of SB01	**7**
			Average Privacy Supportive Score of SB01	**3.5**

- *Communal characteristics of the residential compound*

The Condominium SB01 provided a few recreational and common areas for the residents and guests, namely, swimming pool, gym room, roof garden, and small convenience store. According to the law, the juristic person of the Condominium SB01 was composed of the residential committees and the building managing staffs.

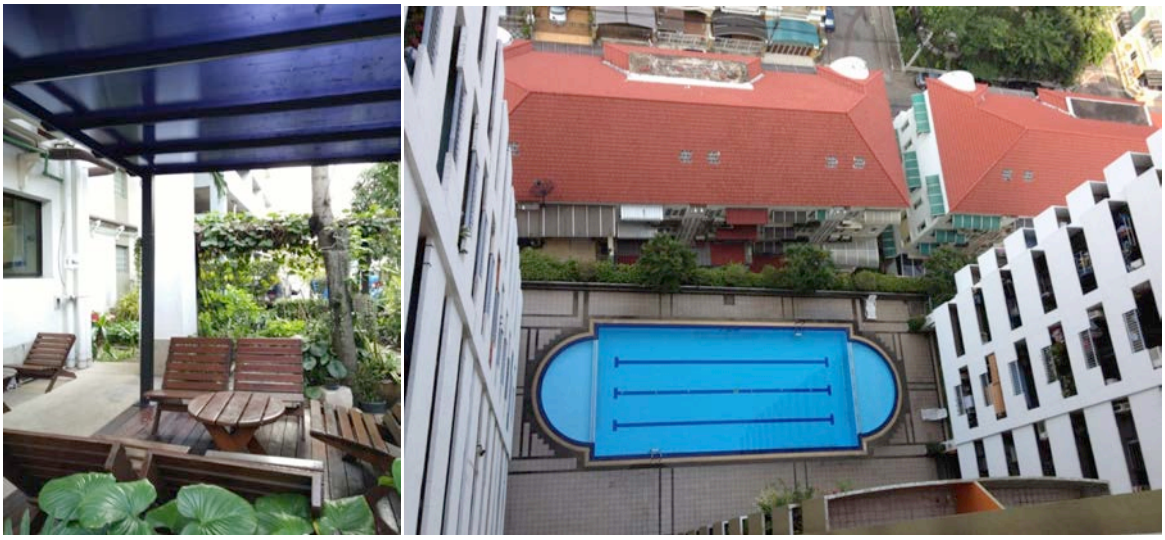


Figure 5.29 The pictures of communal characteristics of Condominium CB02
(Left) the small garden, (Right) the swimming pool located on the low zone's top floor

Table 5.32 The communal characteristic scoring table of Condominium SB01

SB01				
No.	**Sub-indicators**	**Categories and Scores**		**Results**
Indicator CM01: Variety of common and recreational areas				
1.	*Variety of common and recreational areas*	Have 4 to 5	3	3
Indicator CM02: Exposure & Ease of accessibility				
2.	*Exposure & Ease of accessibility*	Private floor/ rooftop	1	1
		Total Communal Characteristic Score of SB01		**4**
		Average Communal Characteristic Score of SB01		**2**

5.3.3.2 *Condominium SB02*

Condominium SB02 represented the population of the middle selling price condominiums located in Wattana district of where the density of population was 6,702 persons/ km^2. This residential compound was located on Soi 39, Sukhumvit road. The Condominium SB02 was the high-rise housing project operated by a private real estate company. The construction was completed in 1996. This residential compound comprises of two towers A and B. Tower A was 23-storey high and contains 200 living units, whereas tower B is 30-storey high and contains 300 living units. The total number of dwelling units was 500. There were three types of dwelling units in this condominium: one-bedroom unit, two-bedroom unit, and three-bedroom unit. The utility space of each unit was varied between 60-125 square metres. The price was approximately 59,843 baht (approximately €1,544) per square metre.

Figure 5.30 The location and layout plan of Condominium SB02

- *Defensible characteristics of the residential compound*

The Condominium SB02 was located amongst the high-density residential neighbourhoods. The opened-front of this residential compound was adjacent to the narrow street. This condominium complex was surrounded by the residential high-rises and the low-rise community malls. There was a main entrance serving vehicle and pedestrian. There were retail shops within the condominium's perimeter, which was serving residents and non-residents as well as the clubhouse of the condominium. The non-residents did not need keycard or residency proof to walk into the compound but vehicle drivers needed to temporarily exchange their identification card for parking lots. The security guards were stationed at the main gate and the front-desks of both buildings. The security checkpoint was at the entrance of elevator hall.

Figure 5.31 The pictures of defensible characteristics of Condominium SB02

(Top Left) the back fence separate from the construction site, (Top Right) the semi-gated allowing non-residents to access clubhouse, (Below) the parking space after the vehicle check

Table 5.33 The defensible characteristic scoring table of the Condominium SB02

SB02				
No.	**Sub-indicators**	**Categories and Scores**		**Results**
Indicator DF01: Access Control				
1.	*Number of gates*	1 gate	5	5
2.	*Frequency of security check point(s)*	Have at least 2 check-points	3	3
3.	*Number of vehicle barriers*	1 to 2 vehicle barriers	3	3
Indicator DF02: Surveillance				
4.	*Number of security guards* (per bldg.)	1 to 2 guards	3	3
5.	*CCTV Installation*	Have at least 3	3	3
Indicator DF03: Territoriality				
6.	*Level of barricade*	Semi-gated community	3	3
7.	*Allowance for non-residents' access*	Non-residents also allowed	1	1
Indicator DF04: Milieu and Juxtaposition				
8.	*Walking distance to public transport*	More than 500 metres	1	1
9.	*Chaotic surrounding and heterogeneity*	Medium or High-density residential ngbhd.	3	3
10	*Building maintenance*	*Medium*	*3*	3
		Total Defensible Characteristic Score of SB02		**28**
		Average Defensible Characteristic Score of SB02		**2.8**

- *Privacy supportive characteristics of the residential compound*

The typical floor plan of this condominium was the double-loaded corridor type. The number of units per floor was 13.

Figure 5.32 The pictures of privacy supportive characteristics of Condominium SB02 (Top) the lobby area and 24 hours security guard, source: www.century21.com, (Below Left) the garden located on the low zone's top floor, (Right) the building's floor stacking

Table 5.34 The privacy supportive characteristic scoring table of the Condominium SB02

SB02				
No.	Sub-indicators	Categories and Scores		Results
Indicator PV01: Number of units per floor				
1.	*Number of units per floor*	Less than 15 units per floor	5	5
Indicator PV02: Typical Floor Plan				
2.	*Typical floor plan*	Double-loaded corridor	3	3
		Total Privacy Supportive Score of SB02		**8**
		Average Privacy Supportive Score of SB02		**4**

- *Communal characteristics of the residential compound*

The Condominium SB02 provided recreational facilities and common areas for the residents and guests, namely, swimming pool, gym room, retail shops, and

small convenience store. According to the law, the juristic person of the Condominium SB01 was composed of the residential committees and the building managing staffs.

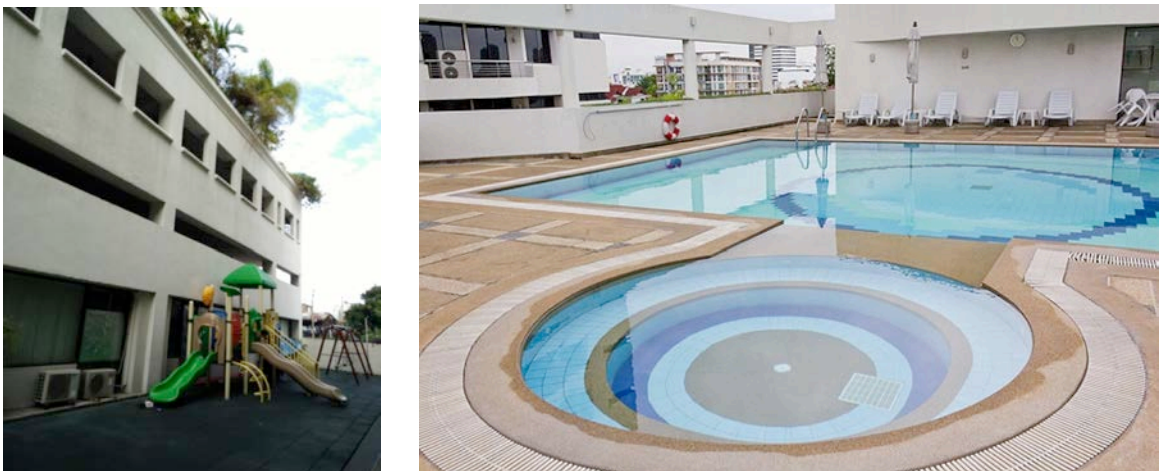


Figure 5.33 The pictures of communal characteristics of Condominium SB02
(Left) the small playground for children, (Right) the swimming pool allowing non-residents' access

Table 5.35 The communal characteristic scoring table of Condominium SB02

SB02			
No.	Sub-indicators	Categories and Scores	Results
Indicator CM01: Variety of common and recreational areas			
1.	*Variety of common and recreational areas*	Have 6 to 7 4	4
Indicator CM02: Exposure & Ease of accessibility			
2.	*Exposure & Ease of accessibility*	Front, middle, or atrium locations 5	5
		Total Communal Characteristic Score of SB02	**9**
		Average Communal Characteristic Score of SB02	**4.5**

5.3.3.3 *Condominium SB03*

Condominium SB03 represented the population of the high selling price condominiums located in Prakanong district of where the density of population was 6,592 persons/ km^2. This residential compound was located on Sukhumvit road. The Condominium SB03 was the high-rise housing project operated by a private real estate company. The construction was completed in 2009. There was only one 22-storey building and the total number of dwelling units was 234. The low platform of this building was functioning as a parking space. There were three types of dwelling units in this condominium: studio, one-bedroom unit, and two-bedroom unit. The utility space of each unit was varied between 31.58-80.79 square metres. The price was approximately 85,000 baht (approximately €2,192) per square metre.

Figure 5.34 The location and layout plan of Condominium SB03

- *Defensible characteristics of the residential compound*

The Condominium SB03 was located in the medium density residential zones. The front gate of the compound was adjacent to the main road where the public buses were available as well as five-minute walking distance from sky-train station. This residential compound was gated property surrounded by low-rise residential neighbourhoods, row houses, small factory, and market. There was only one gateway for serving both vehicle and pedestrian. The security guards were stationed at the gateway and the parking space. The guests with vehicles needed to inform the room number to the guards and to temporarily exchange their identification card in order to get a parking spot. The guest without vehicle could access to the lobby lounge only. The security checkpoints were at the gateway, the entrance of elevator hall, and inside the elevator.

Figure 5.35 The pictures of defensible characteristics of Condominium SB03 (Top) the elevator lobby and the fingerprint scanner checkpoint, (Below Left) the vehicle barrier before parking space entrance with 24 hrs. security guard, (Below Right) the CCTV installed in the lobby area

Table 5.36 The defensible characteristic scoring table of the Condominium SB03

SB03				
No.	**Sub-indicators**	**Categories and Scores**		**Results**
Indicator DF01: Access Control				
1.	*Number of gates*	1 gate	5	5
2.	*Frequency of security check point(s)*	Have all of them	5	5
3.	*Number of vehicle barriers*	1 to 2 vehicle barriers	3	3
Indicator DF02: Surveillance				
4.	*Number of security guards* (per bldg.)	More than 2 guards	5	5
5.	*CCTV Installation*	Have all of them	5	5
Indicator DF03: Territoriality				
6.	*Level of barricade*	Gated community	5	5
7.	*Allowance for non-residents' access*	Residents with permission only	5	5
Indicator DF04: Milieu and Juxtaposition				
8.	*Walking distance to public transport*	Less than 200 metres	5	5
9.	*Chaotic surrounding and heterogeneity*	Medium or High-density residential ngbhd.	3	3
10	*Building maintenance*	Good	5	5
		Total Defensible Characteristic Score of SB03		**46**
		Average Defensible Characteristic Score of SB03		**4.6**

- *Privacy supportive characteristics of the residential compound*

The typical floor plan of this condominium was the double-loaded corridor type. The number of units per floor was 12.

Figure 5.36 The pictures of privacy supportive characteristics of Condominium NB03 (Top) the typical floor plan, (Below Left) the lobby area for non-resident, (Below Right) the building's floor stacking

Table 5.37 The privacy supportive characteristic scoring table of the Condominium SB03

SB03				
No.	**Sub-indicators**	**Categories and Scores**		**Results**
Indicator PV01: Number of units per floor				
1.	*Number of units per floor*	Less than 15 units per floor	5	5
Indicator PV02: Typical Floor Plan				
2.	*Typical floor plan*	Double-loaded corridor	3	3
			Total Privacy Supportive Score of SB03	**8**
			Average Privacy Supportive Score of SB03	**4**

- *Communal characteristics of the residential compound*

The Condominium SB03 provided some recreational facilities and common areas for the residents and guests, namely, swimming pool, gym room, and garden.

According to the law, the juristic person of the Condominium SB03 was composed of the residential committees and the building managing staffs.

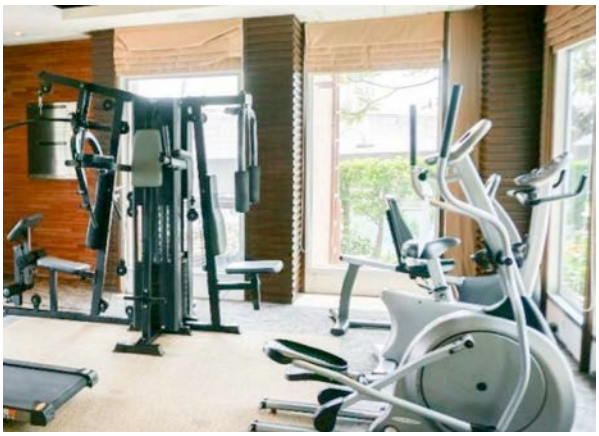



Figure 5.37 The pictures of communal characteristics of Condominium SB03
(Left) the exclusive roof top swimming pool, (Right) the exclusive roof top gym room

Table 5.38 The communal characteristic scoring table of Condominium SB03

SB03			
No.	**Sub-indicators**	**Categories and Scores**	**Results**
Indicator CM01: Variety of common and recreational areas			
1.	*Variety of common and recreational areas*	Have 4 to 5 3	3
Indicator CM02: Exposure & Ease of accessibility			
2.	*Exposure & Ease of accessibility*	Private floor/ rooftop 1	1
		Total Communal Characteristic Score of SB02	**4**
		Average Communal Characteristic Score of SB02	**2**

5.3.4 Zone 4: Eastern Bangkok

Urban Characteristics of Eastern Bangkok:

The eastern part of Bangkok has a population of 1,311,430 (23.02% of Bangkok population) with a boundary of 693.88 square kilometres. It comprises of nine districts as follows: 1) Buengkum, 2) Bangkapi, 3) Prawes, 4) Kannayao, 5) Sapansoong, 6) Klongsamwa, 7) Meenburee, 8) Ladkrabang, and 9) Nongjork. Most of the areas are the low-density residential neighbourhoods, the rural and agricultural land preservation, and the agricultural and rural areas. Moreover, a few areas are the locations of the industrial and storage arcade and the government's institutes. (CPD, 2013, Strategy and Evaluation Department, 2014)

The map of Eastern Bangkok area along with land use planning and the locations of the condominiums EB01, EB02, and EB03 were demonstrated in Figure 5.1 page 98, the map of Bangkok and land use policy Section G-4.

5.3.4.1 *Condominium EB01*

Condominium EB01 represented the population of the low selling price condominiums located in Bangkapi district of where the density of population was 5,227 persons/ km^2. This residential compound was located on Soi 40, Ramkamhaeng road. The Condominium EB01 was the high-rise housing project operated by private real estate companies. The construction was completed in 2004. This residential complex comprises of three 23-storey buildings. The total number of dwelling units was 960. There were three types of dwelling units in this condominium: studio, one-bedroom unit, and two-bedroom unit. The utility space of each unit was varied between 38-93 square metres. The price was approximately 38,208 baht (approximately €985) per square metre.

Figure 5.38 The location and layout plan of Condominium EB01

- *Defensible characteristics of the residential compound*

The Condominium EB01 was located on the street, which was about 15-minute walking distance from the main road where the public transports were available. The complex was surrounded by low-density residential neighbourhoods,

which mostly were low-rise houses. Most of the residents had their own vehicles. The residents who did not have vehicle had to walk, ride taxi, or motorcycle taxi to connect to the main road where the public transports were available. There were vacant low-rise commercial buildings in the property's area. None of them were opened. The south boundary of the complex was adjacent to green wasteland. The security checkpoints were at the main gate where the guests with vehicles needed to inform the room number and building to the guards and to temporarily exchange their identification card in order to get a parking spot. The guest without vehicle could access to the foyer area of the building. The security checkpoint was at the gateway.

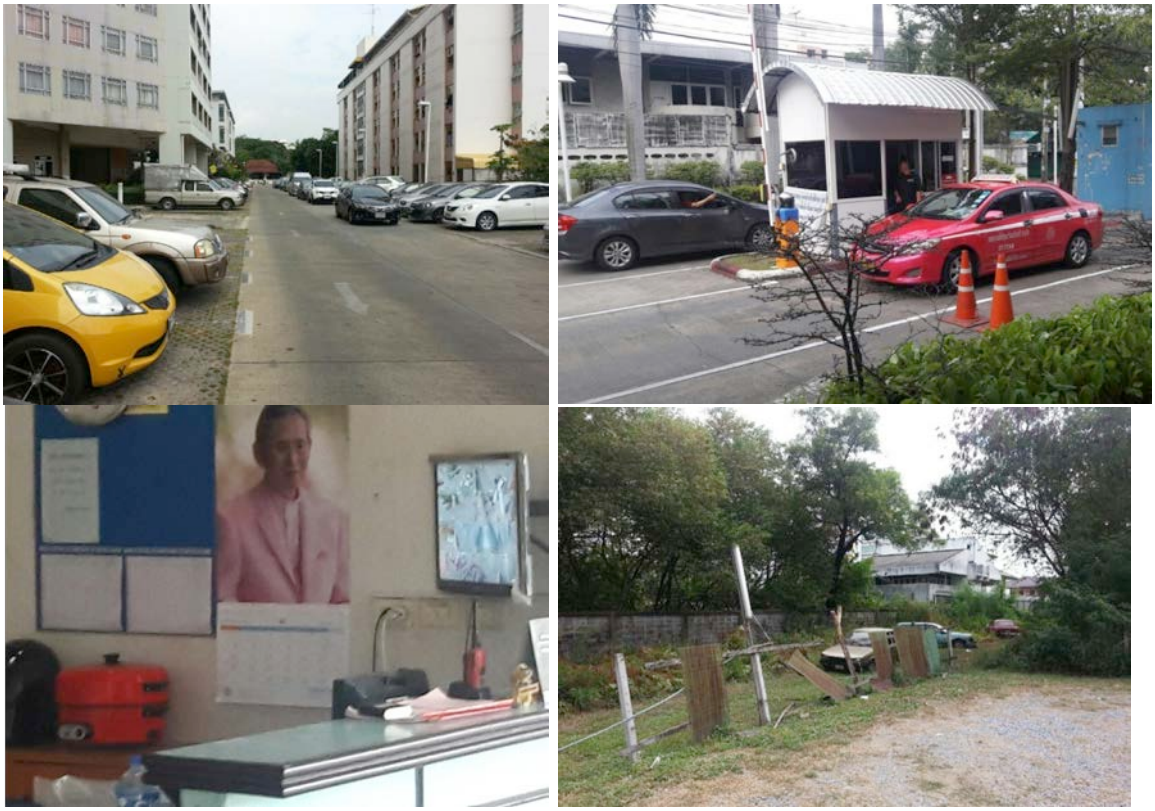


Figure 5.39 The pictures of defensible characteristics of Condominium EB01
(Top Left) the traffic circulation inside the gate, (Top Right) the vehicle barriers and 24 security guard checkpoint, (Below Left) the guards' station, (Below Right) the northern boundary adjacent to derelict land

Table 5.39 The defensible characteristic scoring table of the Condominium EB01

EB01				
No.	**Sub-indicators**	**Categories and Scores**		**Results**
Indicator DF01: Access Control				
1.	*Number of gates*	1 gate	5	5
2.	*Frequency of security check point(s)*	Have at least 2 check-points	3	3
3.	*Number of vehicle barriers*	1 to 2 vehicle barriers	3	3
Indicator DF02: Surveillance				
4.	*Number of security guards* (per bldg.)	1 to 2 guards	3	3
5.	*CCTV Installation*	Have at least 1 or 2	1	1
Indicator DF03: Territoriality				
6.	*Level of barricade*	Gated community	5	5
7.	*Allowance for non-residents' access*	Non-residents also allowed	1	1
Indicator DF04: Milieu and Juxtaposition				
8.	*Walking distance to public transport*	More than 500 metres	1	1
9.	*Chaotic surrounding and heterogeneity*	Medium or High-density residential ngbhd.	3	3
10	*Building maintenance*	Bad	1	1
		Total Defensible Characteristic Score of EB01		**26**
		Average Defensible Characteristic Score of EB01		**2.6**

- *Privacy supportive characteristics of the residential compound*

The typical floor plan of this condominium was the circle single-loaded corridor type. The number of units per floor was 16.

Figure 5.40 The pictures of privacy supportive characteristics of Condominium NB03 (Left) the typical floor plan, (Right) the building's floor stacking of single-loaded corridor atrium

Table 5.40 The privacy supportive characteristic scoring table of the Condominium EB01

EB01				
No.	**Sub-indicators**	**Categories and Scores**		**Results**
Indicator PV01: Number of units per floor				
1.	*Number of units per floor*	Between 15-24 units per floor	4	4
Indicator PV02: Typical Floor Plan				
2.	*Typical floor plan*	Single-loaded corridor	5	5
		Total Privacy Supportive Score of EB01		**9**
		Average Privacy Supportive Score of EB01		**4.5**

- *Communal characteristics of the residential compound*

The Condominium EB01 provided a few recreational and common areas for the residents and guests, namely, garden, and small convenience store. According to the law, the juristic person of the Condominium EB01 was composed of the residential committees and the building managing staffs. Each building had its own juristic committees.

Figure 5.41 The pictures of communal characteristics of Condominium EB01

The common area was the only one recreational facility of EB01

Table 5.41 The communal characteristic scoring table of Condominium EB01

EB01				
No.	**Sub-indicators**	**Categories and Scores**		**Results**
Indicator CM01: Variety of common and recreational areas				
1.	*Variety of common and recreational areas*	Have 1 to 3	2	2
Indicator CM02: Exposure & Ease of accessibility				
2.	*Exposure & Ease of accessibility*	Separated zone or backyard	3	3
			Total Communal Characteristic Score of EB01	**5**
			Average Communal Characteristic Score of EB01	**2.5**

5.3.4.2 *Condominium EB02*

Condominium EB02 represented the population of the middle selling price condominiums located in Bangkapi district of where the density of population was 5,227 persons/ km^2. This residential compound was located on Soi 44, Ramkamhaeng road. The Condominium EB02 was the high-rise housing project operated by a private real estate company. The construction was completed in 2008. This residential compound comprised two towers, A and B. Both towers were 23-storey high. The total number of dwelling units was 827, 404 units of tower A and 409 units of tower

B. There were three types of dwelling units in this condominium: studio, one-bedroom unit, and two-bedroom unit. The utility space of each unit was varied between 30-62 square metres. The price was approximately 59,068 baht (approximately €1,524) per square metre.

Figure 5.42 The location and layout plan of Condominium EB02

- *Defensible characteristics of the residential compound*

The Condominium EB02 was located adjacent to the main road where the public transports were available. The complex was surrounded by medium-density residential neighbourhoods, which mostly were low-rise houses. The compound was the semi-gated community. Non-residents were allowed to walk into the retail spaces of the buildings without residency proof. The security checkpoints were at the main gate where the guests with vehicles needed to inform the room number and building to the guards and to temporarily exchange their identification card in order to get a parking spot. The guest without vehicle could access to the lobby of the building. The security checkpoint was at the gateway and the elevator lobby.

Figure 5.43 The pictures of defensible characteristics of Condominium EB02

(Top Left) the semi-gated corridor to the commercial zone of the building elevator, (Top Right) the vehicle barrier at the drop off area before parking space, (Below Left) the non-gated front yard of the condominium allowing non-residents' access, (Below Right) the lobby area in front of the elevator lobby and keycard check point

Table 5.42 The defensible characteristic scoring table of the Condominium EB02

EB02				
No.	**Sub-indicators**	**Categories and Scores**		**Results**
Indicator DF01: Access Control				
1.	*Number of gates*	2 gates	3	3
2.	*Frequency of security check point(s)*	Have at least 2 check-points	3	3
3.	*Number of vehicle barriers*	More than 2 vehicle barriers	5	5
Indicator DF02: Surveillance				
4.	*Number of security guards* (per bldg.)	1 to 2 guards	3	3
5.	*CCTV Installation*	Have all of them	5	5
Indicator DF03: Territoriality				
6.	*Level of barricade*	Semi-gated community	3	3
7.	*Allowance for non-residents' access*	Residents with permission only	5	5
Indicator DF04: Milieu and Juxtaposition				
8.	*Walking distance to public transport*	Less than 200 metres	5	5
9.	*Chaotic surrounding and heterogeneity*	Medium or High-density residential ngbhd.	3	3
10	*Building maintenance*	Good	5	5
		Total Defensible Characteristic Score of EB02		**40**
		Average Defensible Characteristic Score of EB02		**4**

- *Privacy supportive characteristics of the residential compound*

The typical floor plan of this condominium was the double-loaded corridor type. The number of units per floor was 23.

Figure 5.44 The pictures of privacy supportive characteristics of Condominium NB03

The typical floor plan

Table 5.43 The privacy supportive characteristic scoring table of the Condominium EB02

EB02			
No.	**Sub-indicators**	**Categories and Scores**	**Results**
Indicator PV01: Number of units per floor			
1.	*Number of units per floor*	Between 15-24 units per floor 4	4
Indicator PV02: Typical Floor Plan			
2.	*Typical floor plan*	Double-loaded corridor 3	3
		Total Privacy Supportive Score of EB02	**7**
		Average Privacy Supportive Score of EB02	**3.5**

- *Communal characteristics of the residential compound*

The Condominium EB02 provided various recreational and common areas for the residents and guests, namely, swimming pool, garden, and convenience store, gym-room, library, and retail shops. According to the law, the juristic person of the Condominium EB02 was composed of the residential committees and the building managing staffs.

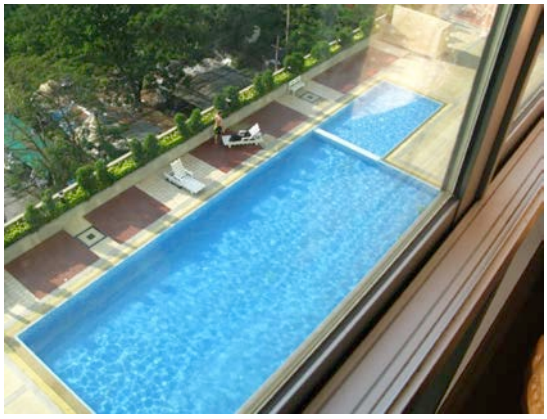



Figure 5.45 The pictures of communal characteristics of Condominium EB02
(Left) the exclusive swimming pool located on the low zone's top floor, (Right) the 24 hours minimart allowing non-residents' access

Table 5.44 The communal characteristic scoring table of Condominium EB02

EB02			
No.	**Sub-indicators**	**Categories and Scores**	**Results**
Indicator CM01: Variety of common and recreational areas			
1.	*Variety of common and recreational areas*	Have all of them 5	5
Indicator CM02: Exposure & Ease of accessibility			
2.	*Exposure & Ease of accessibility*	Private floor/ rooftop 1	1
		Total Communal Characteristic Score of EB02	**6**
		Average Communal Characteristic Score of EB02	**3**

5.3.4.3 *Condominium EB03*

Condominium EB03 represented the population of the high selling price condominiums located in Bangkapi district of where the density of population was 5,227 persons/ km^2. This residential compound was located on Srinakarin road. The Condominium EB03 was the high-rise housing project operated by a private real estate company. The construction was completed in 2008. There was a 26-storey building and the total number of dwelling units was 470. The low platform and underground level of this building are functioning as a parking space. There were four types of dwelling units in this condominium: one-bedroom unit, two-bedroom unit, three-bedroom unit, and duplex. The utility space of each unit was varied between 68.2-146.04 square metres. The price was approximately 93,703 baht (approximately €2,417) per square metre.

Figure 5.46 The location and layout plan of Condominium EB03

- *Defensible characteristics of the residential compound*

The Condominium EB03 was located adjacent to the main road where the public transports were available. The complex was surrounded by medium-density residential neighbourhoods, which mostly were low-rise houses. The compound was the semi-gated community, which located behind the 4-star hotel owned by the same company. Non-residents were allowed to walk into the retail spaces of the buildings without residency proof. The security checkpoints were at the main gate where the guests with vehicles needed to inform the room number and building to the guards and to temporarily exchange their identification card in order to get a parking spot. The guest without vehicle could access to the lobby of the building. The security checkpoint was at the gateway, the elevator lobby, and in the elevator.

Figure 5.47 The pictures of defensible characteristics of Condominium EB03
(Top Left) Parking space after parking card checking at the vehicle barrier, (Top Right) the retail space on the ground floor allowing non-residents' access, (Below) the CCTV installed lobby area

Table 5.45 The defensible characteristic scoring table of the Condominium EB03

EB03				
No.	**Sub-indicators**	**Categories and Scores**		**Results**
Indicator DF01: Access Control				
1.	*Number of gates*	2 gates	3	3
2.	*Frequency of security check point(s)*	Have all of them	5	5
3.	*Number of vehicle barriers*	More than 2 vehicle barriers	5	5
Indicator DF02: Surveillance				
4.	*Number of security guards* (per bldg.)	1 to 2 guards	3	3
5.	*CCTV Installation*	Have all of them	5	5
Indicator DF03: Territoriality				
6.	*Level of barricade*	Semi-gated community	3	3
7.	*Allowance for non-residents' access*	Residents with permission only	5	5
Indicator DF04: Milieu and Juxtaposition				
8.	*Walking distance to public transport*	Less than 200 metres	5	5
9.	*Chaotic surrounding and heterogeneity*	Medium or High-density residential ngbhd.	3	3
10	*Building maintenance*	Good	5	5
		Total Defensible Characteristic Score of EB03		**42**
		Average Defensible Characteristic Score of EB03		**4.2**

- *Privacy supportive characteristics of the residential compound*

The typical floor plan of this condominium was the double-loaded corridor type. The number of units per floor was 24.

Figure 5.48 The pictures of privacy supportive characteristics of Condominium EB03 (Left) the building's floor stacking, (Right) the typical floor plan

Table 5.46 The privacy supportive characteristic scoring table of the Condominium EB03

EB03				
No.	**Sub-indicators**	**Categories and Scores**		**Results**
Indicator PV01: Number of units per floor				
1.	*Number of units per floor*	Between 15-24 units per floor	4	4
Indicator PV02: Typical Floor Plan				
2.	*Typical floor plan*	Double-loaded corridor	3	3
			Total Privacy Supportive Score of EB03	**7**
			Average Privacy Supportive Score of EB03	**3.5**

- *Communal characteristics of the residential compound*

The Condominium EB03 provided various recreational and common areas for the residents and guests, namely, swimming pool, garden, and convenience store, gym-room, and retail shops. According to the law, the juristic person of the Condominium EB03 was composed of the residential committees and the building managing staffs.

Figure 5.49 The pictures of communal characteristics of Condominium EB03
(Left) the semi-gated front yard, (Right) the exclusive swimming pool located on the low zone's top floor

Table 5.47 The communal characteristic scoring table of Condominium EB03

EB03			
No.	**Sub-indicators**	**Categories and Scores**	**Results**
Indicator CM01: Variety of common and recreational areas			
1.	*Variety of common and recreational areas*	Have 4 to 5 3	3
Indicator CM02: Exposure & Ease of accessibility			
2.	*Exposure & Ease of accessibility*	Private floor/ rooftop 1	1
		Total Communal Characteristic Score of EB03	**4**
		Average Communal Characteristic Score of EB03	**2**

5.3.5 Zone 5: Northwestern Bangkok (Northern Thonburee)

Urban Characteristics of Northwestern Bangkok:

The northwestern part of Bangkok (Northern Thonburee) has a population of 806,428 (14.16% of Bangkok population) with a boundary of 150.049 square kilometres. It comprises of eight districts as follows: 1) Thaweewattana, 2) Talingchan, 3) Bangplad, 4) Bangkoknoi, 5) Bangkokyai, 6) Klongsan, 7) Thonburee, and 8) Jomtong. This zone contains the high and medium-density residential neighbourhoods, the rural and agricultural land preservation, and the agricultural and rural areas. A few areas are the locations of the historical and architectural preservation areas. (CPD, 2013, Strategy and Evaluation Department, 2014)

The map of Northwestern Bangkok or Northern Thonburee area along with land use planning and the locations of the condominiums NWB01, NW02, and NW03 were demonstrated in Figure 5.1 page 98, the map of Bangkok and land use policy Section D-3, C-4, and D-5.

5.3.5.1 *Condominium NWB01*

Condominium NWB01 represented the population of the low selling price condominiums located in Bangplad district of where the density of population was 8,405 persons/ km^2. This residential compound was located on Jarunsanitwong road. The Condominium NWB01 was the high-rise housing project operated by private real estate company. The construction was completed in 2010. This residential complex comprises of three 28-storey buildings. The total number of dwelling units was 1000. There were two types of dwelling units in this condominium: studio and one-bedroom unit. The utility space of each unit was varied between 29-44 square metres. The price was approximately 47,657 baht (approximately €1,230) per square metre.

Figure 5.50 The location and layout plan of Condominium NWB01

- *Defensible characteristics of the residential compound*

The front gate of the Condominium NWB01 was located adjacent to the main road where the public transports were available. The complex was surrounded by high-density residential neighbourhoods, which mostly were low-rise houses. There were low-rise residential buildings developed by the same real estate

company located in the same perimeter. The southern boundary was adjacent to the wasteland. The security checkpoints were at the main gate where the guests with vehicles needed to inform the room number and building to the guards and to temporarily exchange their identification card in order to get a parking spot. The guest without vehicle could access to the retail area at the ground floor of the building. The security checkpoint was at the gateway and the lobby lounge.

Figure 5.51 The pictures of defensible characteristics of Condominium NWB01
(Left) the low zone parking space, (Middle) the vehicle barriers at parking space entrance and exit with 24 hours security guard at the gate, (Right) the CCTV installed in the lobby area

Table 5.48 The defensible characteristic scoring table of the Condominium NWB01

NWB01				
No.	**Sub-indicators**	**Categories and Scores**		**Results**
Indicator DF01: Access Control				
1.	*Number of gates*	1 gate	5	5
2.	*Frequency of security check point(s)*	Have at least 2 check-points	3	3
3.	*Number of vehicle barriers*	1 to 2 vehicle barriers	3	3
Indicator DF02: Surveillance				
4.	*Number of security guards* (per bldg.)	1 to 2 guards	3	3
5.	*CCTV Installation*	Have at least 3	3	3
Indicator DF03: Territoriality				
6.	*Level of barricade*	Gated community	5	5
7.	*Allowance for non-residents' access*	Residents and guests no permission needed	3	3
Indicator DF04: Milieu and Juxtaposition				
8.	*Walking distance to public transport*	Less than 200 metres	5	5
9.	*Chaotic surrounding and heterogeneity*	Medium or High-density residential ngbhd.	3	3
10	*Building maintenance*	Good	5	5
		Total Defensible Characteristic Score of NWB01		**38**
		Average Defensible Characteristic Score of NWB03		**3.8**

- *Privacy supportive characteristics of the residential compound*

The typical floor plan of this condominium was the double-loaded

corridor type. The number of units per floor was 35.

Figure 5.52 The pictures of privacy supportive characteristics of Condominium NWB01
The typical floor plan

Table 5.49 The privacy supportive characteristic scoring table of the Condominium NWB01

NWB01			
No.	**Sub-indicators**	**Categories and Scores**	**Results**
Indicator PV01: Number of units per floor			
1.	*Number of units per floor*	Between 35-44 units per floor 2	2
Indicator PV02: Typical Floor Plan			
2.	*Typical floor plan*	Double-loaded corridor 3	3
		Total Privacy Supportive Score of NWB01	**5**
		Average Privacy Supportive Score of NWB01	**2.5**

- *Communal characteristics of the residential compound*

The Condominium NWB01 provided various recreational and common areas for the residents and guests, namely, swimming pool, garden, and convenience store, gym-room, and retail shops. According to the law, the juristic person of the Condominium NWB01 was composed of the residential committees and the building managing staffs.

Figure 5.53 The pictures of communal characteristics of Condominium NWB03
(Left) the separated swimming pool, (Right) the common area for the resident and non-resident

Table 5.50 The communal characteristic scoring table of Condominium NWB01

NWB01				
No.	**Sub-indicators**	**Categories and Scores**		**Results**
Indicator CM01: Variety of common and recreational areas				
1.	*Variety of common and recreational areas*	Have 4 to 5	3	3
Indicator CM02: Exposure & Ease of accessibility				
2.	*Exposure & Ease of accessibility*	Separated zone or backyard	3	3
			Total Communal Characteristic Score of EB03	**6**
			Average Communal Characteristic Score of EB03	**3**

5.3.5.2 *Condominium NWB02*

Condominium NWB02 represented the population of the middle selling price condominiums located in Bangplad district of where the density of population was 8,405 persons/ km^2. This residential compound was located on Baromratchonnee road. The Condominium NWB02 was the high-rise housing project operated by private real estate company. The construction was completed in 2011. This residential compound comprises of two buildings. Both buildings are 30-storey high. The total number of dwelling units was 2707. There was only one type of dwelling provided for the residents, which is studio type dwelling unit. The utility space of each unit was varied between 28-36 square metres. The low zone of the building (1^{st} floor to 5^{th} floor) is functioning as a parking space. The price was approximately 78,843 baht (approximately €2,034) per square metre.

Figure 5.54 The location and layout plan of Condominium NWB02

- *Defensible characteristics of the residential compound*

The opened-front of the Condominium NWB02 was located adjacent to the main road where the public transports were available. The complex was surrounded by medium-density residential neighbourhoods, which mostly were low-rise houses. This condominium was semi-gated community. The non-residents could walk through the front yard to the convenience store. The security checkpoints were at the main gate where the guests with vehicles needed to inform the room number and building to the guards and to temporarily exchange their identification card in order to get a parking spot. The guest without vehicle could access to the retail area at the ground floor of the building. The security checkpoint was at the gateway and the elevator lobby.

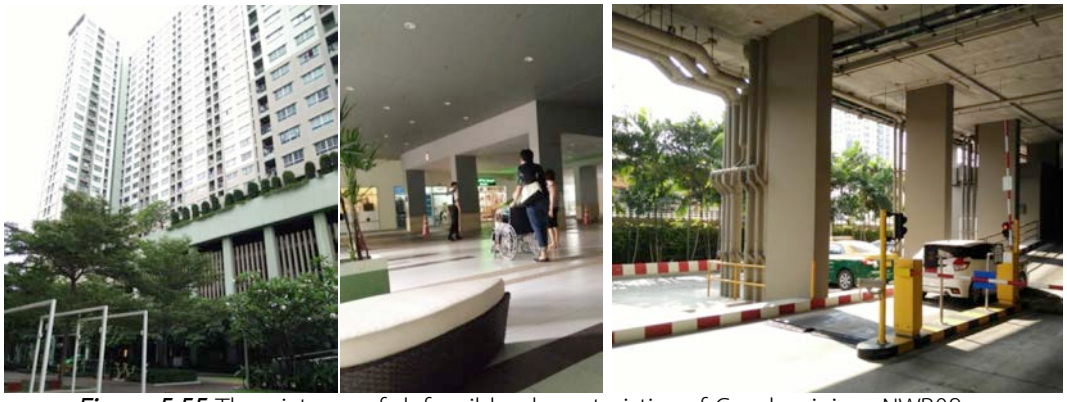


Figure 5.55 The pictures of defensible characteristics of Condominium NWB02 (Left) the semi-gated garden located between two towers, (Middle) the CCTV installed lobby area allowing non-residents' access, (Right) the vehicle barriers before parking space entrance and exit with 24 hrs security guards

Table 5.51 The defensible characteristic scoring table of the Condominium NWB02

NWB02				
No.	**Sub-indicators**	**Categories and Scores**		**Results**
Indicator DF01: Access Control				
1.	*Number of gates*	1 gate	5	5
2.	*Frequency of security check point(s)*	Have at least 2 check-points	3	3
3.	*Number of vehicle barriers*	More than 2 vehicle barriers	5	5
Indicator DF02: Surveillance				
4.	*Number of security guards* (per bldg.)	1 to 2 guards	3	3
5.	*CCTV Installation*	Have all of them	5	5
Indicator DF03: Territoriality				
6.	*Level of barricade*	Semi-gated community	3	3
7.	*Allowance for non-residents' access*	Residents and guests no permission needed	3	3
Indicator DF04: Milieu and Juxtaposition				
8.	*Walking distance to public transport*	Less than 200 metres	5	5
9.	*Chaotic surrounding and heterogeneity*	Medium or High-density residential ngbhd.	3	3
10	*Building maintenance*	Good	5	5
		Total Defensible Characteristic Score of NWB02		**40**
		Average Defensible Characteristic Score of NWB02		**4**

- *Privacy supportive characteristics of the residential compound*

The typical floor plan of this condominium was the double-loaded corridor type. The number of units per floor was 54.

Figure 5.56 The pictures of privacy supportive characteristics of Condominium NWB02
The typical floor plan

Table 5.52 The privacy supportive characteristic scoring table of the Condominium NWB02

NWB02				
No.	**Sub-indicators**	**Categories and Scores**		**Results**
Indicator PV01: Number of units per floor				
1.	*Number of units per floor*	More than 45 units per floor	1	1
Indicator PV02: Typical Floor Plan				
2.	*Typical floor plan*	Double-loaded corridor	3	3
			Total Privacy Supportive Score of NWB02	**4**
			Average Privacy Supportive Score of NWB02	**2**

- *Communal characteristics of the residential compound*

The Condominium NWB02 provided various recreational facilities and common areas for the residents and guests, namely, swimming pool, garden, convenience store, gym-room, library, and retail shops. According to the law, the juristic person of the Condominium NWB02 was composed of the residential committees and the building managing staffs.

Figure 5.57 The pictures of communal characteristics of Condominium NWB02
(Top Left) the large garden between two towers, (Top Right) the playground,
(Below Left) the private swimming pool on the low zone's top floor, (Below Right) the library

Table 5.53 The communal characteristic scoring table of Condominium NWB02

NWB02				
No.	**Sub-indicators**	**Categories and Scores**		**Results**
Indicator CM01: Variety of common and recreational areas				
1.	*Variety of common and recreational areas*	Have all of them	5	5
Indicator CM02: Exposure & Ease of accessibility				
2.	*Exposure & Ease of accessibility*	Front, middle, or atrium locations	5	5
		Total Communal Characteristic Score of NWB03		**10**
		Average Communal Characteristic Score of NWB03		**5**

5.3.5.3 *Condominium NWB03*

Condominium NWB03 represented the population of the high selling price condominiums located in Klongsan district of where the density of population was 12,361 persons/ km^2. This residential compound was located on Jaroennakorn road. The Condominium NWB03 was the high-rise housing project operated by private real estate company. The construction was completed in 2009. This residential high-rise is a 30-storey building. The total number of dwelling units was 297. There were five types of dwelling unit provided for the residents, namely, studio, one-bedroom unit, two-bedroom unit, three-bedroom unit, and penthouse. The utility space of each

unit was varied between 33.27-134.77 square metres. The low zone of the building (1st floor to 8th floor) is functioning as parking and commercial space. The price was approximately 99,925 baht (approximately €2,577) per square metre.

Figure 5.58 The location and layout plan of Condominium NWB03

- *Defensible characteristics of the residential compound*

The Condominium NWB03 was located adjacent to the main road where the public transports were available. The complex was surrounded by high-density residential neighbourhoods, which mostly were low-rise houses. The compound was the semi-gated community. Its low zone was accessible for non-residents who were the commercial zone's customer. Non-residents were allowed to walk into the retail spaces of the buildings without residency proof. The security checkpoints were at the main gate where the guests with vehicles needed to inform the room number and building to the guards and to temporarily exchange their identification card in order to get a parking spot. The non-residents without keycard could not access to the lobby of the resident area. The security checkpoint was at the gateway, the lobby, and in the elevator.

Figure 5.59 The pictures of defensible characteristics of Condominium NWB03

(Left) the residential zone located on the high zone of the building, (Middle) the retail shops and restaurant allowing non-residents' access, (Right) the elevator lobby and the fingerprint scanner checkpoint with the CCTVs and 24 hrs. security guards

Table 5.54 The defensible characteristic scoring table of the Condominium NWB03

NWB03				
No.	**Sub-indicators**	**Categories and Scores**		**Results**
Indicator DF01: Access Control				
1.	*Number of gates*	2 gates	3	3
2.	*Frequency of security check point(s)*	Have all of them	5	5
3.	*Number of vehicle barriers*	More than 2 vehicle barriers	5	5
Indicator DF02: Surveillance				
4.	*Number of security guards* (per bldg.)	More than 2 guards	5	5
5.	*CCTV Installation*	Have all of them	5	5
Indicator DF03: Territoriality				
6.	*Level of barricade*	Semi-gated community	3	3
7.	*Allowance for non-residents' access*	Residents with permission only	5	5
Indicator DF04: Milieu and Juxtaposition				
8.	*Walking distance to public transport*	Less than 200 metres	5	5
9.	*Chaotic surrounding and heterogeneity*	Medium or High-density residential ngbhd.	3	3
10	*Building maintenance*	Good	5	5
		Total Defensible Characteristic Score of NWB03		**44**
		Average Defensible Characteristic Score of NWB03		**4.4**

- *Privacy supportive characteristics of the residential compound*

The typical floor plan of this condominium was the double-loaded corridor type. The number of units per floor was 16.

Figure 5.60 The pictures of privacy supportive characteristics of Condominium NWB03 (Left) the typical floor plan, (Right) the CCTVs installed lobby area for guests' access

Table 5.55 The privacy supportive characteristic scoring table of the Condominium NWB03

NWB03			
No.	**Sub-indicators**	**Categories and Scores**	**Results**
Indicator PV01: Number of units per floor			
1.	*Number of units per floor*	Between 15-24 units per floor 4	4
Indicator PV02: Typical Floor Plan			
2.	*Typical floor plan*	Double-loaded corridor 3	3
		Total Privacy Supportive Score of NWB01	**7**
		Average Privacy Supportive Score of NWB01	**3.5**

- *Communal characteristics of the residential compound*

Besides the community mall on the lower floor, the Condominium NWB03 provided a few recreational facilities and common areas for the residents only, namely, swimming pool, gym-room, lobby lounge. According to the law, the juristic person of the Condominium NWB03 was composed of the residential committees and the building managing staffs.

Figure 5.61 The pictures of communal characteristics of Condominium NWB03 (Left) the exclusive roof top swimming pool, (Right) the common area and CCTVs installed lobby

Table 5.56 The communal characteristic scoring table of Condominium NWB03

NWB03				
No.	**Sub-indicators**	**Categories and Scores**		**Results**
Indicator CM01: Variety of common and recreational areas				
1.	*Variety of common and recreational areas*	Have 4 to 5	3	3
Indicator CM02: Exposure & Ease of accessibility				
2.	*Exposure & Ease of accessibility*	Private floor/ rooftop	1	1
		Total Communal Characteristic Score of NWB03		**4**
		Average Communal Characteristic Score of NWB03		**2**

5.3.6 Zone 6: Southwestern Bangkok (Southern Thonburee)

Urban Characteristics of Southwestern Bangkok:

The southwestern part of Bangkok (Southern Thonburee) has a population of 964,022 (16.92% of Bangkok population) with a boundary of 300.07 square kilometres. It comprises of seven districts as follows: 1) Paseejaroen, 2) Bangkae, 3) Nongkaem, 4) Bangbon, 5) Bangkuntien, 6) Toongkru, and 7) Ratburana. This zone contains the high, medium, and low-density residential neighbourhoods and the agricultural and rural areas. Some areas are the locations of the industrial and business areas. (CPD, 2013, Strategy and Evaluation Department, 2014)

The map of Southwestern Bangkok or Southern Thonburee area along with land use planning and the locations of the condominiums SWB01, SW02, and SW03 were demonstrated in Figure 5.1 page 98, the map of Bangkok and land use policy Section D-6.

5.3.6.1 *Condominium SWB01*

Condominium SWB01 represented the population of the low selling price condominiums located in Ratburana district of where the density of population was 5,332 persons/ km^2. This residential compound was located on Sooksawas road. The Condominium SWB01 was the high-rise housing project operated by private real estate company. The construction was completed in 1993. This residential building is 23-storey high. The total number of dwelling units was 500. There were three types of dwelling units in this condominium: studio, one-bedroom unit, and two-bedroom unit. The utility space of each unit was varied between 30-60 square metres. The price was approximately 26,936 baht (approximately €695) per square metre.

Figure 5.62 The location and layout plan of Condominium SWB01

- *Defensible characteristics of the residential compound*

The Condominium SWB01 was located amongst the medium-density residential neighbourhoods. The opened-front of this residential compound was adjacent to the main road where the public transports were available. This condominium complex was amongst the low-rise residential neighbourhoods and mixed commercial-residential row houses. This condominium had no front gate. The building was located behind the commercial-residential row houses. There were two entrances without gates approaching to the building, one for vehicle and pedestrian, another one for pedestrian only. The non-residents did not need keycard or residency proof to walk into the compound but vehicle drivers needed to temporarily exchange their identification card for parking lots. The security guards were stationed at the cross point of the two entrances and the front-desks. The security checkpoint was at the entrance of elevator hall.

Figure 5.63 The pictures of defensible characteristics of Condominium SWB01
(Left) the semi-gated entrance and parking lot for guests with 24 security guard, (Right) the entrance of parking building without vehicle barrier

Table 5.57 The defensible characteristic scoring table of the Condominium SWB01

SWB01				
No.	**Sub-indicators**	**Categories and Scores**		**Results**
Indicator DF01: Access Control				
1.	*Number of gates*	2 gates	3	3
2.	*Frequency of security check point(s)*	Have at least 2 check-points	3	3
3.	*Number of vehicle barriers*	1 to 2 vehicle barriers	3	3
Indicator DF02: Surveillance				
4.	*Number of security guards* (per bldg.)	1 to 2 guards	3	3
5.	*CCTV Installation*	Have at least 3	3	3
Indicator DF03: Territoriality				
6.	*Level of barricade*	Semi-gated community	3	3
7.	*Allowance for non-residents' access*	Residents and guests no permission needed	3	3
Indicator DF04: Milieu and Juxtaposition				
8.	*Walking distance to public transport*	Less than 200 metres	5	5
9.	*Chaotic surrounding and heterogeneity*	Medium or High-density residential ngbhd.	3	3
10	*Building maintenance*	Bad	1	1
		Total Defensible Characteristic Score of SWB01		**30**
		Average Defensible Characteristic Score of SWB01		**3**

- *Privacy supportive characteristics of the residential compound*

The typical floor plan of this condominium was the double-loaded corridor type. The number of units per floor was 26.

Figure 5.64 The pictures of privacy supportive characteristics of Condominium SWB01 (Top) the double-loaded corridor, (Middle) the elevator lobby with keycard scanner, (Right) the building's floor stacking

Table 5.58 The privacy supportive characteristic scoring table of the Condominium SWB01

SWB01			
No.	**Sub-indicators**	**Categories and Scores**	**Results**
Indicator PV01: Number of units per floor			
1.	*Number of units per floor*	Between 25-34 units per floor 3	3
Indicator PV02: Typical Floor Plan			
2.	*Typical floor plan*	Double-loaded corridor 3	3
		Total Privacy Supportive Score of SWB01	**6**
		Average Privacy Supportive Score of SWB01	**3**

- *Communal characteristics of the residential compound*

The Condominium SWB01 provided a few recreational facilities and common areas for the residents only, namely, swimming pool, gym-room, lobby lounge. According to the law, the juristic person of the Condominium SWB01 was composed of the residential committees and the building managing staffs.

Figure 5.65 The pictures of communal characteristics of Condominium SWB01 (Left) the private swimming pool located on the low zone's top floor, (Right) the private roof top gym room

Table 5.59 The communal characteristic scoring table of Condominium SWB01

SWB01				
No.	**Sub-indicators**	**Categories and Scores**		**Results**
Indicator CM01: Variety of common and recreational areas				
1.	*Variety of common and recreational areas*	Have 1 to 3	2	2
Indicator CM02: Exposure & Ease of accessibility				
2.	*Exposure & Ease of accessibility*	Private floor/ rooftop	1	1
		Total Communal Characteristic Score of SWB01		**3**
		Average Communal Characteristic Score of SWB01		**1.5**

5.3.6.2 *Condominium SWB02*

Condominium SWB02 represented the population of the middle selling price condominiums located in Ratburana district of where the density of population was 5,332 persons/ km^2. This residential compound was located on Ratburana road. The Condominium SWB02 was the high-rise housing project operated by private real estate company. The construction was completed in 2010. This residential compound comprises of two towers. Tower A is 29-storey buidling and tower B is 31-storey building. The total number of dwelling units was 1,021. There was only one type of dwelling provided for the residents, which is one-bedroom type. The utility space of each unit was varied between 26-43 square metres. The low zone of the building is functioning as a parking space. The price was approximately 56,822 baht (approximately €1,465) per square metre.

Figure 5.66 The location and layout plan of Condominium SWB02

- *Defensible characteristics of the residential compound*

The Condominium SWB02 was located adjacent to the main road where the public transports were available. The complex was surrounded by medium-density residential neighbourhoods, which mostly were low-rise houses. The compound was the gated community. There were two gates serving both vehicle and pedestrians. The guests without vehicle were able to walk around the ground floor of the buildings without residency proof. The security checkpoints were at both main gates where the guests with vehicles needed to inform the room number and building to the guards and to temporarily exchanged their identification card in order to get a parking spot. The non-residents without keycard could access to the lobby of the resident area. The security checkpoint was at the gateway, and the elevator lobby.

Figure 5.67 The pictures of defensible characteristics of Condominium SWB02 (Left) the vehicle barriers at the front gate with 24 hours security guard, (Middle) the vehicle barriers before parking space entrance and exit, (Right) the CCTV installed lobby area with the keycard scanned checkpoint

Table 5.60 The defensible characteristic scoring table of the Condominium SWB02

SWB02				
No.	**Sub-indicators**	**Categories and Scores**		**Results**
Indicator DF01: Access Control				
1.	*Number of gates*	2 gates	3	3
2.	*Frequency of security check point(s)*	Have at least 2 check-points	3	3
3.	*Number of vehicle barriers*	More than 2 vehicle barriers	5	5
Indicator DF02: Surveillance				
4.	*Number of security guards* (per bldg.)	More than 2 guards	5	5
5.	*CCTV Installation*	Have all of them	5	5
Indicator DF03: Territoriality				
6.	*Level of barricade*	Gated community	5	5
7.	*Allowance for non-residents' access*	Residents and guests no permission needed	3	3
Indicator DF04: Milieu and Juxtaposition				
8.	*Walking distance to public transport*	Less than 200 metres	5	5
9.	*Chaotic surrounding and heterogeneity*	Medium or High-density residential ngbhd.	3	3
10	*Building maintenance*	Good	5	5
		Total Defensible Characteristic Score of SWB02		**42**
		Average Defensible Characteristic Score of SWB02		**4.2**

- *Privacy supportive characteristics of the residential compound*

The typical floor plan of this condominium was the double-loaded corridor type. The number of units per floor was 24.

Figure 5.68 The pictures of privacy supportive characteristics of Condominium SWB02

The typical floor plan

Table 5.61 The privacy supportive characteristic scoring table of the Condominium SBW02

SWB02				
No.	**Sub-indicators**	**Categories and Scores**		**Results**
Indicator PV01: Number of units per floor				
1.	*Number of units per floor*	Between 15-24 units per floor	4	4
Indicator PV02: Typical Floor Plan				
2.	*Typical floor plan*	Double-loaded corridor	3	3
		Total Privacy Supportive Score of SWB02		**7**
		Average Privacy Supportive Score of SWB02		**3.5**

- *Communal characteristics of the residential compound*

The Condominium SWB02 provided various recreational facilities and common areas for the residents and guests, namely, swimming pool, gym-room, lobby, convenience store, playground, and library. According to the law, the juristic person of the Condominium SWB02 was composed of the residential committees and the building managing staffs.

Figure 5.69 The pictures of communal characteristics of Condominium SWB02 (Left) the playground area, (Right) the semi-gated corridor to the retail space and 24 hours minimart allowing non-residents' access

Table 5.62 The communal characteristic scoring table of Condominium SWB02

SWB02				
No.	**Sub-indicators**	**Categories and Scores**		**Results**
Indicator CM01: Variety of common and recreational areas				
1.	*Variety of common and recreational areas*	Have all of them	5	5
Indicator CM02: Exposure & Ease of accessibility				
2.	*Exposure & Ease of accessibility*	Private floor/ rooftop	1	1
		Total Communal Characteristic Score of SWB01		**6**
		Average Communal Characteristic Score of SWB01		**3**

5.3.6.3 *Condominium SWB03*

Condominium SWB03 represented the population of the high selling price condominiums located in Ratburana district of where the density of population was 5,332 persons/ km^2. This residential compound was located on Ratburana road. The Condominium SWB03 was the high-rise housing project operated by private real estate company. The construction was completed in 2009. This residential compound comprises of three buildings, which are two 32-storey towers, and one waterfront 5-storey building. The total number of dwelling units was 1,265. There

were three types of dwelling unit provided for the residents, namely, studio, one-bedroom unit, and two-bedroom unit. The utility space of each unit was varied between 30-101 square metres. The low zone of the building is functioning as parking and commercial space. The price was approximately 85,000 baht (approximately €2,192) per square metre.

Figure 5.70 *The location and layout plan of Condominium SWB03*

- *Defensible characteristics of the residential compound*

The Condominium SWB03 was located adjacent to the main road where the public transports were available. The complex was surrounded by medium-density residential neighbourhoods, which mostly were low-rise houses. The compound was the gated community and its east boundary was adjacent to the Chaopraya River. There was only one gate serving both vehicle and pedestrians. The guests without vehicle were able to walk around the ground floor of the buildings without residency proof. At the main gate, the guests with vehicles needed to inform the room number and building to the guards and to temporarily exchanged their identification card in order to get a parking spot. The non-residents without keycard could access to the lobby of the resident area. The security checkpoint was at the

gateway, and the elevator lobby. The security guards were positioned at the main gate, and the front-desks of both towers.

Figure 5.71 The pictures of defensible characteristics of Condominium SWB03 (Left) the vertical stacking of the two towers, (Right) the northern boundary adjacent to Chao Praya River with private pier with 24 hours security guards

Table 5.63 The defensible characteristic scoring table of the Condominium SWB03

SWB03				
No.	**Sub-indicators**	**Categories and Scores**		**Results**
Indicator DF01: Access Control				
1.	*Number of gates*	1 gate	5	5
2.	*Frequency of security check point(s)*	Have all of them	5	5
3.	*Number of vehicle barriers*	1 to 2 vehicle barriers	3	3
Indicator DF02: Surveillance				
4.	*Number of security guards* (per bldg.)	1 to 2 guards	3	3
5.	*CCTV Installation*	Have all of them	5	5
Indicator DF03: Territoriality				
6.	*Level of barricade*	Gated community	5	5
7.	*Allowance for non-residents' access*	Residents with permission only	5	5
Indicator DF04: Milieu and Juxtaposition				
8.	*Walking distance to public transport*	Less than 200 metres	5	5
9.	*Chaotic surrounding and heterogeneity*	Medium or High-density residential ngbhd.	3	3
10	*Building maintenance*	Good	5	5
		Total Defensible Characteristic Score of SWB03		**44**
		Average Defensible Characteristic Score of SWB03		**4.4**

- *Privacy supportive characteristics of the residential compound*

The typical floor plan of this condominium was the double-loaded corridor type. The number of units per floor was 23.

Figure 5.72 The pictures of privacy supportive characteristics of Condominium SWB03 (Left and Middle) the typical floor plans of two towers, (Right) the CCTVs installed lobby area for residents and non-residents with 24 security guards

Table 5.64 The privacy supportive characteristic scoring table of the Condominium SWB03

SWB03			
No.	**Sub-indicators**	**Categories and Scores**	**Results**
Indicator PV01: Number of units per floor			
1.	*Number of units per floor*	Between 15-24 units per floor 4	4
Indicator PV02: Typical Floor Plan			
2.	*Typical floor plan*	Double-loaded corridor 3	3
		Total Privacy Supportive Score of SWB02	**7**
		Average Privacy Supportive Score of SWB02	**3.5**

- *Communal characteristics of the residential compound*

The Condominium SWB03 provided various recreational facilities and common areas for the residents and guests, namely, clubhouse, swimming pool, gym-room, lobby lounge, playground, riverside garden, and private pier. According to the law, the juristic person of the Condominium SWB03 was composed of the residential committees and the building managing staffs.

Figure 5.73 The pictures of communal characteristics of Condominium SWB03
(Left) the private swimming pool located between two towers, (Right) the exclusive gym room on the 2nd floor of clubhouse

Table 5.65 The communal characteristic scoring table of Condominium SWB03

SWB03				
No.	**Sub-indicators**	**Categories and Scores**		**Results**
Indicator CM01: Variety of common and recreational areas				
1.	*Variety of common and recreational areas*	Have all of them	5	5
Indicator CM02: Exposure & Ease of accessibility				
2.	*Exposure & Ease of accessibility*	Front, middle, or atrium locations	5	5
			Total Communal Characteristic Score of SWB01	**10**
			Average Communal Characteristic Score of SWB01	**5**

5.4 Comparative Physical Environmental Scores of the Participating Condominiums

After conducting the PE assessment, the results of the current physical evaluation were categorised separately by zoning and by the economic level of the condominiums. The summarised scores of each primary indicator are demonstrated in the table below. (See Table 5.66)

Table 5.66 The comparative table for the PE assessment score of all participating Condominiums

	Defensible Indicators					Privacy Indicators			Communal Indicators		
	DF01	DF02	DF03	DF04	Avr.	PV01	PV02	Avr.	CM01	CM02	Avr.
NB01	2.33	3.00	2.00	2.33	2.40	4.00	3.00	3.50	4.00	5.00	4.50
NB02	3.67	4.00	3.00	4.33	3.80	4.00	3.00	3.50	5.00	3.00	4.00
NB03	4.33	5.00	5.00	4.33	4.60	4.00	3.00	3.50	3.00	1.00	2.00
ZONE 1	**3.44**	**4.00**	**3.33**	**3.66**	**3.60**	**4.00**	**3.00**	**3.50**	**4.00**	**3.00**	**3.50**
CB01	2.33	3.00	3.00	1.67	2.40	3.00	3.00	3.00	3.00	1.00	2.00
CB02	3.67	3.00	4.00	3.67	3.60	4.00	3.00	3.50	3.00	5.00	4.00
CB03	4.33	3.00	5.00	3.67	4.00	5.00	3.00	4.00	2.00	1.00	1.50
ZONE 2	**3.44**	**3.00**	**4.00**	**3.00**	**3.33**	**4.00**	**3.00**	**3.50**	**2.67**	**2.33**	**2.50**
SB01	3.67	3.00	4.00	2.33	3.20	4.00	3.00	3.50	3.00	1.00	2.00
SB02	3.67	3.00	2.00	2.33	2.80	5.00	3.00	4.00	4.00	5.00	4.50
SB03	4.33	5.00	5.00	4.33	4.60	5.00	3.00	4.00	3.00	1.00	2.00
ZONE 3	**3.89**	**3.67**	**3.67**	**3.00**	**3.53**	**4.67**	**3.00**	**3.83**	**3.33**	**2.33**	**2.83**
EB01	3.67	2.00	3.00	1.67	2.60	4.00	5.00	4.50	2.00	3.00	2.50
EB02	3.67	4.00	4.00	4.33	4.00	4.00	3.00	3.50	5.00	1.00	3.00
EB03	4.33	4.00	4.00	4.33	4.20	4.00	3.00	3.50	3.00	1.00	2.00
ZONE 4	**3.89**	**3.33**	**3.67**	**3.44**	**3.60**	**4.00**	**3.67**	**3.83**	**3.33**	**1.67**	**2.50**
NWB01	3.67	3.00	4.00	4.33	3.80	2.00	3.00	2.50	3.00	3.00	3.00
NWB02	4.33	4.00	3.00	4.33	4.00	1.00	3.00	2.00	5.00	5.00	5.00
NWB03	4.33	5.00	4.00	4.33	4.40	4.00	3.00	3.50	3.00	1.00	2.00
ZONE 5	**4.11**	**4.00**	**3.67**	**4.33**	**4.07**	**2.33**	**3.00**	**2.67**	**3.67**	**3.00**	**3.33**
SWB01	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	2.00	1.00	1.50
SWB02	3.68	5.00	4.00	4.33	4.20	4.00	3.00	3.50	5.00	1.00	3.00
SWB03	4.33	4.00	5.00	4.33	4.40	4.00	3.00	3.50	5.00	5.00	5.00
ZONE 6	**3.67**	**4.00**	**4.00**	**3.89**	**3.87**	**3.67**	**3.00**	**3.33**	**4.00**	**2.33**	**3.17**

The physical-environmental scores of the buildings in the above table were further analysed and calculated using both descriptive and inferential statistical methods to investigate the influence of physical environment on the psychological status of respondents as hypothesised at the beginning of the study. The further outcomes of advanced statistical analysis will be interpreted in Chapter 6.

The three bar charts below were created for picturing the comparative score of the defensible characteristic score, privacy-supportive characteristic, and communal characteristic of the eighteen condominiums participating in this study.

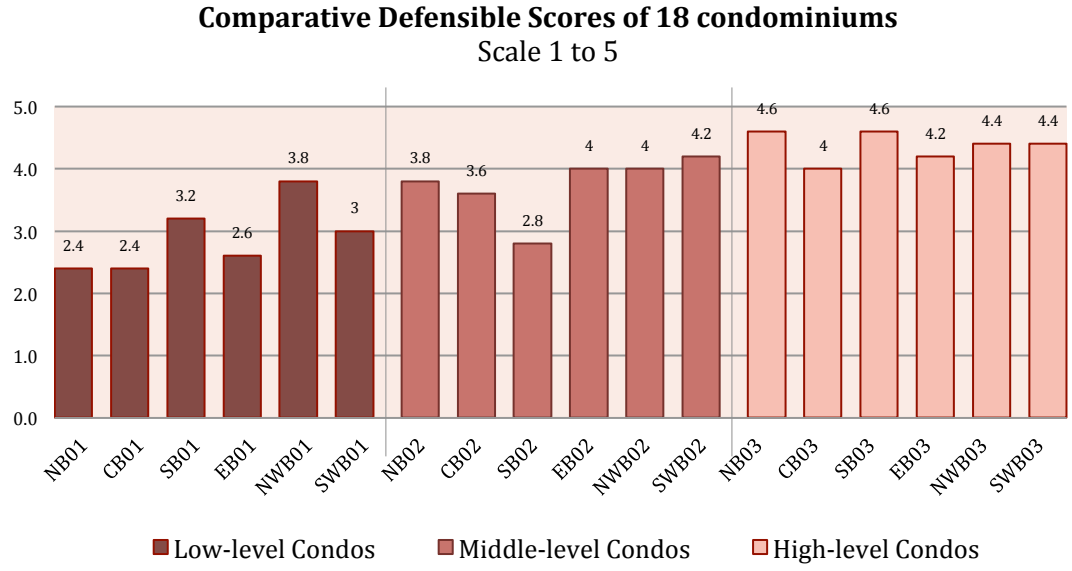


Figure 5.74 The comparative diagram of the defensible characteristic score of all 18 condominiums by economic cluster

Regarding the above bar graph, it appeared that the high-selling price condominiums, namely, NB03, SB03, and NWB03 earned the highest average score of the defensible characteristic amongst others. Meanwhile, the low-selling price condominiums, namely, NB01, CB01, and EB01 received the lowest defensible characteristic scores. (See Figure 5.74)

In more detail, when considering the sub-indicators of the defensible characters, the protective territoriality and surveillance of the high-selling prices condominiums were akin. The low-selling price condos had weakness of multiple gates control and the locations in where the chaotic high density of population neighbourhood was mixed with business area, whereas, some were too far from the public transportation.

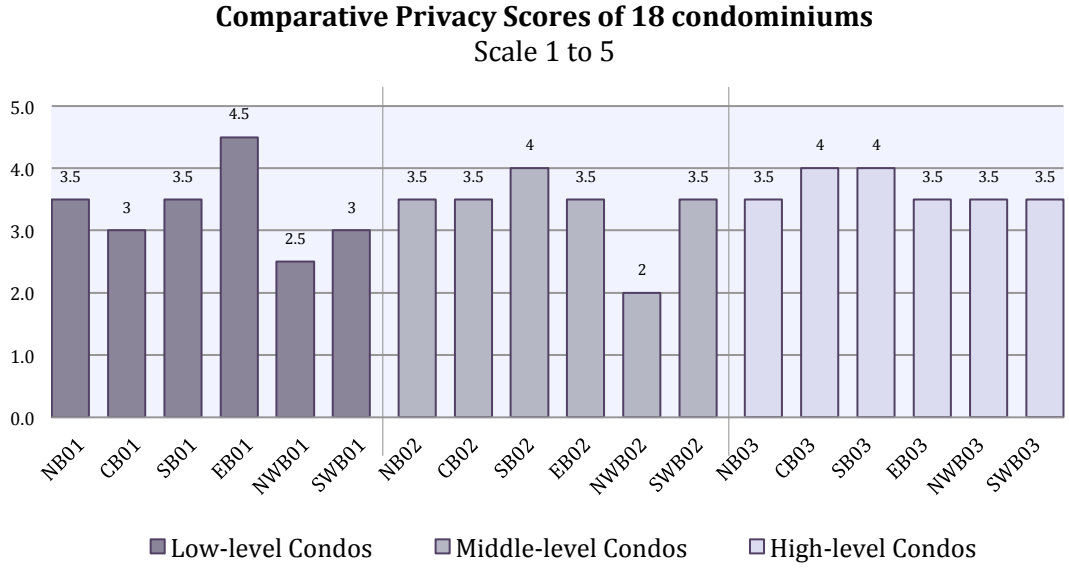


Figure 5.75 The comparative diagram of the privacy supportive characteristic score of all 18 condominiums by economic cluster

The above chart represents the comparative score of the privacy-supportive characteristic of eighteen condominiums participating in this study. Regarding the bar graph, the average score of privacy characteristic of all three levels: low, middle, and high-selling price condos were not dramatically different. However, it was notable that the condominiums in the group of high-selling price condos averagely owned the better score of privacy features than others. (See Figure 5.75)

When considering in more detail, the condominium EB01 earned the highest average score of privacy characteristic followed by condominium SB03, SB02, and CB03 respectively. The salient qualification of the condo EB01 was its atrium corridor type which was considered as a feature that can provide more privacy for the occupants than the double-loaded corridor, whereas, the condos SB03, SB02, and CB03 had the less density (number of units per floor) than the rest of condominiums.

Meanwhile, the condominium NWB02 earned the lowest privacy supportive score due to its highest number of units per floor (at 54 units), followed by the condo NWB01, SWB01, and CB01 which also had higher floor density than others. Still the privacy supportive score of the building needed to be combined with the score of density per unit, which was measured by the PEP questionnaire, before being analysed by the inferential statistic in Chapter 6.

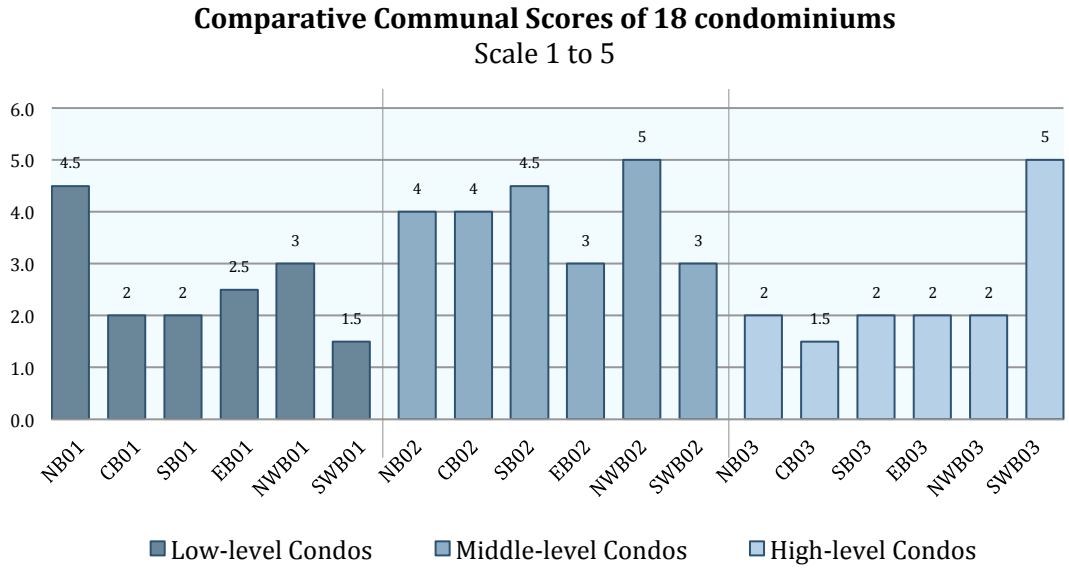


Figure 5.76 The comparative diagram of the communal characteristic score of all 18 condominiums by economic cluster

The above bar chart illustrates the comparative score of communal characteristics of the eighteen condominiums participating in this study. According to the graph, it appeared that averagely the condominiums in the group of middle-selling price properties received the better score of the communal characteristic than the other two levels (See Figure 5.76)

To be more specific, the condominiums NWB02 and SWB03 acquired the highest communal score followed by the condos SB02 and NB01. In respect to the observation and the PE assessment, it was clear that these leading properties had provided more various recreational facilities for their residents than others. Furthermore, their master plans could invigorate residents to access these areas and entail more chances for them to perceive the communal atmosphere. Oppositely, the condominiums SWB01 and CB03 received the lowest communal scores due to lacking recreational facility and the exclusive approach of their recreational facility planning.

All in all, the results of the PE assessment, which were transformed into the numerical data in this chapter, were further input into the statistical analysis as the primary independent variables to investigate the significant influence of the physical environment on the psychological status of the high-rise residents. The causal analyses and hypotheses were tested and described in Chapter 6.

CHAPTER 6

THE ENVIRONMENTAL PSYCHOLOGICAL ASSESSMENT

Part 1:

The Analysis of Influential Environmental and Personal Factors

Chapter Summary

The primary purposes of this chapter are to focus on analysing the results of the Personal and Environmental Psychological Assessment Questionnaire (PEP questionnaire) retrieved from the field survey as well as to test the research hypotheses stated at the beginning of this study. This chapter consists of the four main sections. The first section explains the systematic structure of the questionnaire including the various units of measurement designed for the further statistical analysis as well as declares the content reliability and internal consistency of the questionnaire by employing the Cronbach's Alpha coefficent.

The second section is an explanatory demographic configuration of the sampling group contained 1,206 respondents who were living in the eighteen sampling condominiums located in six zones of Bangkok metropolitan area. Afterwards, the third section contributes to the inferential statistical analysis and hypotheses testing for examining and extracting the particular influences of each independent variable on the core dependent variables: safety concern, privacy satisfaction, and sense of community.

In the third section, the results are categorised into five sub-sections to efficiently describe the distinct impacts and the specific calculation methods applied to the different types of factors, namely, urban and community factors, architectural factors, personal attribute factors, dwelling behavioural factors, and psychological background factors.

At the end, Section 6.4 devotes for deliberating the effect size and statistical power of 216 single-effects derived from the analytical process by employing the Cohen's magnitudes of effect size and statistical power analysis. This stage allows the outcomes obtained from the different means of calculation to be

compared and valued on the same platform. It is noteworthy that the statistical effects detected in this research are confirmed only when they achieve the minimum requirement of the effect size and statistical power. The in-depth discussion based on these findings will be further clarified in Chapter 8.

6.1 Systematic Structure, Unit, and Scale of Measurement of the PEP Questionnaire

The PEP questionnaire was designed to gain the data involving personal attributes, psychological status, and the opinion about residential building of the respondents. As mentioned in Chapter 3, the scales of measurement of the question items in this questionnaire were diversities. All scale types, which were nominal, interval, and ratio scale, were interpreted and analysed in the latter sections of this chapter.

- PART 1 of the PEP questionnaire emphasised the general information of the respondent. The units and scales of measurement varied depending on the nature of information. All units and scales of measurement of indicators were identified in Table 3.4 and Table 3.5 in Chapter 3. Meanwhile, the question items were clarified in Appendix.
- PART 2 of the PEP questionnaire emphasised the residential status and dwelling behaviour of the respondent. The variety of unit and scale of measurement depended on the nature of information as well. All units and scales of measurement of indicators were identified in Table 3.4 and Table 3.5 in Chapter 3. Meanwhile, the question items were clarified in Appendix.
- PART 3 of the PEP questionnaire focused on the background of the respondents involving physical and mental health, privacy need, experience of threats, and social capital and participation. All scores and scales of measurement of question items were interpreted in Table 3.4 and Table 3.5 in Chapter 3, whereas, the question items were clarified in Appendix. Afterwards, the nominal data derived from this section were converted into the psychometric scores in order to identify the level of respondents' experience of threats, privacy need, and social capital and participation and statistically investigate together with other ratio variables.

- PART 4 of the PEP questionnaire focused on the environmental psychological status of the respondents, which involved the high-rise living context. The units of measurement of all questions in this part were designed in the form of the Likert-scale type, one to five, in order to convert the level of the three psychological domains to the quantitative data. All scores and scales of measurement of question items were interpreted in Table 3.4 and Table 3.5 in Chapter 3, whereas, the question items can be seen in Appendix.

- PART 5 of the PEP questionnaire allowed the respondents to evaluate the existing physical conditions of their own residential building. There were fourteen physical environmental aspects contained in this section for being evaluated. (See Appendix) The units of measurement of all questions in Part 5.1 were designed in the simplest bipolar scale, whereas, Part 5.2 contained the multiple choices of the solution for improving the three categories: safety concern, privacy satisfaction, and sense of community, so that the respondents could vote the most three important solutions for each category. However, the attitudinal and open-ended questions of this part were not included in the inferential statistical analysis. The feedback in this section was contributed to the managers and committees of the building as requested.

6.1.1 Content Reliability and Internal Consistency

After considering the results of the pilot study defined in Section 3.1.4, Chapter 3, it was considered that the α of all items were acceptable at above 0.7. (Bruin, 2006) Then the full-scale field survey was performed. The calculated Cronbach's alpha coefficients derived from the result of the field survey are shown in the table below.

Table 6.1 Summary of the calculated Cronbach's alpha coefficients derived from the full-scale survey Part 4.1, 4.2, and 4.3

Section	Psychological Question Items	Full-scale Field Survey (N)	Number of Items	Cronbach's alpha Coefficient
Part 4.1	Safety Concern	1206	8	.905
Part 4.2	Privacy Satisfaction	1206	8	.894
Part 4.3	Sense of Community	1206	8	.885

Consequently, the alpha coefficient of all section was .905, .894, and .885 consecutively suggesting that the items had relatively high internal consistency. Additionally, the dimensionality of the scale was investigated by means of a factor analysis. The outcome suggested that the scale items of these three parts were unidimensional due to the differences between the Eigenvalue of component 1 and component 2 of part 4.1, 4.2, and 4.3 were more than 50%. (See the summary table of Eigenvalue in Appendix)

6.2 Demographic Data of the Sampling Group

In this field survey, the sampling group was composed of 1,206 participants who were living in the eighteen purposive sampling condominiums located in six different zones of the city clustered by Bangkok Metropolitan Administration (BMA) as mentioned earlier. The demographics of this sampling group consisted of several categories as described in the following section.

6.2.1. Gender

Regarding the results of the survey, the 523 respondents (43.4 %) were male and 683 respondents (56.6%) were female. This indicated that the proportion of female was higher than male. The gendered distributions of the respondents of each zone were illustrated in the figure below.

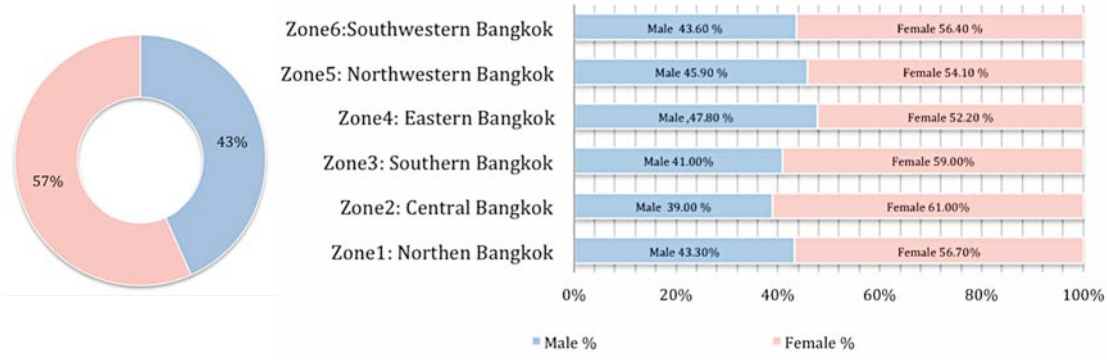


Figure 6.1 Gendered distribution of the dataset

(Left) Pie chart representing gendered distribution of the sampling group

(Right) Bar chart representing gendered distribution of each zone

6.2.2. Age

The average age of the whole sampling group was 32.8 years old. According to the life-stage categories, the composition of life-stages of the whole sampling group comprised 1) 1.2% of Middle Childhood (6-12 years old), 2) 7.8% of Early Adolescence (13-18 years old), 3) 20.1% of Later Adolescence (19-24 years old), 4) 32.0% of Early Adulthood (25-34 years old), 5) 35.7% of Middle Adulthood (35-60 yrs), 6) 3.2% of Later Adulthood and Old (61 years old and older). The outcome indicated that the majority of this sampling group was in the middle adulthood (35-60 yrs) stage of life. The aging distributions of the respondents of each zone are illustrated in the figure below.

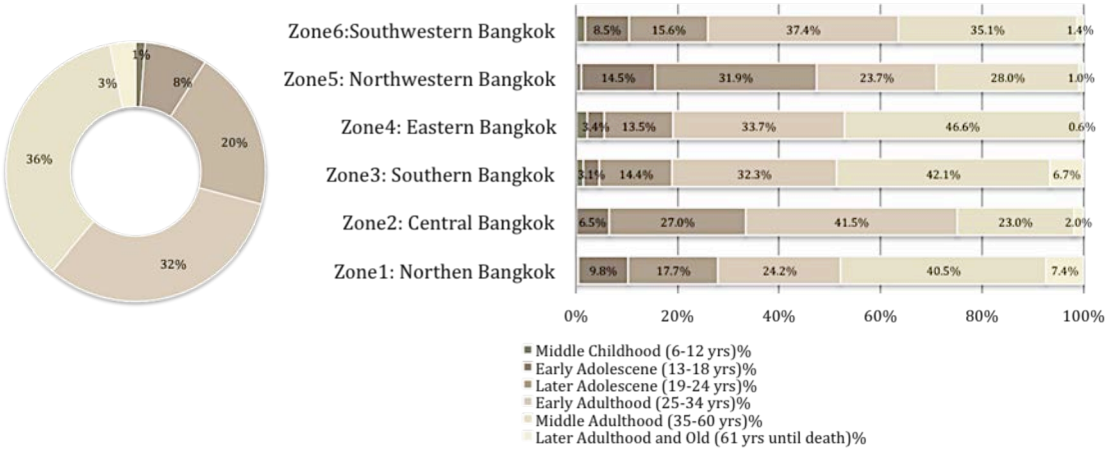


Figure 6.2 Stage of life distribution of the dataset

(Left) Pie chart representing stage of life distribution of the sampling group

(Right) Bar chart representing stage of life distribution of each zone

6.2.3. Household's Income per Month

After the outliers' treatment, the mean, mode, and median of household income per month of the sampling group were 56,949 (approximately 2,186 Euro), 50,000, and 50,000 Baht (approximately 1,280 Euro) per month. The mean, mode, and median of household income per month of the respondents of each zone are illustrated in the figure below.

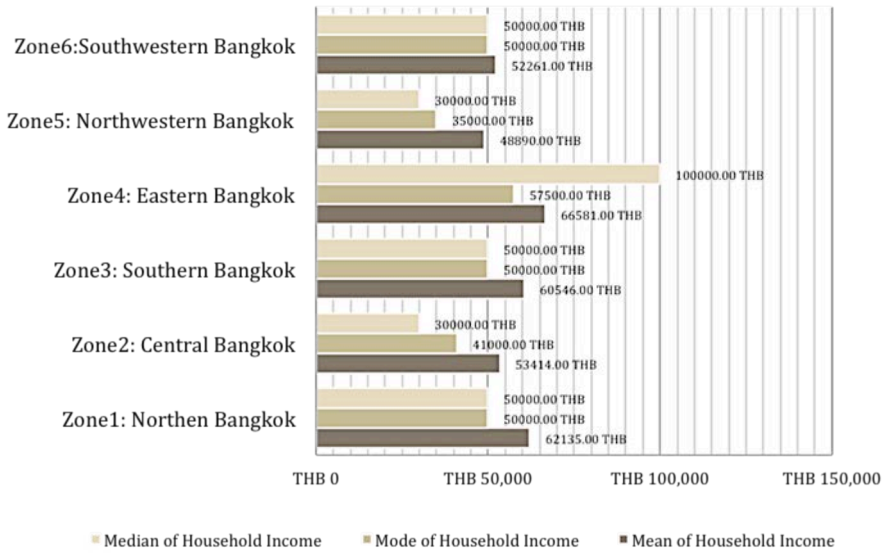


Figure 6.3 Household Income of the Sampling Group (Baht per Month)

6.2.4. Geographical Cluster: Bangkok Zoning

Regarding the results of the field survey, the proportions of the respondents from each zone were approximate, as shown in the figure below. Regarding the geographically clustered sampling, the 215 respondents (17.8%) were living in Zone 1:Northern Bangkok, 200 respondents (16.6%) were residing in Zone 2: Central Bangkok, 195 (16.2%) respondents were from Zone 3: Southern Bangkok, 178 respondents (14.8%) were from Zone 4: Eastern Bangkok, 207 respondents (17.2%) were living in Zone 5: Northwestern Bangkok, and 211 respondents (17.5%) were from Zone 6: Southwestern Bangkok. The slight differences in the proportion depended on the participants' willingness and availability including the omission of incomplete questionnaires. Moreover, in the zone having the low density of population, for example, the southern part of Bangkok, it appeared that the number of respondents was less than the other zones.

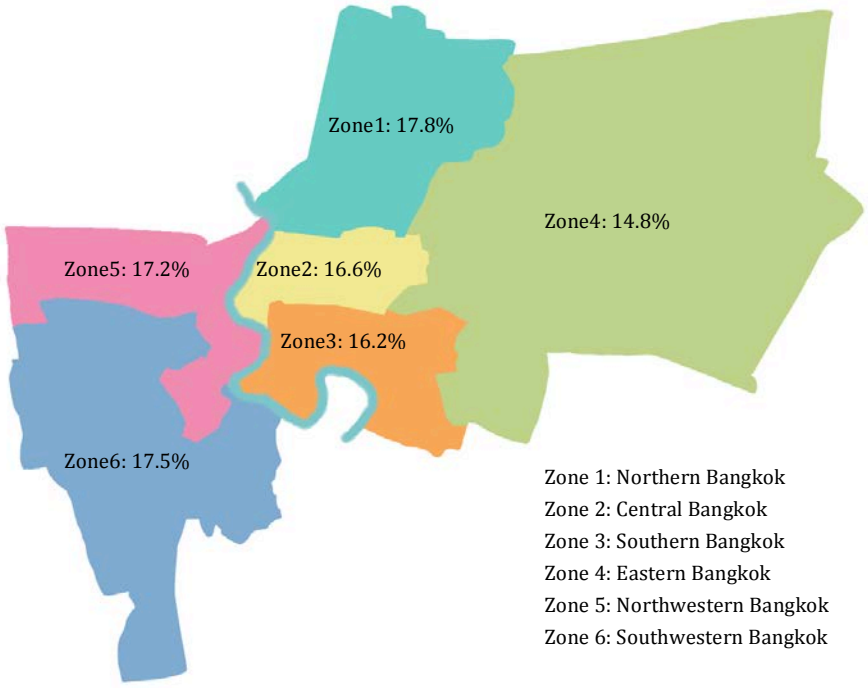


Figure 6.4 Geographical Distribution of the Sampling Group

6.2.5. Economic Cluster: Level of Property

Regarding the economic clustering, there were 404, 425, and 377 respondents (33.5%, 35.2%, and 31.3%), who were living in the low, middle, and high selling-price condominiums consecutively.

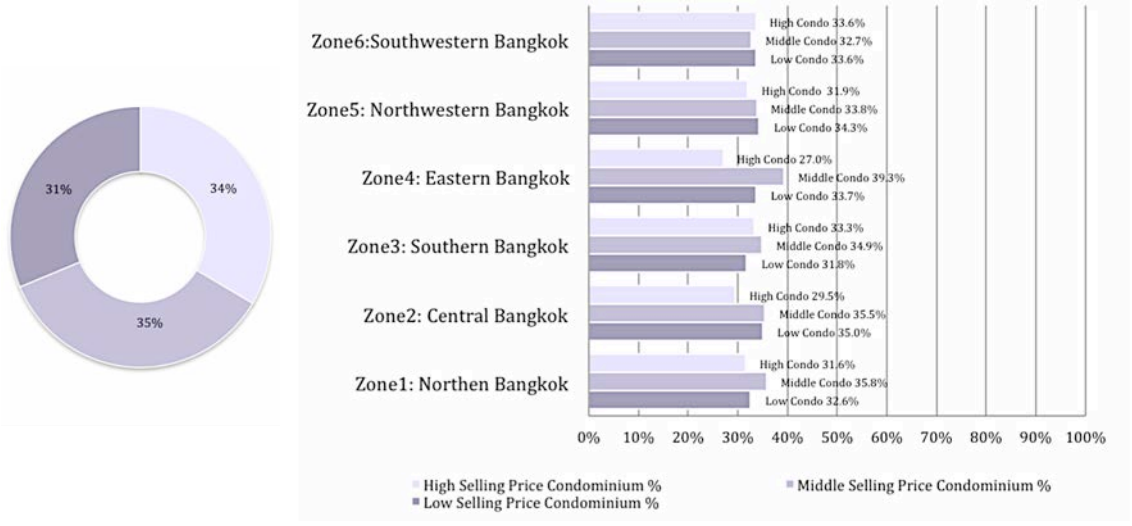


Figure 6.5 Distribution of dataset by level of property

(Left) Pie chart representing distribution of the sampling group by level of property

(Right) Bar chart representing distribution of each zone by level of property

6.2.6. Religion

Overall, the majority of the sampling group was Buddhism at 88.5%. The distribution of religions comprised of 1,057 Buddhists (88.5%), 58 Non-religious (4.8%), 56 Christians (4.6%), 16 Muslims (1.3%), and 9 other religions (0.7%). The figure below represents the religion composition of the respondents.

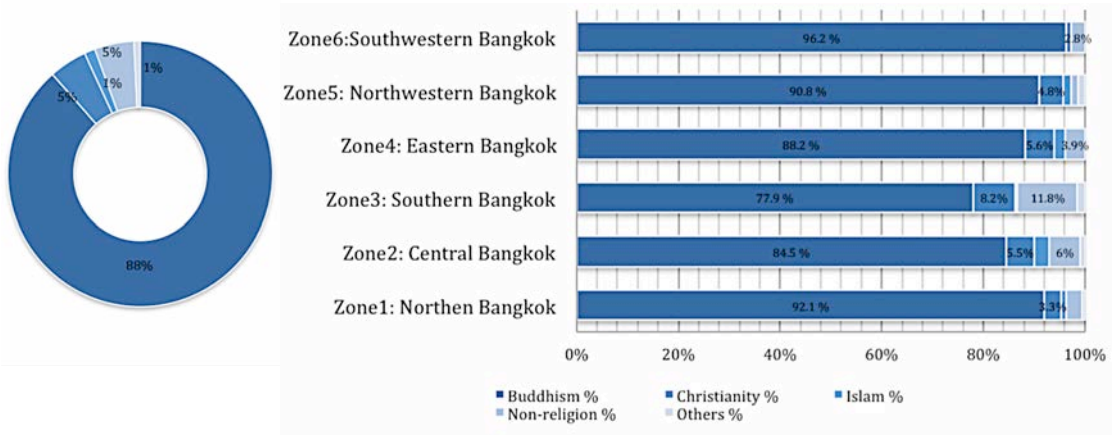


Figure 6.6 Religious Distribution of the dataset

(Left) Pie chart representing religious distribution of the sampling group

(Right) Bar chart representing religious distribution of each zone

6.2.7. Nationality

The majority of respondents, 1,121 persons (93%), were Thai nationality. The rest, 85 persons (7%), were foreigners from many countries around the world.

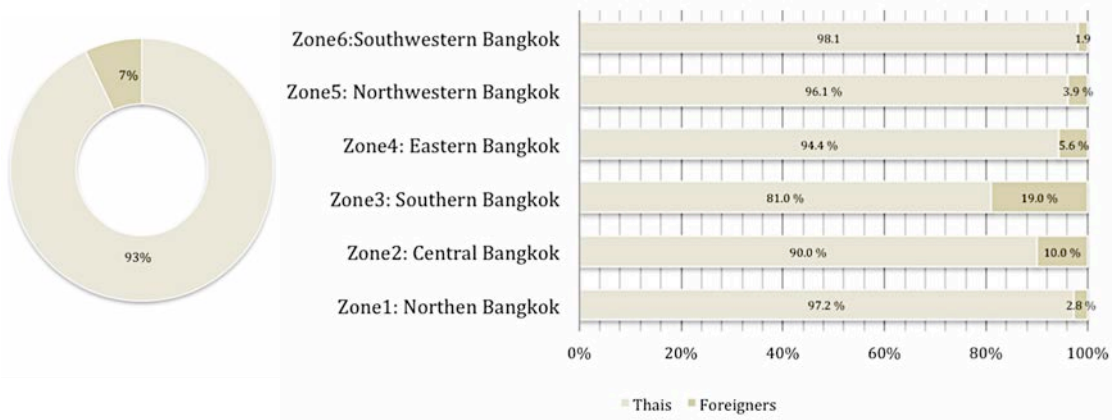


Figure 6.7 National distribution of the dataset

(Left) Pie chart representing national distribution of the sampling group

(Right) Bar chart representing national distribution of each zone

6.2.8. Marital Status

Most of the respondents in this survey, 844 persons (70%) were bachelor, whereas, 328 person (27.2%) and 24 persons (2.8%) were married and divorced/ widow consecutively.

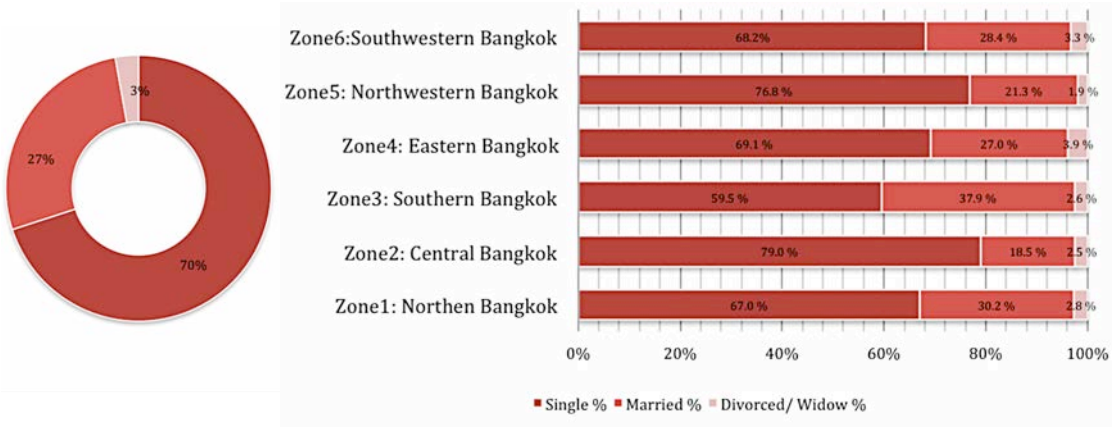


Figure 6.8 Marital distribution of the dataset

(Left) Pie chart representing marital distribution of the sampling group

(Right) Bar chart representing marital distribution of each zone

6.2.9. Parental Status

Considering the parenthood of the respondents, the proportion of the respondents who had no child was 75.5% (910 persons), whereas, the respondents who had child/ children were 24.5% (296 persons).

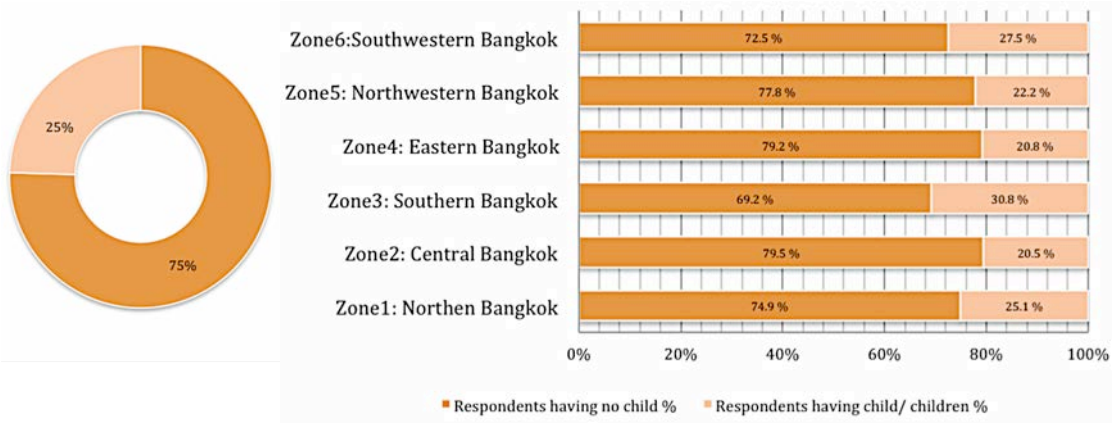


Figure 6.9 Parental distribution of the dataset

(Left) Pie chart representing parental distribution of the sampling group

(Right) Bar chart representing parental distribution of each zone

6.2.10. Education

The educational composition of this sampling group comprised of 219 persons (18.2%) earned the Lower-Bachelor degree, 704 persons (58.4%) earned Bachelor degree, and 283 persons (23.5%) earned the Higher-Bachelor degree.

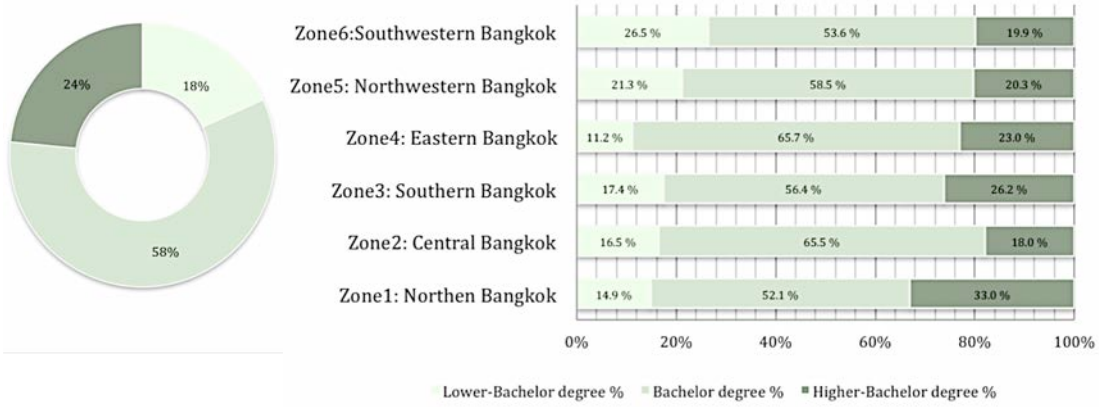


Figure 6.10 Educational distribution of the dataset

(Left) Pie chart representing educational distribution of the sampling group

(Right) Bar chart representing educational distribution of each zone

6.2.11. Occupation

The occupational proportion of the sampling group was composed of 436 private companies' employees (36.2%), 298 students (24.7%), 254 business owners/ freelancers (21.1%), 119 Government's employees (9.9%), 79 retirees/ housewives (6.6%), and 20 others (1.7%).

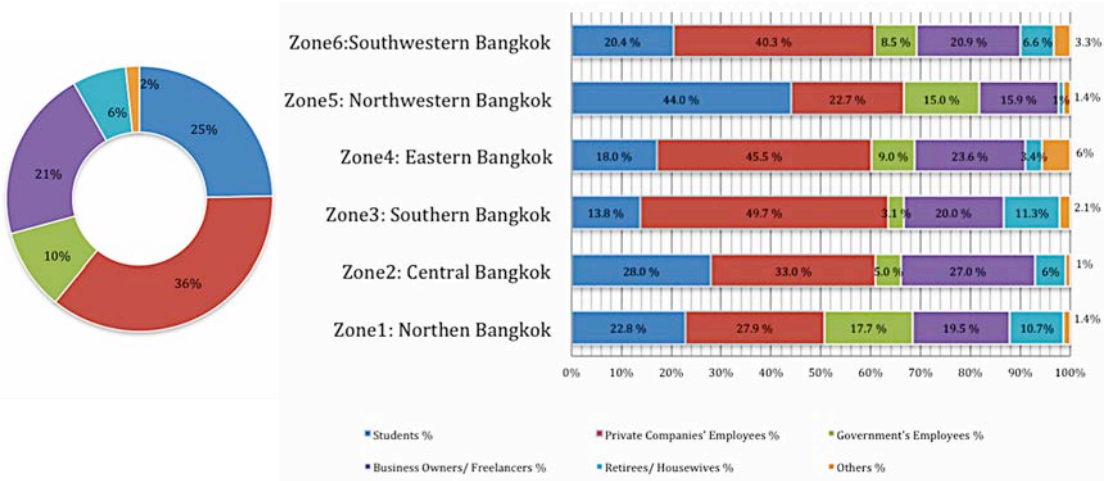


Figure 6.11 Occupational distribution of the dataset

(Left) Pie chart representing occupational distribution of the sampling group

(Right) Bar chart representing occupational distribution of each zone

6.2.12. Tenure

According to this sampling group, there were 555 respondents (46%) who were the owner of the dwelling units. Meanwhile, there were 324 tenants (26.9%) and 282 guests (24.3%) consecutively.

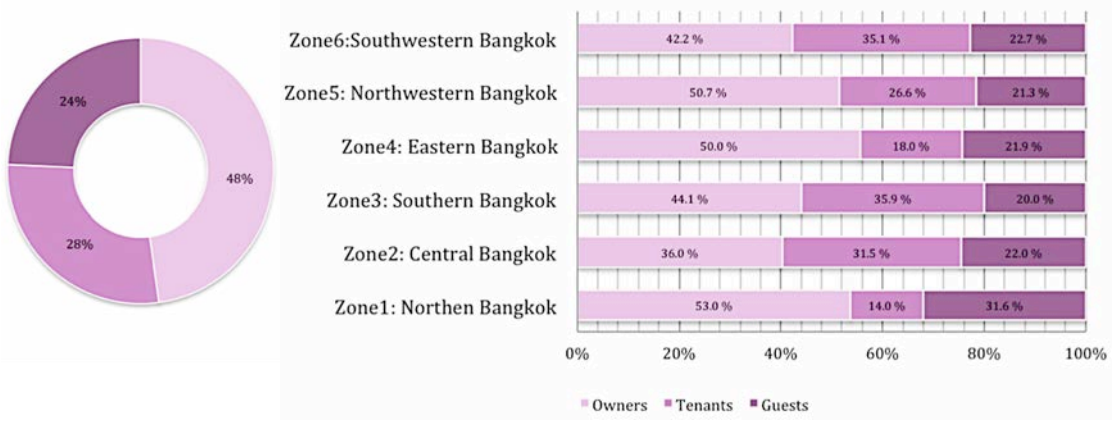


Figure 6.12 Tenure distribution of the dataset
(Left) Pie chart representing tenure distribution of the sampling group
(Right) Bar chart representing tenure distribution of each zone

6.3 Inferential Statistical Analysis and Hypotheses Testing

This section aims to analyse the quantitative data derived from the field survey as well as to implement the proper statistical methodologies for exploring the influence of all independent variables on the psychological dependent variables, namely, safety concern, privacy satisfaction, and sense of community as stated in the first research question.

RQ1:	How are the three fundamental psychological senses of home significantly affected by the physical-environmental factors and the personal factors?
$H1_0$:	The safety concern, privacy satisfaction, and sense of community are not significantly affected by the physical and personal factors
$H1_1$:	The safety concern, privacy satisfaction, and sense of community are significantly affected by the physical and personal factors

The main research question and hypotheses framed at the beginning of this research were transformed into the conceptual diagram showed below.

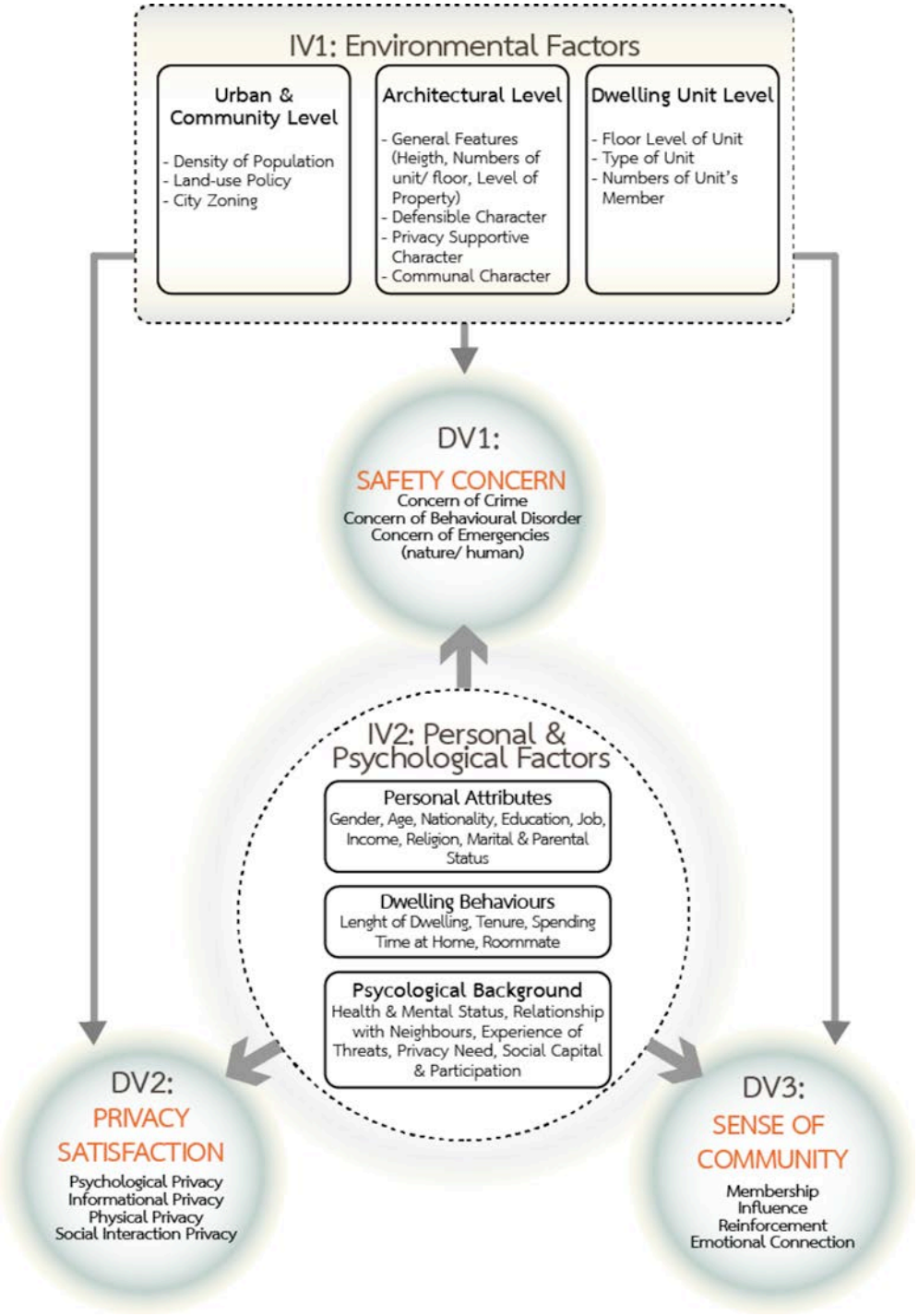


Figure 6.13 The conceptual diagram of research hypothesis H_1

6.3.1 Influences of Urban Factors on the Psychological Status of High-rise Dwellers

To find the answer for this research question and prove the hypothesis $H1_0$, the physical environmental variables listed below were tested by means of the different statistical approaches depending on the levels of measurement.

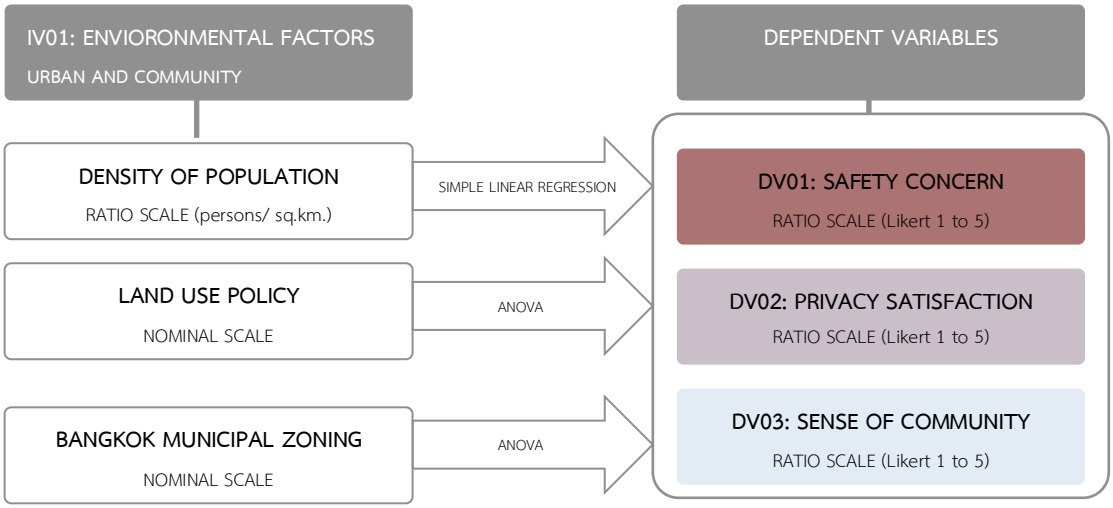


Figure 6.14 Diagram of analytical approach for urban and community variables

The table below summarises the statistically significant effects of all independents variables under the category of urban and community factors. The further explanations about the statistical analytical process of each independent variable are provided separately in the next section.

Table 6.2 Summary of Statistical Effects of Urban and Community Variables on Dependent Variables Safety Concern, Privacy Satisfaction, and Sense of Community and their sub-variables

	Dependent Variables and Sub Variables														
IV01: Environmental Factors *Urban and Community Variables*	Average Safety Concern	Crime Concern	Behavioural Disorder Concern	Emergency Concern	Average Privacy Satisfaction	Psychological Privacy Satisfaction	Informational Privacy Satisfaction	Physical Privacy Satisfaction	Social Privacy Satisfaction	Average Sense of Community	Membership	Influence	Reinforcement	Emotional Connection	Notes
1. Density of Population	✔		✔							✔	✔	✔	✔	✔	SLR
2. Land Use Policy	✔	✔	✔	✔						✔	✔	✔	✔	✔	ANOVA
3. Bangkok Municipal Zoning	✔		✔	✔	✔		✔	✔		✔	✔	✔	✔	✔	ANOVA

6.3.1.1 Density of Population by Districts

As mentioned earlier in the literature review, the density of population was assumed to have a negative impact on people's liveliness and also deter the trustfulness between individuals including their social participation. Assumedly, the presumptive effects of the density of population, in particular on the sense of community and privacy satisfaction, were negative. The effects of density of population on the dependent variables were calculated by employing a simple linear regression to test the statistical sub-hypothesis 1.1 as described below.

Null Hypothesis $H(1.1)_0$: There is no significant prediction of dependent variables: safety concern, privacy satisfaction, and sense of community by density of population

Alternative Hypothesis $H(1.1)_1$: There is significant prediction of dependent variables: safety concern, privacy satisfaction, and sense of community by density of population

Regarding the results of simple linear regression (SLR), the null hypothesis (1.1) was rejected at p-value < 0.05, which meant that the effect of density of population on at least one of the dependent variables statistically existed.

For the issue of safety concern, the findings indicated that the population density of each district positively affected the average score of safety concern, in particular on the behavioural disorder. (See Table 6.3.)

Please note that, although the p-values were significant, the R^2 of these equations were extremely subtle and lower than the minimum required magnitude and power of effect of this research. (See more detail in Section 6.4, Table 6.54) Consequently, the predictability of these two equations was still unconfirmed due to their small effect size and the chance of detecting which was less than 80%, according to the Cohen's criterion of effect size. (Cunningham and McCrum-Gardner, 2007, G*Power 3.1 manual, [3.1], 2017)

For the issue of sense of community, the SLR result also indicated that the density of population by district had negative effects on the respondents' sense of community. Considering the average score of participants' sense of community, the significant regression equation was found ($F(1,1204)= 53.657$, $p = .000$), with an R^2 of .043. (See Table 6.3) Participants' average sense of community decreased 0.000044 for each person/ km^2 of districts' population density. Regarding the model function of SLR, the predictive equation for the average sense of community is defined as follow.

$$\mathrm{Y} = b_0 + b_1 X$$

$\boldsymbol{Y}$ = Predicted value of *dependent variables*

X = Value of *independent variables*

b_0 = Estimate of regression intercept

b_1 = Estimate of regression slope

Sense of Community = 3.651 + (-0.000044)(Density of Population)

In more detail, it was found that the participants' feeling of membership score decreased 0.000041 for each person/ km^2 of districts' population density ($F(1,1204)= 34.871$, $p = .000$), with an R^2 of .028, whereas, their feeling of reciprocal influence decreased 0.000039 for each person/ km^2 of districts' population density ($F(1,1204)= 29.161$, $p = .000$), with an R^2 of .024.

Membership = 3.732 + (-0.000041)(Density of Population)

Influence = 3.507 + (-0.000039)(Density of Population)

Furthermore, the participants' sense of communal reinforcement decreased 0.000044 for each person/ km^2 of districts' population density ($F(1,1204)= 33.587$, $p = .000$), with an R^2 of .027 and their emotional connection decreased 0.000053 for each person/ km^2 of districts' population density ($F(1,1204)= 52.709$, $p = .000$), with an R^2 of .042. (See Table 6.3)

Reinforcement = 3.561 + (-0.000044)(Density of Population)

Emotional Connection = 3.806 + (-0.000053)(Density of Population)

The above mentioned predictive models for the sense of community and its sub-variables measured in Likert-scale type: membership, influence, reinforcement, and emotional connection, by the density of population received R^2 less than 0.1 yet they were considered acceptable since their effect size achieved the minimum requirement relative to the large sampling size and the statistical power of more than 99% chances of detecting their small to medium-sized effects amongst this sampling group. (See more detail in Section 6.4, Table 6.54)

Meanwhile, the effect of the population density on the respondents' privacy satisfaction could not be detected in this dataset.

Table 6.3 Summary of simple linear regression models for Safety Concern, Privacy Satisfaction, and Sense of Community Scores including their sub-variables predicted by the predictor Density of population (Enter Method)

N=1206

	Predictors Density of population (Enter Method)						
Response variables	*F*	R^2	B	S.E.	β	*t*	*p*
Safety Concern	3.944	.003	1.628E-05	8.1E-06	.057	1.986	.047*
Crime Concern	2.438	.002	1.437E-05	9.2E-06	.045	1.562	.119
Behavioural Concern	5.526	.005	2.091E-05	8.8E-06	.068	2.351	.019**
Emergency Concern	1.465	.001	1.219E-05	1.0E-05	.035	1.211	.226
Privacy Satisfaction	.009	.000	-6.042E-07	6.5E-06	-.003	-.093	.926
Psycho. Privacy Sat.	1.598	.001	1.026E-05	8.1E-06	.036	1.264	.206
Info. Privacy Sat.	.837	.001	-7.190E-06	7.8E-06	-.026	-.915	.360
Physical Privacy Sat.	.764	.001	-6.305E-06	7.2E-06	-.025	-.874	.382
Social Privacy Sat.	.010	.000	8.137E-07	8.0E-06	.003	.100	.920
Sense of Community	53.657	.043	-4.439E-05	6.0E-06	-.207	-7.325	.000***
Membership	34.871	.028	-4.077E-05	6.9E-06	-.168	-5.905	.000***
Influence	29.161	.024	-3.936E-05	7.2E-06	-.154	-5.400	.000***
Reinforcement	33.857	.027	-4.400E-05	7.5E-06	-.165	-5.819	.000***
Emotional Connection	52.709	.042	-5.345E-05	7.3E-06	-.205	-7.260	.000***

*$p \leq .05$, ** $p \leq .005$, *** $p \leq .001$

***Note**: All predictive regression models were under the conditions that all variables were measured with the defined units of PE assessment and PEP questionnaire.*

All data sets were proved conforming to the primary assumptions of 1) linear relationship (by Scatter plot), 2) no auto-correlation (by Durbin-Watson test $d \leq 4\text{-}d_l$), 3) error terms had mean zero and constant variance uncorrelated (by residual statistics), and 4) multivariate normality *(by Normal P-P plot).*

6.3.1.2 Land Use Policy

According to Bangkok urban context and city planning, there were three types of land use zoning related to the locations of eighteen condominiums participating in this field survey as described below:

Land use Zoning 1: Medium-density Residential Area
Land use Zoning 2: High-density Residential Area
Land use Zoning 3: Business Centre Area

The land use policy of each area implied the heterogeneity of the community including the context and the public infrastructures available in the area. As well, it was also expected to have an effect on the variance of the respondents' psychological status. At this analytical stage, a one-way Analysis of Variance (one-way ANOVA) was conducted to compare the effect of the land use zoning related to the residential high-rises' locations, namely, medium-density residential, high-density

residential, and business centre areas on the safety concern, privacy satisfaction, and sense of community of the dwellers. The statistical sub-hypotheses 1.2 are described below.

Null Hypothesis H(1.2)$_0$: There is no significant difference in safety concern, privacy satisfaction, and sense of community between Land use Zone1, Land use Zone2, and Land use Zone3

Alternative Hypothesis H(1.2)$_1$: There is significant difference in safety concern, privacy satisfaction, and sense of community between Land use Zone1, Land use Zone2, and Land use Zone3

The one-way ANOVA analysis rejected H_0 and accepted the alternative hypothesis H_1 that there were some significant differences in safety concern and sense of community amongst the respondents from the different land use planned areas. The results suggested that the land use policy affected the variance of safety concern and sense of community significantly, whereas, its effect was not found on privacy satisfaction.

There was a significant effect of land use zoning on the dwellers' safety concerned at $F(2, 1203) = 10.197$, $p = .000$. In more detail, the results showed that the significant effects were found on crime concern at (2, 1203) = 11.271, $p = .000$, behavioural disorder at $F(2, 1203) = 7.661$, $p = .000$, and emergencies concern at $F(2, 1203) = 4.534$, $p = .011$. Post hoc comparisons using the Scheffe criteria (Equal of variances assumed) and Tamhane (Equal of variances not assumed) tests indicated the mean differences as described below.

Table 6.4 One-way ANOVA summary table: Safety Concern Score, Crime Concern Score, Behavioural Disorder Score, and Emergency Concern Score by Land use Zoning 1,2, and 3

N=1206

	Land use 1		*Land use 2*		*Land use 3*				
Variables	*M*	*S.D.*	*M*	*S.D.*	*M*	*S.D.*	*F(2,1203)*	*p*	*Post hoc Tests*
Safety Concern	2.613	.984	2.755	.955	2.336	.970	10.197	.000***	Scheffe 1, 2 > 3
Crime Concern	2.590	1.131	2.770	1.048	2.282	1.035	11.271	.000***	Tamhane 1 < 2 > 3
Behavioural Disorder Concern	2.483	1.061	2.602	1.045	2.203	1.075	7.661	.000***	Scheffe 1, 2 > 3
Emergency Concern	2.843	1.223	2.961	1.173	2.618	1.166	4.534	.011*	Scheffe 2 > 3

*$p \leq .05$, ** $p \leq .005$, *** $p \leq .001$

***Note**: All predictive regression models were under the conditions that all variables were measured with the defined units of PE assessment and PEP questionnaire.*

All data sets were proved conforming to the primary assumption of a normal distribution *by means of considering the skewness and kurtosis of data sets, which were in between ±2.*

Additionally, there was the significant effect of land use zoning on the dwellers' sense of community at $F(2, 1203) = 10.621$, $p = .000$. In more detail, the results showed that the significant effects were found on sense of membership at *F*

(2, 1203) = 6.379, p = .002, reciprocal influence at F(2, 1203) = 8.072, p = .000, communal reinforcement at F(2, 1203) = 9.441, p = .000, and emotional connection at F(2, 1203) = 7.134, p = .001 respectively.

Post hoc comparisons using the Scheffe criteria (Equal of variances assumed) tests indicated the mean differences as follows.

Table 6.5 One-way ANOVA summary table: Sense of Community Score, Sense of Membership Score, Reciprocal Influence Score, Communal Reinforcement Score and Emotional Connection Score by Land use Zoning 1,2, and 3

N=1206

	Land use 1		*Land use 2*		*Land use 3*				
Variables	*M*	*S.D.*	*M*	*S.D.*	*M*	*S.D.*	*F(2,1203)*	*p*	*Post hoc Tests*
Sense of Community	3.413	.713	3.206	.749	3.306	.752	10.621	.000***	Scheffe 1 > 2
Membership	3.512	.811	3.332	.860	3.386	.814	6.379	.002**	Scheffe 1 > 2
Influence	3.315	.862	3.108	.885	3.132	.887	8.072	.000***	Scheffe 1 > 2
Reinforcement	3.341	.903	3.098	.908	3.228	.925	9.441	.000***	Scheffe 1 > 2
Emotional Connection	3.486	.860	3.286	.921	3.478	.925	7.134	.001***	Scheffe 1 > 2

*$p \leq .05$, ** $p \leq .005$, *** $p \leq .001$

***Note**: All predictive regression models were under the conditions that all variables were measured with the defined units of PE assessment and PEP questionnaire.*

All data sets were proved conforming to the primary assumption of a normal distribution *by means of considering the skewness and kurtosis of data sets, which were in between ±2.*

The effect size and statistical power of all significant differences affected by land use policy were compared and described in Section 6.4.

6.3.1.3 Bangkok Municipal Zoning

According to Bangkok urban context and Bangkok Municipal Administration (BMA), the city was divided into six zones as follows:

Zoning 1: Northern Bangkok
Zoning 2: Central Bangkok
Zoning 3: Southern Bangkok
Zoning 4: Eastern Bangkok
Zoning 5: Northwestern Bangkok (Northern Thonburee)
Zoning 6: Southwestern Bangkok (Southern Thonburee)

Due to the distinctive context and geographical condition of each zone, investigating the psychological differences amongst the dwellers of the different zones was one of the primary processes of this analytical stage. To investigate the

effects of Bangkok municipal zoning on the dependent variables, the one-way ANOVA was also performed. The statistical sub-hypotheses 1.3 are described below.

Null Hypothesis H(1.3)$_0$: There is no significant difference in safety concern, privacy satisfaction, and sense of community between Zone1, Zone2, Zone3, Zone4, Zone5, and Zone6

Alternative Hypothesis H(1.3)$_1$: There is significant difference in safety concern, privacy satisfaction, and sense of community between Zone1, Zone2, Zone3, Zone4, Zone5, and Zone6

The one-way ANOVA analysis rejected H_0 and accepted the alternative hypothesis H_1 that there were significant differences in safety concern, privacy satisfaction, and sense of community amongst the respondents from the different zones of Bangkok.

The significant effects of Bangkok municipal zoning on the dwellers' safety concerned were detected at $F(5, 1200) = 3.899$, $p = .002$. In more detail, it was found that the city zoning affected behavioural disorder at $F(5, 1200) = 5.566$, $p = .000$, and emergencies concern at $F(5, 1200) = 2.794$, $p = .016$. Post hoc comparisons using the Scheffe (Equal of variances assumed) and Tamhane criteria (Equal of variances not assumed) indicated the mean differences as described below.

Table 6.6 One-way ANOVA summary table: Safety Concern Score, Behavioural Disorder Score, and Emergency Concern Score by Bangkok Municipal Zoning

N=1206

	Variables	Safety Concern	Behavioural Disorder Concern	*Emergency Concern*
Zone1: Northern Bangkok	*M*	2.506	2.360	2.688
	S.D.	.998	1.053	1.185
Zone2: Central Bangkok	*M*	2.670	2.528	2.938
	S.D.	.940	1.027	1.175
Zone3: Southern Bangkok	*M*	2.592	2.398	2.792
	S.D.	.994	1.055	1.151
Zone4: Eastern Bangkok	*M*	2.467	2.283	2.750
	S.D.	.911	.908	1.216
Zone5: Northwestern Bangkok	*M*	2.777	2.717	2.954
	S.D.	.974	1.108	1.208
Zone6: Southwestern Bangkok	*M*	2.791	2.673	3.050
	S.D.	1.003	1.128	1.239
	F(5,1200)	3.899	5.566	2.794
	p	.000***	.000***	.016*
	Post hoc Tests	Tamhane 5,6>4	Tamhane 5,6>1,4; 5>3	Tamhane 6>1

*$p \leq .05$, ** $p \leq .005$, *** $p \leq .001$

***Note**: All predictive regression models were under the conditions that all variables were measured with the defined units of PE assessment and PEP questionnaire.*

All data sets were proved conforming to the primary assumption of a normal distribution *by means of considering the skewness and kurtosis of data sets, which were in between ±2.*

Meanwhile, the significant effects of Bangkok municipal zoning on the dwellers' privacy satisfaction was detected at $F(5, 1200) = 2.324$, $p = .041$. In more detail, it was found that the city zoning affected informational privacy satisfaction at $F(5, 1200) = 2.542$, $p = .027$, and physical privacy satisfaction at $F(5, 1200) = 2.954$, $p = .012$. Post hoc test using the Tamhane's calculation (Equal of variances not assumed) indicated the mean differences as follows.

Table 6.7 One-way ANOVA summary table: Privacy Satisfaction Score, Informational Privacy Score, and Physical Privacy Score by Bangkok Municipal Zoning

N=1206

	Variables	*Privacy Satisfaction*	*Informational Privacy*	*Physical Privacy*
Zone1: Northern Bangkok	*M*	4.131	4.130	4.433
	S.D.	.673	.862	.761
Zone2: Central Bangkok	*M*	4.006	3.942	4.214
	S.D.	.745	.890	.845
Zone3: Southern Bangkok	*M*	3.964	3.895	4.164
	S.D.	.791	.959	.9159
Zone4: Eastern Bangkok	*M*	4.030	4.006	4.239
	S.D.	.772	.886	.851
Zone5: Northwestern Bangkok	*M*	3.989	3.903	4.197
	S.D.	.804	.936	.881
Zone6: Southwestern Bangkok	*M*	3.884	3.841	4.164
	S.D.	.844	1.050	.883
	F(5,1200)	2.324	2.542	2.954
	p	.041*	.027*	.012*
	Post hoc Tests	Tamhane 1>6	Tamhane 1>6	Tamhane 1>3,6

*$p \leq .05$, ** $p \leq .005$, *** $p \leq .001$

***Note**: All predictive regression models were under the conditions that all variables were measured with the defined units of PE assessment and PEP questionnaire.*

All data sets were proved conforming to the primary assumption of a normal distribution *by means of considering the skewness and kurtosis of data sets, which were in between ±2.*

Considering sense of community, the significant effects of Bangkok municipal zoning on the dwellers' sense of community were detected at $F(5, 1200) = 11.295$, $p = .000$. To be more specific, it was found that the city zoning affected sense of membership at $F(5, 1200) = 8.326$, $p = .000$, reciprocal influence at $F(5, 1200) = 7.216$, $p = .000$, communal reinforcement at $F(5, 1200) = 7.848$, $p = .000$, and emotional connection at $F(5, 1200) = 10.857$, $p = .000$. Post hoc comparisons using the Tamhane (Equal of variances not assumed) tests indicated the mean differences as follows.

Table 6.8 One-way ANOVA summary table: Sense of Community Score, Sense of Membership Score, Reciprocal Influence Score, Communal Reinforcement Score and Emotional Connection Score by Bangkok Municipal Zoning

N=1206

	Variables	Sense of Community	Membership	Influence	*Reinforcenm-ent*	*Emotional Connection*
Zone1: Northern	*M*	3.462	3.623	3.309	3.260	3.654
	S.D.	.742	.841	.869	.926	.888
Zone2: Central	*M*	3.033	3.170	2.925	2.970	3.068
	S.D.	.757	.853	.894	.895	.953
Zone3: Southern	*M*	3.375	3.469	3.262	3.292	3.477
	S.D.	.660	.794	.850	.864	.811
Zone4: Eastern	*M*	3.487	3.531	3.407	3.494	3.514
	S.D.	.684	.785	.807	.864	.834
Zone5: Northwestern	*M*	3.205	3.291	3.139	3.096	3.293
	S.D.	.753	.859	.864	.906	.891
Zone6: Southwestern	*M*	3.367	3.478	3.249	3.310	3.430
	S.D.	.728	.791	.911	.940	.878
	F(5,1200)	11.295	8.326	7.216	7.848	10.857
	p	.000***	.000***	.000***	.000***	.016*
	Post hoc Tests	Scheffe 2<1,3,4,6 5<1 5<4	Scheffe 2<1,3,4,6 5<1	Scheffe 2<1,3,4,6	Scheffe 2<3,4,6 5<4	Scheffe 2<1,3,4,6 5<1

*$p \leq .05$, ** $p \leq .005$, *** $p \leq .001$

***Note**: All predictive regression models were under the conditions that all variables were measured with the defined units of PE assessment and PEP questionnaire.*

All data sets were proved conforming to the primary assumption of a normal distribution *by means of considering the skewness and kurtosis of data sets, which were in between ±2.*

The effect size and statistical power of all significant differences affected by zoning of Bangkok were compared and described in Section 6.4.

6.3.2 Influences of Physical Environmental Factors on the Psychological Status of High-rise Dwellers

To find the answer to this research question and test the major hypothesis $H1_0$, the physical environmental variables listed below were tested by means of the different statistical approaches depending on the kind of data and the scale of measurements.

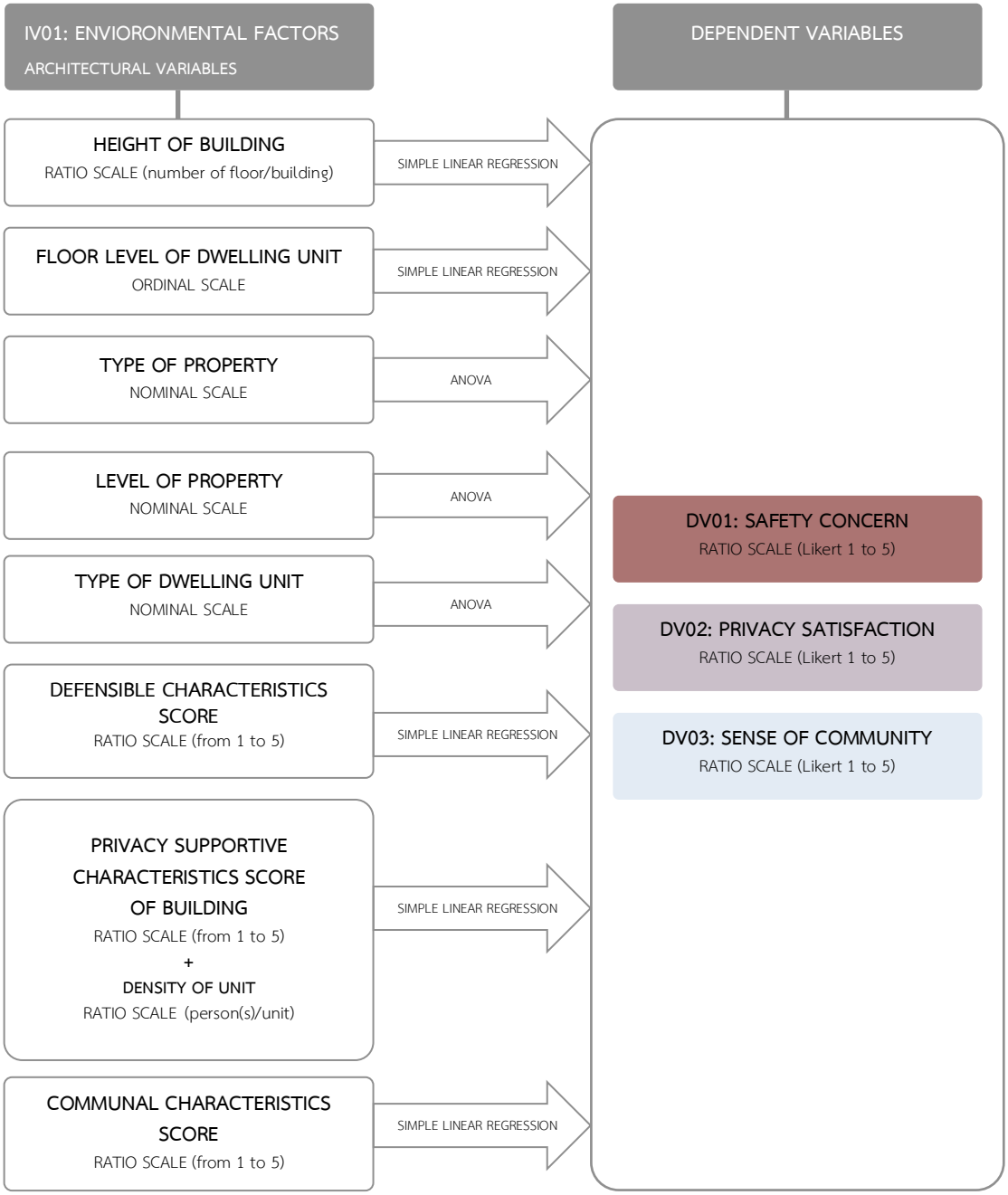


Figure 6.15 *Diagram of analytical approach for architectural variables*

The table below summarises the statistically significant effects of all independents variables under the group of architectural factors. The further explanations about the statistical analytical process of each independent variable are provided separately in the next section.

Table 6.9 Summary of Statistical Effects of Architectural Variables on Dependent Variables Safety Concern, Privacy Satisfaction, and Sense of Community and their Sub-variables

IV01: Environmental Factors *Architectural Variables*	Dependent Variables and Sub Variables														Notes
	Average Safety Concern	Crime Concern	Behavioural Disorder Concern	Emergency Concern	Average Privacy Satisfaction	Psychological Privacy Satisfaction	Informational Privacy Satisfaction	Physical Privacy Satisfaction	Social Privacy Satisfaction	Average Sense of Community	Membership	Influence	Reinforcement	Emotional Connection	
1. Height of Building	✔	✔												✔	SLR
2. Floor Level of Dwelling Unit				✔											SLR
3. Type of Property	✔	✔		✔						✔	✔		✔	✔	T-test
4. Level of Property	✔	✔	✔	✔		✔					✔		✔		ANOVA
5. Type of Dwelling Unit			✔				✔	✔							ANOVA
6. Defensible Score Bldg.	✔	✔		✔						✔	✔		✔		SLR
7. Privacy Supportive Score Bldg.	✔		✔	✔	✔	✔	✔	✔					✔		SLR
8. Communal Score Bldg.						✔				✔				✔	SLR

✔ = Statistical effect detected at 95% Confidence Interval

6.3.2.1 Height of Building

The height of each residential building was considered as an architectural factor that influenced the psychological status of the dwellers due to this number related to the density of residential high-rises. However, it was also necessary to consider this value with other concurrent values, such as the floor density and the floor level of the dwelling unit interpreted in the next sections. According to the field survey, the height of the building was measured on the ratio scale. The unit of measurement was the total number of building's storeys (number of floors per building).

The simple linear regression was calculated to predict participants' average score safety concern influenced by the height of building. The statistical sub-hypotheses 1.4 are described below.

Null Hypothesis $H(1.4)_0$ **:** There is no significant prediction of dependent variables: safety concern, privacy satisfaction, and sense of community by density of height of building

Alternative Hypothesis $H(1.4)_1$ **:** There is significant prediction of dependent variables: safety concern, privacy satisfaction, and sense of community by density of height of building

The simple linear regression calculation rejected the null hypothesis at p-value < 0.05, which meant the effect of the height of condominium on at least one of the dependent variables statistically existed. According to the summary table (See

Table 6.10), it appeared that the negative effect of condominium's height on the average score of safety concern existed, whereas, the positive effect of the height of condominium on emotional connection was also detected.

However, please note that despite the significant p-values < .05, the R^2 of these equations were extremely small and lower than the minimum magnitude and power of effect required by this study. (See more detail in Section 6.4, Table 6.53 and 6.55) Therefore, the predictability of these two equations was unconfirmed due to their small sized-effect and the low chance of detecting which was less than 80% according to the Cohen's criterion of effect size.

Amongst the mentioned influences described in Table 6.10, the negative effects of the height of building on crime concern achieved the minimum requirement of the study by owning the 82% chances to detect a small-sized effect at $F(1,1204)= 8.798$, $p = .003$), with an R^2 of .007. It could be interpreted that the participants' crime concern decreased 0.018 for each floor per building. In other words, the higher condominium was, the less crime concern of the residents could be predicted. The predictive equation is revealed as follows.

Crime Concern = 3.067 + (-.018)(height of building)

Table 6.10 Summary of simple linear regression models for Safety Concern, Privacy Satisfaction, and Sense of Community Scores including their sub-variables predicted by the predictor, Height of Residential Building

N=1206

	Predictors						
	Height of Residential Building (Enter Method)						
Response variables	*F*	R^2	B	S.E.	β	*t*	*p*
Safety Concern	4.294	.004	-.011	.005	-.059	-2.061	.039*
Crime Concern	8.798	.007	-.018	.006	-.085	-2.966	.003**
Behavioural Concern	1.253	.001	-.006	.006	-.032	-1.120	.263
Emergency Concern	1.366	.001	-.008	.007	-.034	-1.169	.243
Privacy Satisfaction	.173	.000	.002	.004	.012	.415	.678
Psycho. Privacy Sat.	.000	.005	.000	.005	-.002	-.068	.945
Info. Privacy Sat.	.013	.000	-.001	.005	-.003	-.115	.909
Physical Privacy Sat.	.324	.000	.003	.005	.016	.570	.569
Social Privacy Sat.	1.016	.001	.005	.005	.029	1.008	.314
Sense of Community	.083	.000	.001	.004	.008	.287	.774
Membership	.570	.000	-.003	.005	-.022	-.755	.450
Influence	.001	.000	.000	.005	-.001	-.036	.971
Reinforcement	.085	.000	-.001	.005	-.008	-.292	.771
Emotional Connection	3.941	.003	.010	.005	.057	1.985	.047*

*$p \leq .05$, ** $p \leq .005$, *** $p \leq .001$

Note*: All predictive regression models were under the conditions that all variables were measured with the defined units of PE assessment and PEP questionnaire.*

All data sets were proved conforming to the primary assumptions of 1) linear relationship (by Scatter plot), 2) no auto-correlation (by Durbin-Watson test $d \leq 4\text{-}d_L$*), 3)* error terms had mean zero and constant variance uncorrelated (by residual statistics), and 4) multivariate normality *(by Normal P-P plot).*

6.3.2.2 Floor Level of Dwelling Unit

This architectural feature was assumed as another physical environmental factor influencing the psychological variables in this study. The most expected effect of the height of the dwelling unit was on the safety concern as found in some previous research. The ratio data was measured in the unit of the floor level of dwelling unit. The SLR method was performed to investigate the significant predictive model. The statistical sub-hypotheses 1.5 are described below

Null Hypothesis $H(1.5)_0$ **:** There is no significant prediction of dependent variables: safety concern, privacy satisfaction, and sense of community by floor level of dwelling unit

Alternative Hypothesis $H(1.5)_1$ **:** There is significant prediction of dependent variables: safety concern, privacy satisfaction, and sense of community by floor level of dwelling unit

According to the results shown in Table 6.11, the SLR calculation rejected the null hypothesis at p-value < 0.05 and accepted the existence of the positive

effect of the floor level of the dwelling unit on the emergency concern. However, it is noteworthy that the R^2 of this effect was minuscule and lower than the minimum magnitude and power of effect required by this study. (See more detail in Section 6.4, Table 6.53 and 6.55) Therefore, the predictability of this effect was unconfirmed due to the small sized-effect and the chance of detecting which was less than 80%.

Table 6.11 Summary of simple linear regression models for Safety Concern, Privacy Satisfaction, and Sense of Community Scores including their sub-variables predicted by the predictor, Floor Level of Dwelling Unit

N=1206

	Predictors						
	Floor Level of Dwelling Unit (Enter Method)						
Response variables	*F*	R^2	B	S.E.	β	*t*	*p*
Safety Concern	.452	.000	.003	.004	.020	.672	.502
Crime Concern	.132	.000	-.002	.005	-.011	-.363	.717
Behavioural Concern	.161	.000	.002	.005	.012	.401	.689
Emergency Concern	4.686	.004	.011	.005	.065	2.165	.031*
Privacy Satisfaction	.405	.000	.002	.003	.019	.636	.525
Psycho. Privacy Sat.	.063	.000	-.001	.004	-.008	-.252	.801
Info. Privacy Sat.	.041	.000	-.001	.004	-.006	-.203	.839
Physical Privacy Sat.	.932	.001	.004	.004	.029	.965	.335
Social Privacy Sat.	2.650	.002	.007	.004	.049	1.628	.104
Sense of Community	1.008	.001	-.003	.003	-.030	-1.004	.316
Membership	2.477	.001	-.006	.004	-.047	-1.574	.116
Influence	.468	.000	-.003	.004	-.021	-.684	.494
Reinforcement	.932	.001	-.004	.004	-.029	-.965	.335
Emotional Connection	.034	.000	-.001	.004	-.006	-.183	.854

*$p \leq .05$, ** $p \leq .005$, *** $p \leq .001$

Note*: All predictive regression models were under the conditions that all variables were measured with the defined units of PE assessment and PEP questionnaire.*

All data sets were proved conforming to the primary assumptions of 1) linear relationship (by Scatter plot), 2) no auto-correlation (by Durbin-Watson test $d \leq 4\text{-}d_L$*), 3)* error terms had mean zero and constant variance uncorrelated (by residual statistics), and 4) multivariate normality *(by Normal P-P plot).*

6.3.2.3 Type of Property

According to the literature, the discussion on the issue of gated and non-gated residence has continued for decades. In some urban contexts, the gated territory seemed to be an effective access control and crime defense yet in some contexts it became a wall that trapped fear and over-responsive behaviour to threats inside. Amongst the eighteen condominiums, there were two types of residential

high-rise compound: 1) Gated property, and 2) Semi-gated property as described earlier in the Chapter 5.

To investigate the differences of psychological status between the residents of gated community and semi-gated community, an independent sample t-test was performed. The statistical sub-hypotheses 1.6 are described below.

Null Hypothesis H(1.6)$_0$:	There is no significant difference in safety concern, privacy satisfaction, and sense of community between sampling groups of gated property and semi-gated property
Alternative Hypothesis H(1.6)$_1$:	There is significant difference in safety concern, privacy satisfaction, and sense of community between sampling groups of gated property and semi-gated property

The independent sample t-test method rejected H_0, whereas, accepted the alternative hypothesis H_1 that the respondents from gated and semi-gated communities had the different level of safety concern and sense of community significantly.

The results indicated that the total mean score of safety concern of these two groups were statistically different at the significant level of .05 (t = 2.248, p = .025). When considering the mean score of sub-variables involving the safety issue, the independent sample t-test led to the finding that the mean score of crime concern and emergency concern of respondents living in the gated condominiums were significantly higher than those who living in the semi-gated condominiums (t = 2.201, p = .028 and t = 2.902, p = .004 consecutively). Furthermore, the mean score of sense of community of the respondents living in the semi-gated condominiums was significantly higher than those who living in the gated condominiums (t = -3.337, p = .001) as well as their mean scores of membership, reinforcement, and emotional senses of community were significantly higher (t = -3.627, p = .000, t = -2.533, p = .011, and t = -3.350, p = .001 consecutively). (See Table 6.12) Meanwhile, the mean scores of privacy satisfaction and its sub-variables of these two groups of respondents were not different statistically.

Table 6.12 Independent sample t-test table comparing mean scores of Safety Concern, Crime Concern, Emergency Concern, Sense of Community, Membership, Reinforcement, and Emotional Connection between Group of residents of gated condominiums and Group of residents of semi-gated condominiums

N=1206

	Residents of gated condominiums			Residents of semi-gated condominiums			t-test for Equality of Means	
	N	Mean	Std. Deviation	N	Mean	Std. Deviation	*t*	Sig. (2-tailed)
Safety Concern	596	2.7017	.93811	610	2.5754	1.0127	2.248	.025*
Crime Concern	596	2.6963	1.0615	610	2.5574	1.1284	2.201	.028*
Emergency Concern	596	2.9656	1.1779	610	2.7656	1.2153	2.902	.004**
Sense of Community	596	3.2481	.7002	610	3.3893	.7675	-3.337	.001***
Membership	596	3.3393	.8100	610	3.5128	.8497	-3.627	.000***
Reinforcement	596	3.1651	.8772	610	3.2980	.9440	-2.533	.011*
Emotional	596	3.3191	.8762	610	3.4913	.9081	-3.350	.001***

95% Confidence Interval of the Difference

*$p \leq .05$, ** $p \leq .005$, *** $p \leq .001$

The effect size and statistical power of all significant differences affected by type of property were compared and described in Section 6.4.

6.3.2.4 Level of Property

The level of property in this study was categorised in the same way as the economic clusters of the sampling group as follows: 1) Low selling price condominium, 2) Middle selling price condominium, and 3) High selling price condominium, which was measured in the nominal scale. According to the physical survey reported in the Chapter 5, it was clear that the environmental management of these three levels of condominium were different. The high-selling price condos seemed to have more defensible features than the other two. Meanwhile, the middle and low selling price condos were more opened to the community and did not strictly control the non-residents' access. Therefore, these distinctive environments led to the assumption that the residents of each level of the condominium are having the different psychological status as well.

The one-way ANOVA was brought up to investigate the significant effects of the level of the property on the three psychological dependent variables. The statistical sub-hypotheses 1.7 are described below.

Null Hypothesis H(1.7)$_0$:	There is no significant difference in safety concern, privacy satisfaction, and sense of community between Level 1: Low selling price condominium, Level 2: Middle selling price condominium, and Level 3: High selling price condominium
Alternative Hypothesis H(1.7)$_1$:	There is significant difference in safety concern, privacy satisfaction, and sense of community between Level 1: Low selling price condominium, Level 2: Middle selling price condominium, and Level 3: High selling price condominium

The analysis rejected the null hypothesis H_0 and accepted the alternative hypothesis H_1 that there were significant differences in safety concern and sense of community amongst the respondents living the different levels of property.

The results revealed that the significant effects of the level of property on the respondents' safety concern, crime concern, behavioural disorder concern, and emergency concern were detected at $F(2, 1203) = 9.736$, $p = .000$, $F(2, 1203) = 12.738$, $p = .000$, $F(2, 1203) = 5.292$, $p = .005$, and $F(2, 1203) = 10.307$, $p = .000$ respectively. Moreover, it also affected the respondents' psychological privacy satisfaction at $F(2, 1203) = 4.572$, $p = .011$ as well as the respondents' sense of membership and reinforcement at $F(2, 1203) = 3.742$, $p = .024$ and $F(2, 1203) = 4.755$, $p = .009$ respectively. The Post hoc comparisons using the Scheffe (Equal of variances assumed) and Tamhane (Equal of variances not assumed) criteria indicated the mean differences as follows. (See Table 6.13)

Table 6.13 One-way ANOVA summary table: Behavioural Disorder Concern, Informational Privacy Satisfaction, and Physical Privacy Satisfaction Scores by Type of Dwelling Unit

N=1206

	Level 1		*Level 2*		*Level 3*				
Variables	*M*	*S.D.*	*M*	*S.D.*	*M*	*S.D.*	*F(2,1203)*	*p*	*Post hoc Tests*
Safety Concern	2.808	0.917	2.522	0.978	2.586	1.019	9.736	.000***	Tamhane 1 > 2,3
Crime Concern	2.811	1.040	2.431	1.093	2.647	1.129	12.738	.000***	Scheffe 1 > 2 < 3
Behaviour Concern	2.625	1.028	2.485	1.077	2.379	1.070	5.292	.005**	Scheffe 1 > 3
Emergency Concern	3.078	1.152	2.715	1.193	2.804	1.231	10.307	.000***	Scheffe 1 > 2,3
Psycho Privacy Stfn	3.963	0.925	3.902	1.011	4.105	0.955	4.572	.011*	Scheffe 3 > 2
Membership	3.516	0.818	3.402	0.849	3.359	0.829	3.742	.024*	Scheffe 1 > 3
Reinforcement	3.312	0.880	3.260	0.949	3.117	0.899	4.755	.009*	Scheffe 1 > 3

*$p \leq .05$, ** $p \leq .005$, *** $p \leq .001$

***Note**: All predictive regression models were under the conditions that all variables were measured with the defined units of PE assessment and PEP questionnaire.*

All data sets were proved conforming to the primary assumption of a normal distribution *by means of considering the skewness and kurtosis of data sets, which were in between ±2.*

The effect size and statistical power of all significant differences affected by the level of property were compared and described in Section 6.4.

6.3.2.5 Type of Dwelling Unit

The physical feature of the dwelling unit was brought up as one of the interior architectural determinants that influenced the level of privacy satisfaction of the occupants. Although, there were no previous research that confirmed its physical impact on people, the density of the unit and unbalance between the number of occupants and the living space were pointed out. Based on the approach of this research that considered the privacy as the psychological process of controlling personal emotion, information, physical protection, etc., the features of each dwelling unit type could be the key that help them to control these issues. The occupants who living in the one bedroom unit, two bedroom unit, and the multi-bedroom unit could exploit the extra walls provided by the building, whereas, the occupants living in the studio type might face more difficulties to control their privacy. The type of dwelling unit was measured in the nominal scale. Regarding the PEP questionnaire, there were five types of dwelling units: 1) Studio, 2) One bedroom unit, 3) Two bedrooms unit, 4) More than two bedrooms unit, and 5) Others. The one-way ANOVA was brought up to investigate the significant effects of different types of dwelling unit on the three psychological dependent variables. The statistical sub-hypotheses 1.8 are described below.

Null Hypothesis H(1.8)$_0$:	There is no significant difference in safety concern, privacy satisfaction, and sense of community between Type1: studio, Type2: one bedroom unit, Type3: two bedrooms unit, Type4: more than two bedrooms unit, and Type5: others
Alternative Hypothesis H(1.8)$_1$:	There is significant difference in safety concern, privacy satisfaction, and sense of community between Type1: studio, Type2: one bedroom unit, Type3: two bedrooms unit, Type4: more than two bedrooms unit, and Type5: others

The one-way ANOVA analysis rejected the null hypothesis H_0 and accepted the alternative hypothesis H_1 that there were significant differences in behavioural disorder concern and privacy satisfaction amongst the respondents living the different type of unit.

The results revealed that the significant effects of the type of dwelling unit on the respondents' behavioural concern were detected at $F(4, 1201) = 2.642$, $p = .032$. Moreover, it also affected the respondents' privacy satisfaction especially the informational and physical privacy satisfaction at $F(4, 1201) = 2.575$, $p = .036$, and $F(4, 1201) = 3.108$, $p = .013$ consecutively. The Post hoc comparisons using the LSD

(Equal of variances assumed) tests indicated the mean differences as described below. (See Table 6.14)

Table 6.14 One-way ANOVA summary table: Behavioural Disorder Concern, Informational Privacy Satisfaction, and Physical Privacy Satisfaction Scores by Type of Dwelling Unit

N=1206

	Variables	*Behavioural Disorder Concern*	*Informational Privacy Satisfaction*	*Physical Privacy Satisfaction*
Type 1: Studio	*M*	2.631	3.870	4.144
	S.D.	1.054	.962	.897
Type 2: One bedroom	*M*	2.440	4.022	4.301
	S.D.	1.038	.898	.806
Type 3: Two bedrooms	*M*	2.420	4.010	4.299
	S.D.	1.090	.914	.866
Type 4: More than two bedrooms	*M*	2.425	3.839	4.218
	S.D.	1.120	1.015	.908
Type 5: Others	*M*	2.182	3.500	3.727
	S.D.	1.177	1.304	.958
	F(4,1201)	2.642	2.575	3.108
	p	.032*	.036*	.013*
	Post hoc Tests	LSD 1<2,3	LSD 1<2	LSD 1<2,3

*$p \leq .05$, ** $p \leq .005$, *** $p \leq .001$

***Note**: All predictive regression models were under the conditions that all variables were measured with the defined units of PE assessment and PEP questionnaire.*

All data sets were proved conforming to the primary assumption of a normal distribution *by means of considering the skewness and kurtosis of data sets, which were in between ±2.*

The effect size and statistical power of all significant differences affected by type of dwelling unit were compared and described in Section 6.4.

6.3.2.6 Defensible Characteristics Score

According to the results of PE assessment described in Chapter 5, the defensible characteristics score of the condominiums were converted from the nominal data to the numerical scores in order to investigate its effects on all dependent variables especially on the safety concern of the respondents. The architectural defensible characteristic of the building was presumed to reduce their concern of safety. With respect to the ratio unit of measurement scoring one to five, the simple linear regression was applied based on the statistical sub-hypotheses 1.9 are described below.

Null Hypothesis $H(1.9)_0$: There is no significant prediction of dependent variables: safety concern, privacy satisfaction, and sense of community by defensible characteristics score of building

Alternative Hypothesis H(1.9)$_1$: There is significant prediction of dependent variables: safety concern, privacy satisfaction, and sense of community by defensible characteristics score of building

According to the results shown in Table 6.15, the simple linear regression calculation rejected the null hypothesis at p-value < 0.05 and accepted the adverse influences of the defensible characteristic score on the safety concern and sense of community including their sub-variables. Meanwhile, the regressive effect of this indicator on the privacy satisfaction could not be detected.

Regarding the Cohen's magnitude of the effect (See Section 6.4, Table 6.53 and 6.55), amongst all results reported in the summary table, there were two SLR equations that reached the minimum effect size and power required by this study, namely, the effects of the defensible characteristic score of the condominium on crime concern and feeling of membership. The predictive equation for crime concern was detected at $F(1,1204)= 8.996$, $p = .003$, with an R^2 of .007, whereas, the predictive model for the feeling of membership was found at $F(1,1204)= 10.341$, $p = .001$, with an R^2 of .009 respectively. The predictive equations are described as follows.

Crime Concern = 3.262 + (-.109)(defensible score of condominiums)
Membership = 3.815 + (-.106)(defensible score of condominiums)

The above equations are implying that the higher defensible characteristic score earned by a condominium, the less crime concern and the feeling of membership of its residents could be predicted.

Table 6.15 Summary of simple linear regression models for Safety Concern, Privacy Satisfaction, and Sense of Community Scores including their sub-variables predicted by the predictor, Defensible Characteristics Score of the Building

N=1206

	Predictors						
	Defensible Characteristics Score of Condominiums (Enter Method)						
Response variables	*F*	R^2	B	S.E.	β	*t*	*p*
Safety Concern	5.908	.005	-.094	.039	-.070	-2.431	.015*
Crime Concern	8.996	.007	-.130	.043	-.086	-2.999	.003**
Behavioural Concern	1.315	.001	-.048	.042	-.033	-1.147	.252
Emergency Concern	5.236	.004	-.109	.047	-.066	-2.288	.022*
Privacy Satisfaction	2.576	.002	.049	.031	.046	1.605	.109
Psycho. Privacy Sat.	1.812	.002	.052	.038	.039	1.346	.179
Info. Privacy Sat.	.788	.001	.033	.037	.026	.888	.375
Physical Privacy Sat.	3.115	.003	.060	.034	.051	1.765	.078
Social Privacy Sat.	1.881	.002	.052	.038	.039	1.372	.170
Sense of Community	6.005	.005	-.072	.029	-.070	-2.450	.014*
Membership	10.341	.009	-.106	.033	-.092	-3.261	.001***
Influence	.780	.001	-.031	.035	-.025	-.883	.377
Reinforcement	7.538	.006	-.099	.036	-.079	-2.745	.006**
Emotional Connection	2.005	.002	-.050	.036	-.041	-1.416	.157

*$p \leq .05$, ** $p \leq .005$, *** $p \leq .001$

***Note**: All predictive regression models were under the conditions that all variables were measured with the defined units of PE assessment and PEP questionnaire.*

All data sets were proved conforming to the primary assumptions of 1) linear relationship (by Scatter plot), 2) no auto-correlation (by Durbin-Watson test $d \leq 4\text{-}d_L$), 3) error terms had mean zero and constant variance uncorrelated (by residual statistics), and 4) multivariate normality *(by Normal P-P plot).*

6.3.2.7 Privacy Supportive Characteristics Score

To investigate the impact of privacy supportive characteristics of high-rise housing environment, the privacy supportive characteristics scores of the eighteen condominiums derived from the PE assessment were combined with the density of dwelling unit score of each respondents before the simple linear regression modelling was applied. The density of dwelling unit (person(s) per unit) was converted into five privacy supportive scores as follows.

One occupant = 5	Two occupants = 4	Three occupants = 3
Four occupants = 2	Five occupants and more = 1	

The effects of the privacy characteristic score of the building were presumed especially on the privacy satisfaction level of the respondents. The statistical sub-hypotheses 1.10 are described below.

Null Hypothesis H(1.10)$_0$:	There is no significant prediction of dependent variables: safety concern, privacy satisfaction, and sense of community by privacy supportive characteristics score of building
Alternative Hypothesis H(1.10)$_1$:	There is significant prediction of dependent variables: safety concern, privacy satisfaction, and sense of community by privacy supportive characteristics score of building

The SLR calculation rejected the null hypothesis and accepted that the privacy-supportive characteristic of the condominium influenced the variation of safety concern, privacy satisfaction, and sense of community including their sub-variables. Concerning the effect size and power (See Section 6.4), the regressive effects that achieved the minimum requirement were interpreted as follows.

The results indicated that the privacy supportive characteristic score of condominiums negatively affected the average score of safety concern and behavioural disorder concern. The predictive model of the safety concern was found at $F(1,1204)= 7.936$, $p = .005$, with an R^2 of .007. Participants' predicted safety concern was equal to 3.114 + (-.066)(privacy-supportive score). (See Table 6.16) Participants' predicted safety concern decreased 0.066 for each privacy-supportive score. The model for behavioural disorder concern was detected at $F(1,1204)= 10.015$, $p = .002$, with an R^2 of .008. The predicted behavioural concern was equal to 3.079 + (-.081)(privacy supportive score). (See Table 6.16) The predictive equation is described as follows.

Safety Concern = 3.114 + (-.066)(privacy supportive score)
Behavioural Disorder Concern = 3.079 + (-.081)(privacy supportive score)

For the aspect of privacy satisfaction, it appeared that the privacy supportive characteristic score of the condominium positively affected the average score of privacy satisfaction including the psychological privacy satisfaction and the physical privacy satisfaction.

The predictive model of the privacy satisfaction was found at $F(1,1204)= 9.540$, $p = .002$, with an R^2 of .008 which could be interpreted that participants' privacy satisfaction increased 0.058 for each privacy supportive score. (See Table 6.16) The predictive model of the psychological privacy satisfaction was revealed at $F(1,1204)= 10.412$, $p = .001$, with an R^2 of .009 which could be interpreted that

participants' psychological privacy satisfaction increased 0.075 for each privacy supportive score. Meanwhile, the predictive model of the physical privacy satisfaction was revealed at $F(1,1204)= 12.364$, $p = .000$, with an R^2 of .01 (See Table 6.16) which could be interpreted that participants' physical privacy satisfaction increased 0.074 for each privacy supportive score. The predictive equations of these results are described as follows.

Privacy Satisfaction = 3.587 + .058(privacy supportive score)

Psychological Privacy Satisfaction = 3.446 + .075 (privacy supportive score)

Physical Privacy Satisfaction = 3.709 + .074 (privacy supportive score)

Table 6.16 Summary of simple linear regression models for Safety Concern, Privacy Satisfaction, and Sense of Community Scores including their sub-variables predicted by the predictor, Privacy Supportive Characteristics Score of the Building

N=1206

	Predictors Privacy Supportive Characteristics Score of Condominiums (Enter Method)						
Response variables	*F*	R^2	B	S.E.	β	*t*	*p*
Safety Concern	7.936	.007	-.066	.024	-.081	-2.817	.005**
Crime Concern	2.896	.002	-.045	.027	-.049	-1.702	.089
Behavioural Concern	10.015	.008	-.081	.026	-.091	-3.165	.002**
Emergency Concern	6.994	.006	-.077	.029	-.076	-2.645	.008*
Privacy Satisfaction	9.540	.008	.058	.019	.089	3.089	.002**
Psycho. Privacy Sat.	10.412	.009	.075	.023	.093	3.227	.001***
Info. Privacy Sat.	6.068	.005	.056	.023	.071	2.463	.014*
Physical Privacy Sat.	12.364	.010	.074	.021	.102	3.554	.000***
Social Privacy Sat.	1.272	.001	.026	.023	.032	1.128	.260
Sense of Community	1.595	.001	-.023	.018	-.036	-1.263	.207
Membership	.000	.000	.000	.020	.000	.007	.994
Influence	.028	.000	-.004	.021	-.005	-.166	.868
Reinforcement	4.660	.004	-.048	.022	-.062	-2.159	.031*
Emotional Connection	3.267	.003	-.039	.022	-.052	-1.808	.071

*$p \leq .05$, ** $p \leq .005$, *** $p \leq .001$

***Note**: All predictive regression models were under the conditions that all variables were measured with the defined units of PE assessment and PEP questionnaire.*

All data sets were proved conforming to the primary assumptions of 1) linear relationship (by Scatter plot), 2) no auto-correlation (by Durbin-Watson test $d \leq 4\text{-}d_L$), 3) error terms had mean zero and constant variance uncorrelated (by residual statistics), and 4) multivariate normality *(by Normal P-P plot).*

6.3.2.8 Communal Characteristics Score

The communal characteristic score of the condominium derived from the PE assessment was included in the SLR calculation as one of the predictors. Assumedly, the presumptive effect of the communal characteristic of the building on the sense of community of the respondents was expected. The statistical sub-hypotheses 1.11 are described below.

Null Hypothesis $H(1.11)_0$:	There is no significant prediction of dependent variables: safety concern, privacy satisfaction, and sense of community by communal characteristics score of building
Alternative Hypothesis $H(1.11)_1$:	There is significant prediction of dependent variables: safety concern, privacy satisfaction, and sense of community by communal characteristics score of building

After considering the SLR results, the null hypothesis was rejected at p-value < 0.05. According to the summary demonstrated in Table 6.17, the positive effects of the communal environment on the average score of the sense of community and emotional connection were detected yet their R^2 including the effect size and power were below the minimum requirement of this study. (See Section 6.4)

It appeared that the communal characteristic of the condominium seemed to have an adverse influence on the psychological privacy satisfaction more than on the sense of community.

The regression equation of psychological privacy satisfaction was found at F(1,1204)= 8.609, p = .003, with an R^2 of .007. (See Table 6.17) Participants' predicted psychological privacy satisfaction was equal to 4.193 + (-.069)(communal characteristics score). Participants' predicted psychological privacy satisfaction decreased 0.069 for each communal characteristics score. The predictive equation was revealed as follows.

Psychological Privacy Satisfaction = 4.193 + (-.069)(communal characteristics score)

Apart from the aforementioned results, there was no linear regressive effect was detected significantly between the communal characteristics score of the buildings and the respondents' safety concern.

Table 6.17 Summary of simple linear regression models for Safety Concern, Privacy Satisfaction, and Sense of Community Scores including their sub-variables predicted by the predictor, Communal Characteristics Score of the Building

N=1206

	Predictors Communal Characteristics Score of Condominiums (Enter Method)						
Response variables	*F*	R^2	B	S.E.	β	*t*	*p*
Safety Concern	.212	.000	.011	.024	.013	.461	.645
Crime Concern	1.082	.001	.028	.027	.030	1.040	.299
Behavioural Concern	1.343	.001	.030	.026	.033	1.159	.247
Emergency Concern	2.138	.002	-.042	.029	-.042	-1.462	.144
Privacy Satisfaction	3.051	.008	-.033	.019	-.050	-1.747	.081
Psycho. Privacy Sat.	8.609	.007	-.069	.023	-.084	-2.934	.003**
Info. Privacy Sat.	2.532	.002	-.036	.023	-.046	-1.591	.112
Physical Privacy Sat.	1.699	.010	-.027	.021	-.038	-1.303	.193
Social Privacy Sat.	.001	.000	.001	.023	.001	.031	.975
Sense of Community	4.500	.004	.038	.018	.061	2.121	.034*
Membership	3.288	.003	.037	.020	.052	1.813	.070
Influence	.837	.001	.019	.021	.026	.915	.360
Reinforcement	2.505	.002	.035	.022	.046	1.583	.114
Emotional Connection	7.780	.006	.060	.022	.080	2.789	.005**

*$p \leq .05$, ** $p \leq .005$, *** $p \leq .001$

***Note**: All predictive regression models were under the conditions that all variables were measured with the defined units of PE assessment and PEP questionnaire.*

All data sets were proved conforming to the primary assumptions of 1) linear relationship (by Scatter plot), 2) no auto-correlation (by Durbin-Watson test $d \leq 4\text{-}d_L$), 3) error terms had mean zero and constant variance uncorrelated (by residual statistics), and 4) multivariate normality *(by Normal P-P plot).*

6.3.3 Influences of Personal Factors on the Psychological Status of High-rise Dwellers: Personal Attributes

According to the aforementioned research framework, the personal factors were considered as the important determinants affecting psychological status of high-rise dwellers as well. Due to numbers of variables and indicators, to facilitate the statistical analysis, the variables involving personal factors were divided into three categories as follows: 1) personal attributes, 2) dwelling behaviours, and 3) psychological background.

- Personal Attributes

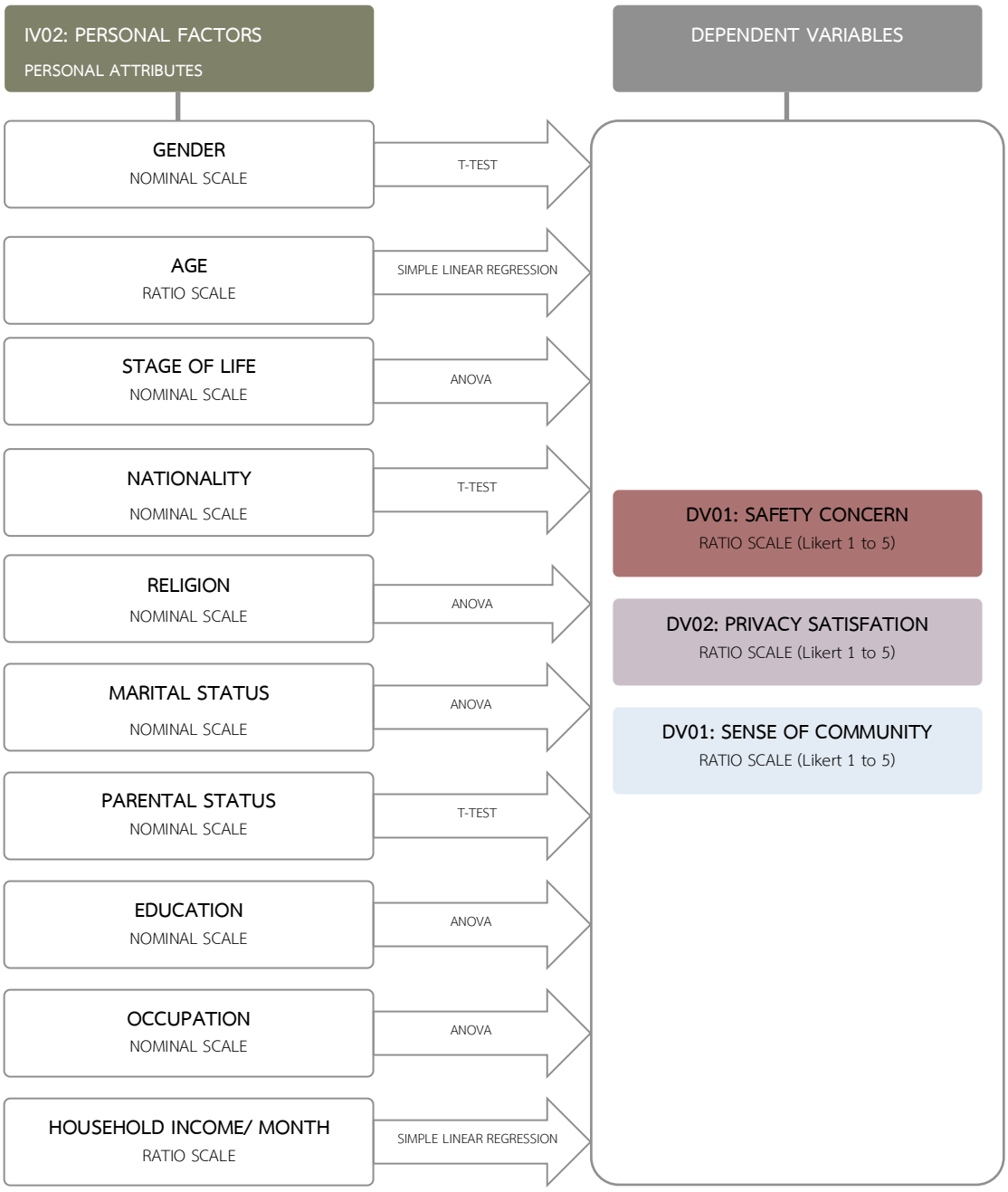


Figure 6.16 Diagram of analytical approach for personal attribute variables

The table below summarised the statistically significant effects of all independents variables under the category of personal attributes. The further explanations about the statistical analytical process of each independent variable are provided separately in the next section.

Table 6.18 *Summary of Statistical Effects of Personal Attribute Variables on Dependent Variables Safety Concern, Privacy Satisfaction, and Sense of Community and their Sub-variables*

IV02: Personal Factors *Personal Attribute Variables*	Dependent Variables and Sub Variables														Notes
	Average Safety Concern	Crime Concern	Behavioural Disorder Concern	Emergency Concern	Average Privacy Satisfaction	Psychological Privacy Satisfaction	Informational Privacy Satisfaction	Physical Privacy Satisfaction	Social Privacy Satisfaction	Average Sense of Community	Membership	Influence	Reinforcement	Emotional Connection	
1. Gender	✔	✔		✔	✔	✔	✔							✔	t-test
2. Age										✔	✔	✔	✔	✔	SLR
3. Stage of life	✔	✔	✔	✔					✔	✔	✔	✔	✔	✔	ANOVA
4. Nationality	✔	✔		✔					✔					✔	t-test
5. Religion	✔	✔	✔	✔				✔	✔	✔			✔	✔	ANOVA
6. Marital Status	✔	✔	✔							✔	✔	✔	✔		ANOVA
7. Parental Status										✔	✔	✔	✔		t-test
8. Education	✔	✔	✔	✔	✔	✔	✔	✔		✔			✔	✔	ANOVA
9. Occupation		✔					✔			✔			✔	✔	ANOVA
10. Household Incomes/ month								✔							SLR

✔ = Statistical effect detected at 95% Confidence Interval

6.3.3.1 Gender

As mentioned in Chapter 2, gender was one of the factors that influenced the mental status of the respondents. In some studies, gender was identified as the moderators. However, this research as well aimed to test its direct impact on the three core psychological variables. Regarding the field survey, the gendered distribution of this sampling group comprised 683 (56.6%) female, and 523 (43.4 %) male. To investigate the significant psychological differences between female and male, the independent sample t-test calculation was administered. The statistical sub-hypotheses 1.12 are described below.

Null Hypothesis H(1.12)$_0$: There is no significant difference in safety concern, privacy satisfaction, and sense of community between sampling groups of male and female

Alternative Hypothesis H(1.12)$_1$: There is significant difference in safety concern, privacy satisfaction, and sense of community between sampling groups of male and female

The independent sample t-test method rejected the null hypothesis H_0, whereas, accepted the alternative hypothesis H_1 that male respondents and female

respondents had the different level of safety concern, privacy satisfaction, and sense of community significantly.

The results indicated that the total mean score of safety concern of male and female dwellers were statistically different at the significant level of .05 (t = 3.151, p = .002). When considering the mean score of variables involving the safety issue, the independent sample t-test led to the finding that the mean score of crime concern and emergency concern of female dwellers were significantly higher than male (t = 3.389, p = .001 and t = 3.113, p = .002 consecutively). (See Table 6.23)

Likewise, the mean score of privacy satisfaction of female was significantly higher than male (t = 2.076, p = .038). In more detail, the mean score of psychological privacy satisfaction and informational privacy satisfaction of female dwellers were significantly higher than male (t = 3.320, p = .001 and t = 2.365, p = .018 consecutively). Amongst the variables in the group of sense of community, it appeared that the mean score of emotional connection of female respondents was also significantly higher than male (t = 2.010, p = .045). (See Table 6.23)

Table 6.19 Independent sample t-test table comparing mean scores of Safety Concern, Crime Concern, Emergency Concern, Privacy Satisfaction, Psychological Privacy Satisfaction, Informational Privacy Satisfaction, and Emotional Connection between Groups of male and female residents

N=1206

	Male Respondents			Female Respondents			t-test for Equality of Means	
	N	Mean	Std. Deviation	N	Mean	Std. Deviation	*t*	Sig. (2-tailed)
Safety Concern	523	2.5368	.96084	623	2.7152	.98500	-3.151	.002**
Crime Concern	523	2.5041	1.09029	623	2.7194	1.09481	-3.389	.001***
Emergency Concern	523	2.7419	1.18956	623	2.9583	1.20151	-3.113	.002**
Privacy Satisfaction	523	3.9477	.76549	623	4.0411	.78074	-2.076	.038*
Psycho Privacy	523	3.8805	.97161	623	4.0665	.95841	-3.320	.001***
Informational Privacy	523	3.8803	.92399	623	4.0088	.94302	-2.365	.018*
Emotional Connect	523	3.3470	.88869	623	3.4516	.90005	-2.010	.045*

95% Confidence Interval of the Difference

*$p \leq .05$, ** $p \leq .005$, *** $p \leq .001$

The effect size and statistical power of all significant differences affected by gender were further compared and described in Section 6.4.

6.3.3.2 Age

Likewise, the age of participants was assumed to vary their level of mental status as defined in the previous research. Regarding the field survey, the age of respondents was measured in the ratio unit (years). The simple linear regression calculation was applied to investigate the significant impacts of ageing on the psychological status of high-rise dwellers. The statistical sub-hypotheses 1.13 are described below.

Null Hypothesis $H(1.13)_0$: There is no significant prediction of dependent variables: safety concern, privacy satisfaction, and sense of community by age of the respondents

Alternative Hypothesis $H(1.13)_1$: There is significant prediction of dependent variables: safety concern, privacy satisfaction, and sense of community by age of the respondents

The results of simple linear regression rejected the null hypothesis and revealed the linear regressive effects of ageing on the sense of community, whereas, the effect of this personal attribute was not found on safety concern and privacy satisfaction. Concerning the conventional Cohen's effect size and statistical power (See Section 6.4), the following results achieved the minimum requirement of acceptance of this study.

The predictive model for the sense of community was found at $F(1,1204)= 14.463$, $p = .000$, with an R^2 of .012. Participants' predicted sense of community was equal to 3.107 + .006(age) years. (See Table 6.20) Participants' predicted sense of community increased 0.006 for each year of age. The predictive equation is described as follows.

Sense of Community = 3.114 + .066(Age) years

In the meantime, the predictive model for the feeling of membership, influence, and emotional connection were found at $F(1,1204)= 14.764$, $p = .000$, with an R^2 of .012, $F(1,1204)= 9.375$, $p = .002$, with an R^2 of .008, and $F(1,1204)= 11.461$, $p = .001$, with an R^2 of .009 consecutively. (See Table 6.20) Participants' predicted sense of membership, influence, and emotional connection increased 0.007, 0.006, and 0.007 for each year of age consecutively. The predictive equations are demonstrated below.

Membership = 3.184 + .007(Age) years

Influence = 3.008 + .006(Age) years

Emotional Connection = 3.176 + .007(Age) years

Table 6.20 Summary of simple linear regression models for Safety Concern, Privacy Satisfaction, and Sense of Community Scores including their sub-variables predicted by the predictor, Age of Respondents

N=1206

	Predictors Age of Respondents (Enter Method)						
Response variables	*F*	R^2	B	S.E.	β	*t*	*p*
Safety Concern	.452	.000	-.002	.002	-.019	-.672	.501
Crime Concern	.986	.001	.003	.003	.029	.993	.321
Behavioural Concern	2.143	.002	-.004	.002	-.042	-1.464	.144
Emergency Concern	2.601	.002	-.004	.003	-.046	-1.613	.107
Privacy Satisfaction	.072	.000	.000	.002	.008	.268	.789
Psycho. Privacy Sat.	.603	.001	.002	.002	.022	.777	.438
Info. Privacy Sat.	.259	.000	.001	.002	.015	.509	.611
Physical Privacy Sat.	1.072	.001	.002	.002	.030	1.036	.301
Social Privacy Sat.	1.786	.001	-.003	.002	-.038	-1.337	.182
Sense of Community	14.463	.012	.006	.002	.109	3.803	.000***
Membership	14.764	.012	.007	.002	.110	3.482	.000***
Influence	9.375	.008	.006	.002	.088	3.062	.002**
Reinforcement	6.223	.005	.005	.002	.072	2.495	.013*
Emotional Connection	11.461	.009	.007	.002	.097	3.385	.001***

*$p \leq .05$, ** $p \leq .005$, *** $p \leq .001$

Note*: All predictive regression models were under the conditions that all variables were measured with the defined units of PE assessment and PEP questionnaire.*

All data sets were proved conforming to the primary assumptions of 1) linear relationship (by Scatter plot), 2) no auto-correlation (by Durbin-Watson test d≤4-d_L), 3) error terms had mean zero and constant variance uncorrelated (by residual statistics), and 4) multivariate normality *(by Normal P-P plot).*

6.3.3.3 Stage of Life

Besides the simple linear regression analysis, the age of respondents divided into six stages were administered by means of the one-way ANOVA calculation in order to expand the statistical analysis and investigate the psychological differences of the respondents who were in the different lifespans. The six stages was composed of 1) Middle Childhood (6-12 years old), 2) Early Adolescence (13-18 years old), 3) Later Adolescence (19-24 years old), 4) Early Adulthood (25-34 years old), 5) Middle Adulthood (35-60 years), 6) Later Adulthood and Older (61 years old and older). The statistical sub-hypotheses 1.14 are described below.

Null Hypothesis H(1.14)$_0$:	There is no significant difference in safety concern, privacy satisfaction, and sense of community between Stage1: Middle childhood, Stage2: Early Adolescence, Stage3: Later Adolescence, Stage4: Early Adulthood, Stage5: Middle Adulthood, and Stage6: Later Adulthood
Alternative Hypothesis H(1.14)$_1$:	There is significant difference in safety concern, privacy satisfaction, and sense of community between Stage1: Middle childhood, Stage2: Early Adolescence, Stage3: Later Adolescence, Stage4: Early Adulthood, Stage5: Middle Adulthood, and Stage6: Later Adulthood

The one-way ANOVA analysis rejected the null hypothesis H_0 and accepted the alternative hypothesis H_1 that there were significant differences in safety concern, privacy satisfaction, and sense of community amongst the respondents who were in the different lifespans.

The significant effects of the lifespan on the respondents' safety concern was detected at $F(5, 1200) = 3.226$, $p = .007$. Attentively, the differences of variances of crime concern, behavioural disorder concern, and emergency concern between groups were also detected at $F(5, 1200) = 3.121$, $p = .008$, $F(5, 1200) = 2.503$, $p = .029$, and $F(5, 1200) = 2.826$, $p = .015$ consecutively. Meanwhile, the effect of lifespan on social privacy satisfaction was found at $F(5, 1200) = 2.812$, $p = .016$.

The Post hoc comparisons using the Scheffe and LSD (Equal of variances assumed) tests indicated the mean differences as follows. (See Table 6.21)

Table 6.21 One-way ANOVA summary table: Safety Concern Score, Crime Concern Score, Behavioural Disorder Score, and Emergency Concern Score by Life-stages

N=1206

		Safety Concern	*Crime Concern*	Behavioural Concern	*Emergency Concern*	*Social Privacy Stfn.*
Stage1: Middle Childhood	*M*	2.929	2.714	2.857	3.357	3.179
(6-12 years old)	*S.D.*	1.152	1.273	1.218	1.598	1.120
Stage2: Early Adolescence	*M*	2.356	2.287	2.262	2.601	3.830
(13-18 years old)	*S.D.*	.988	1.083	1.025	1.221	1.025
Stage3: Later Adolescence	*M*	2.658	2.573	2.560	2.934	3.845
(19-24 years old)	*S.D.*	.933	1.061	1.028	1.190	.983
Stage4: Early Adulthood	*M*	2.682	2.686	2.533	2.903	3.903
(25-34 years old)	*S.D.*	.984	1.126	1.087	1.186	.893
Stage5: Middle Adulthood	*M*	2.672	2.700	2.508	2.874	3.800
(35-60 years)	*S.D.*	.971	1.079	1.052	1.192	.962
Stage6: Later Adulthood	*M*	2.269	2.333	2.120	2.397	3.487
(61 years old and older)	*S.D.*	.978	1.059	1.072	1.170	1.227
	F(5,1200)	3.226	3.121	2.503	2.826	2.812
	p	.007*	.008*	.029*	.015*	.016*
Post hoc Tests		LSD 2< 1,3,4,5; 6<1,3,4,5	LSD 2< 3,4,5; 6<5	LSD 2< 1,3,4,5;	LSD 2< 1,3,4,5; 6<1,3,4,5	LSD 1> 2,3,4,5; 6<3,4

*$p \leq .05$, ** $p \leq .005$, *** $p \leq .001$

***Note**: All predictive regression models were under the conditions that all variables were measured with the defined units of PE assessment and PEP questionnaire.*

All data sets were proved conforming to the primary assumption of a normal distribution *by means of considering the skewness and kurtosis of data sets, which were in between ±2.*

Moreover, this nominal variable also affected the respondents' sense of community ($F(5, 1200) = 4.727$, $p = .000$), in particular the sense of membership, influencing, reciprocal, and emotional connection at $F(5, 1200) = 3.823$, $p = .002$, $F(5, 1200) = 2.694$, $p = .020$, $F(5, 1200) = 4.545$, $p = .000$, and $F(5, 1200) = 3.728$, $p = .002$ consecutively. The Post hoc comparisons using the Scheffe and LSD (Equal of variances assumed) tests indicated the mean differences as described below. (See Table 6.22)

The effect size and statistical power of all significant differences affected by stage of life were compared and described in Section 6.4.

Table 6.22 One-way ANOVA summary table: Sense of Community Score, Membership Score, Influence Score, Reinforcement Score, and Emotional Connection Score by Life-stages

N=1206

		Sense of Community	*Membership*	*Influence*	*Reinforce-ment*	*Emotional Connection*
Stage1: Middle Childhood	*M*	3.692	3.770	3.607	3.893	3.500
(6-12 years old)	*S.D.*	.691	.990	.813	.859	.877
Stage2: Early Adolescence	*M*	3.312	3.388	3.160	3.239	3.463
(13-18 years old)	*S.D.*	.830	.901	.973	1.013	.960
Stage3: Later Adolescence	*M*	3.209	3.318	3.096	3.073	3.347
(19-24 years old)	*S.D.*	.720	.804	.892	.920	.870
Stage4: Early Adulthood	*M*	3.249	3.354	3.177	3.182	3.283
(25-34 years old)	*S.D.*	.697	.799	.864	.874	.849
Stage5: Middle Adulthood	*M*	3.415	3.531	3.292	3.327	3.509
(35-60 years)	*S.D.*	.744	.848	.858	.902	.917
Stage6: Later Adulthood	*M*	3.541	3.641	3.397	3.432	3.692
(61 years old and older)	*S.D.*	.788	.835	.852	.953	.971
	F(5,1200)	4.727	3.823	2.694	4.545	3.728
	p	.000***	.002**	.020*	.000***	.002**
	Post hoc Tests	Scheffe 3<5	LSD 3,4<5; 3,4<6; 1>3	LSD 2< 1,3,4,5	LSD 3< 1,5,6	Scheffe 4<5

*$p \leq .05$, ** $p \leq .005$, *** $p \leq .001$

Note: *All predictive regression models were under the conditions that all variables were measured with the defined units of PE assessment and PEP questionnaire.*

All data sets were proved conforming to the primary assumption of a normal distribution *by means of considering the skewness and kurtosis of data sets, which were in between ±2.*

6.3.3.4 Nationality

The cultural background of the respondents was also considered as one of the personal attributes that could impact their attitude and mental status. The independent sample t-test was performed to investigate the psychological differences between the group of Thai residents and foreign residents. The statistical sub-hypotheses 1.15 are described below.

Null Hypothesis $H(1.15)_0$ **:** There is no significant difference in safety concern, privacy satisfaction, and sense of community between sampling groups of Thai respondents and foreign respondents

Alternative Hypothesis $H(1.15)_1$ **:** There is significant difference in safety concern, privacy satisfaction, and sense of community between sampling groups of Thai respondents and foreign respondents

The independent sample t-test method rejected H_0, whereas, accepted the alternative hypothesis H_1 that the Thai residents and the foreign residents had the different level of safety concern and sense of community significantly.

The significant differences between the mean score of the safety concern, crime concern, and emergency concern were detected at $t = 2.895$, $p = .004$, $t = 2.851$, $p = .005$, and $t = 2.628$, $p = .009$ consecutively. It appeared that Thai

respondents significantly had higher concern about safety, crime, and emergency than foreign respondents. Furthermore, the mean score of emotional connection of Thai respondents were found higher than foreign respondents significantly at t = 3.854, p = .000, whereas, the mean score of social privacy satisfaction of foreign respondents was higher than Thais at t = 3.214, p = .001. (See Table 6.23)

Table 6.23 Independent sample t-test table comparing mean scores of Safety Concern, Crime Concern, Emergency Concern, Social Privacy Satisfaction, and Emotional Connection between Groups of Thai and Foreign residents

N=1206

	Thai Respondents			*Foreign Respondents*			*t-test for Equality of Means*	
	N	Mean	Std. Deviation	N	Mean	Std. Deviation	*t*	Sig. (2-tailed)
Safety Concern	1121	2.6602	.95937	85	2.3426	1.16611	2.895	.004**
Crime Concern	1121	2.6542	1.08006	85	2.2549	1.25636	2.851	.005**
Emergency Concern	1121	2.8894	1.18953	85	2.5353	1.30199	2.628	.009*
Social Privacy Stfn.	1121	3.8024	.96644	85	4.1499	.88908	-3.214	.001***
Emotional Connect	1121	3.4335	.88458	85	3.0471	.97475	3.854	.000***

95% Confidence Interval of the Difference
*$p \leq .05$, ** $p \leq .005$, *** $p \leq .001$

The effect size and statistical power of all significant differences affected by nationality of the respondents were compared and described in Section 6.4.

6.3.3.5 Religion

Regarding the PEP questionnaire, there were five categories of religion that were available for the respondents to choose, namely, 1) Buddhism, 2) Christianity, 3) Islam, 4) Non-religion, and 5) others. As the categorical factors involving the personal attributes of the respondents, the one-way ANOVA was performed to investigate the significant differences of variance between groups of religion. The statistical sub-hypotheses 1.16 are described below.

Null Hypothesis $H(1.16)_0$: There is no significant difference in safety concern, privacy satisfaction, and sense of community between Religion1: Buddhism, Religion2: Christianity, Religion3: Islam, Religion4: Non-religion, and Religion5: other religion

Alternative Hypothesis $H(1.16)_1$: There is significant difference in safety concern, privacy satisfaction, and sense of community between Religion1: Buddhism, Religion2: Christianity, Religion3: Islam, Religion4: Non-religion, and Religion5: other religion

The one-way ANOVA analysis rejected the null hypothesis H_0 and accepted the alternative hypothesis H_1 that there were significant differences in safety concern,

privacy satisfaction, and sense of community between the different groups of religion.

The results indicated that the significant effects of religion on the respondents' safety concern, crime concern, behavioural concern, and emergency concern were detected at $F(4, 1201) = 5.257$, $p = .000$, $F(4, 1201) = 4.866$, $p = .001$, $F(4, 1201) = 3.655$, $p = .006$, and $F(4, 1201) = 4.101$, $p = .003$ consecutively. (See Table 6.24)

Table 6.24 One-way ANOVA summary table: Safety Concern Score, Crime Concern Score, and Emergency Concern Score by Religion

N=1206

		Safety Concern	*Crime Concern*	*Behavioural Concern*	*Emergency Concern*
Religion1: Buddhism	*M*	2.675	2.668	2.529	2.904
	S.D.	.959	1.084	1.044	1.188
Religion2: Christianity	*M*	2.440	2.423	2.363	2.580
	S.D.	1.253	1.217	1.251	1.317
Religion3: Islam	*M*	2.492	2.396	2.542	2.563
	S.D.	.888	1.260	1.321	1.377
Religion4: Non-religion	*M*	2.134	2.075	2.017	2.397
	S.D.	1.338	1.003	.940	1.091
Religion5: Others	*M*	2.986	2.852	2.815	3.444
	S.D.	.978	1.292	1.547	1.488
	F(4,1201)	5.257	4.866	3.655	4.101
	p	.000***	.001***	.006**	.003**
	Post hoc Tests	Scheffe 4< 1	Scheffe 4< 1	Tamhane 4< 1	Scheffe 4< 1

*$p \leq .05$, ** $p \leq .005$, *** $p \leq .001$

***Note**: All predictive regression models were under the conditions that all variables were measured with the defined units of PE assessment and PEP questionnaire.*

All data sets were proved conforming to the primary assumption of a normal distribution *by means of considering the skewness and kurtosis of data sets, which were in between ±2.*

In terms of privacy satisfaction, the between-groups differences of physical privacy satisfaction and social privacy satisfaction were detected at $F(4, 1201) = 3.365$, $p = .009$, and $F(4, 1201) = 2.825$, $p = .024$ consecutively.

Moreover, religion also affected the respondents' sense of community as well as sense of reinforcement and emotional connection at $F(4, 1201) = 2.693$, $p = .030$, $F(4, 1201) = 2.528$, $p = .039$, $F(4, 1201) = 3.509$, $p = .007$ consecutively. The Post hoc comparisons using the Scheffe and LSD (Equal of variances assumed) tests indicated the mean differences are the followings. (See Table 6.25)

Table 6.25 One-way ANOVA summary table: Safety Concern Score, Crime Concern Score, and Emergency Concern Score by Religion

N=1206

		Physical Privacy Stfn.	*Social Privacy Stfn.*	Sense of Community	*Reinforce-ment*	*Emotional Connection*
Religion1: Buddhism	*M*	4.210	3.806	3.332	3.252	3.430
	S.D.	.860	.965	.733	.905	.889
Religion2: Christianity	*M*	4.277	3.737	3.279	3.098	3.313
	S.D.	.9240	.992	.868	1.064	1.007
Religion3: Islam	*M*	4.438	3.969	3.141	3.219	3.344
	S.D.	.981	1.176	.612	.875	.908
Religion4: Non-religion	*M*	4.595	4.216	3.095	2.931	3.017
	S.D.	.652	.806	.654	.845	.848
Religion5: Others	*M*	4.556	4.056	3.806	3.667	3.778
	S.D.	.882	.982	.942	1.118	.870
	F(4,1201)	3.365	2.825	2.693	2.528	3.509
	p	.009*	.024*	.030*	.039*	.007*
	Post hoc Tests	Scheffe 4> 1	Scheffe 4> 1	LSD 4<1; 2,3,4<5	LSD 4< 1,5	Scheffe 4< 1

*$p \leq .05$, ** $p \leq .005$, *** $p \leq .001$

***Note**: All predictive regression models were under the conditions that all variables were measured with the defined units of PE assessment and PEP questionnaire.*

All data sets were proved conforming to the primary assumption of a normal distribution *by means of considering the skewness and kurtosis of data sets, which were in between ±2.*

The effect size and statistical power of all significant differences affected by religion of the respondents were compared and described in Section 6.4.

6.3.3.6 Marital Status

As well, this study aims to investigate every aspect of the personal attributes including the marital status of the residents on their psychological wellbeing. Regarding the PEP questionnaire, the marital status was another personal factor measured in nominal scale. The three marital categories were 1) bachelor, 2) married, and 3) divorced/widow. The one-way ANOVA was performed to calculate the effects marital status on the variances of dependent variables. The statistical sub-hypotheses 1.17 are described below.

Null Hypothesis $H(1.17)_0$***:*** There is no significant difference in safety concern, privacy satisfaction, and sense of community between Marital1: bachelor, Marital2: married, and Marital3: divorced/ widow

Alternative Hypothesis $H(1.17)_1$***:*** There is significant difference in safety concern, privacy satisfaction, and sense of community between Marital1: bachelor, Marital2: married, and Marital3: divorced/ widow

The one-way ANOVA analysis rejected the null hypothesis H_0 and accepted the alternative hypothesis H_1 that there were significant differences in safety concern and sense of community between the three groups of marital status.

The Post hoc test results suggested that the group of married participants significantly reported higher concern about safety, especially crime and behavioural disorder concerns than other two groups at $F(2, 1203) = 5.566$, $p = .004$, $F(2, 1203) = 6.733$, $p = .001$,and $F(4, 1201) = 3.913$, $p = .020$ consecutively. (See Table 6.26)

Likewise, the group of single participants significantly reported stronger sense of community, especially sense of membership, influence, and community reinforcement than other groups at $F(2, 1203) = 4.468$, $p = .012$, $F(2, 1203) = 3.748$, $p = .024$, $F(2, 1203) = 3.413$, $p = .033$, and $F(2, 1203) = 4.803$, $p = .008$ consecutively. (See Table 6.26)

Table 6.26 One-way ANOVA summary table: Safety Concern, Crime Concern, Behavioural Disorder Concern, Sense of Community, Membership, Influence, and Reinforcement Scores, by Marital Status

N=1206

		Safety Concern	*Crime Concern*	Behaviour Concern	*Sense of Comm.*	*Member-ship*	*Influence*	*Reinforce*
Marital1:	*M*	2.609	2.586	2.470	3.278	3.384	3.175	3.179
Bachelor	*S.D.*	.972	1.089	1.055	.720	.811	.873	.900
Marital2:	*M*	2.754	2.777	2.608	3.420	3.531	3.319	3.357
Married	*S.D.*	.985	1.104	1.079	.773	.862	.900	.939
Marital3:	*M*	2.239	2.167	2.147	3.368	3.485	3.118	3.353
Divorced/Widow	*S.D.*	.919	1.052	.989	.762	1.041	.759	.901
	F(2,1203)	5.566	6.733	3.913	4.468	3.748	3.413	4.803
	p	.004**	.001***	.020*	.012*	.024*	.033*	.008*
	Post hoc Tests	Scheffe 2>3	Scheffe 2>3	Scheffe 2>1,3	Scheffe 2>1	Scheffe 2>1	Scheffe 2>1	Scheffe 2>1

*$p \leq .05$, ** $p \leq .005$, *** $p \leq .001$

***Note**: All predictive regression models were under the conditions that all variables were measured with the defined units of PE assessment and PEP questionnaire.*

All data sets were proved conforming to the primary assumption of a normal distribution *by means of considering the skewness and kurtosis of data sets, which were in between ±2.*

The effect size and statistical power of all significant differences affected by marital status of the respondents were compared and described in Section 6.4.

6.3.3.7 Parental Status

Besides the marital status, parental status was one of the personal factors assumed to have influence on the psychological variables in this study. There were

two types of parental status in the questionnaire, namely, 1) having no child, and 2) having child/ children. The statistical sub-hypotheses 1.18 are described below.

Null Hypothesis H(1.18)$_0$: There is no significant difference in safety concern, privacy satisfaction, and sense of community between sampling groups of having no child and having child/children

Alternative Hypothesis H(1.18)$_1$: There is significant difference in safety concern, privacy satisfaction, and sense of community between sampling groups of having no child and having child/children

The independent sample t-test method rejected the null hypothesis H_0, whereas, accepted the alternative hypothesis H_1 that the respondents who had no child and the respondents who had child/ children had the different level of sense of community significantly.

The results of independent t-test suggested that the group of participants having no child reported stronger sense of community significantly than the group of participants having child/ children (t = 3.358, p = .001), which included its sub-categories: membership, influence, and reinforcement at t = 2.401, p = .017, t = 2.987, p = .003, and t = 3.911, p = .000 consecutively. (See Table 6.27)

Table 6.27 Independent sample t-test table comparing mean scores of Sense of Community, Membership, Influence, and Reinforcement between Groups of Residents Having No Child and Having Child/ Children

N=1206

	Having No Child			*Having Child/ Children*			*t-test for Equality of Means*	
	N	Mean	Std. Deviation	N	Mean	Std. Deviation	*t*	Sig. (2-tailed)
Sense of Community	910	3.2790	.7341	296	3.4441	.7376	-3.358	.001***
Membership	910	3.3942	.8231	296	3.5280	.8622	-2.401	.017*
Influence	910	3.1695	.8777	296	3.3446	.8711	-2.987	.003**
Reinforcement	910	3.1740	.9093	296	3.4117	.9051	-3.911	.000***

95% Confidence Interval of the Difference

*$p \leq .05$, ** $p \leq .005$, *** $p \leq .001$

The effect size and statistical power of all significant differences affected by parental status of the respondents were compared and described in Section 6.4.

6.3.3.8 Educational Level

The three educational levels in the questionnaire, namely, 1) lower than the bachelor degree, 2) bachelor degree, and 3) higher than the bachelor degree

were analysed by means of the one-way ANOVA. The statistical sub-hypotheses 1.19 are described below.

Null Hypothesis H(1.19)$_0$:	There is no significant difference in safety concern, privacy satisfaction, and sense of community between Level1: lower than Bachelor degree, Level2: Bachelor degree, and Level1: higher than Bachelor degree
Alternative Hypothesis H(1.19)$_1$:	There is significant difference in safety concern, privacy satisfaction, and sense of community between Level1: lower than Bachelor degree, Level2: Bachelor degree, and Level1: higher than Bachelor degree

The one-way ANOVA analysis rejected the null hypothesis H_0 and accepted the alternative hypothesis H_1 that there were significant differences in safety concern and sense of community between the three groups of marital status.

The results indicated that the differences between these three groups existed significantly. In terms of safety concern, the Post hoc test revealed that the group of respondents who earned Bachelor degree had higher concern about safety, crime, behavioural disorder, and emergency than the group of respondents who earned lower Bachelor degree at $F(2, 1203) = 5.471$, $p = .004$, $F(2, 1203) = 3.366$, $p = .035$, $F(2, 1203) = 4.923$, $p = .007$, and $F(2, 1203) = 4.697$, $p = .009$ consecutively. (See Table 6.28) Considering privacy satisfaction, it appeared that the group of respondents who earned higher education than Bachelor degree significantly had more satisfaction with their privacy, which included psychological, informational, physical privacy satisfactions, than the other two groups at $F(2, 1203) = 9.375$, $p = .000$, $F(2, 1203) = 15.387$, $p = .000$, $F(2, 1203) = 9,.544$, $p = .000$, and $F(2, 1203) = 3.318$, $p = .037$ consecutively. (See Table 6.28) Meanwhile, the group of respondents who earned Bachelor degree significantly had less sense of community than the other two groups, particularly sense of reinforcement and emotional connection at $F(2, 1203) = 3.479$, $p = .031$, $F(2, 1203) = 3.265$, $p = .039$, and $F(2, 1203) = 3.817$, $p = .022$ consecutively. (See Table 6.28) The effect size and statistical power of the educational level were further analysed and described in Section 6.4.

Table 6.28 One-way ANOVA summary table: Sense of Community Score, Sense of Membership Score, Reciprocal Influence Score, Communal Reinforcement Score and Emotional Connection Score by Educational Level: Lower than Bachelor degree, Bachelor degree, and Higher than Bachelor degree

N=1206

	Level 1: Lower Bachelor		***Level 2: Bachelor***		***Level 3: Higher Bachelor***				
Variables	*M*	*S.D.*	*M*	*S.D.*	*M*	*S.D.*	*F(2,1203)*	*p*	*Post hoc Tests*
Safety Concern	2.483	1.023	2.713	.965	2.572	.961	5.471	.004***	Scheffe 2 > 1
Crime Concern	2.498	1.154	2.693	1.086	2.558	1.073	3.366	.035*	Scheffe 2 > 1
Behaviour Concern	2.332	1.080	2.574	1.055	2.441	1.054	4.923	.007*	Scheffe 2 > 1
Emergency Concern	2.690	1.249	2.950	1.190	2.788	1.173	4.697	.009*	Scheffe 2 > 1
Privacy Satisfaction	3.840	.910	3.995	.743	4.140	.714	9.375	.000***	Tamhane 3 > 2,1
Psycho Privacy Stfn.	3.730	1.126	3.977	.939	4.207	.854	15.387	.000***	Tamhane 3 > 2,1 & 2 > 1
Info Privacy Stfn.	3.751	1.137	3.950	.903	4.117	.811	9.544	.000***	Tamhane3 > 2,1
Physical Privacy Stfn.	4.146	.975	4.224	.840	4.339	.807	3.318	.037*	Scheffe 3 > 1
Sense of Community	3.390	.761	3.272	.743	3.382	.702	3.479	.031*	LSD 2 < 1,3
Reinforcement	3.370	.946	3.189	.924	3.233	.853	3.265	.039*	Scheffe 1 > 2
Emotional Connection	3.477	.920	3.347	.910	3.500	.832	3.817	.022*	Scheffe 3 > 1

*$p \leq .05$, ** $p \leq .005$, *** $p \leq .001$

Note*: All predictive regression models were under the conditions that all variables were measured with the defined units of PE assessment and PEP questionnaire.*

All data sets were proved conforming to the primary assumption of a normal distribution *by means of considering the skewness and kurtosis of data sets, which were in between ±2.*

6.3.3.9 Occupation

The one-way ANOVA was performed to investigate the occupational effects on the dependent variables. The statistical sub-hypotheses 1.20 are described below.

Null Hypothesis H(1.20)$_0$: There is no significant difference in safety concern, privacy satisfaction, and sense of community between Students, Private companies' employee, Government's employee, Business owner/ Freelance, Retired/ Housewife, and others

Alternative Hypothesis H(1.20)$_1$: There is significant difference in safety concern, privacy satisfaction, and sense of community between Students, Private companies' employee, Government's employee, Business owner/ Freelance, Retired/ Housewife, and others

The one-way ANOVA analysis rejected the null hypothesis H_0 and accepted the alternative hypothesis H_1 that there were significant differences in safety concern, privacy satisfaction, and sense of community between the different groups of occupation.

The findings indicated that the differences of variance of crime concern between groups existed at $F(5, 1200) = 2.913$, $p = .013$, whereas, the differences of informational privacy concern was significantly found at $F(5, 1200) = 2.405$, $p = .035$.

Moreover, the differences of variance involving sense of community, reinforcement, and emotional connection between groups were detected at $F(5, 1200) = 2.784$, $p = .017$, $F(5, 1200) = 2.414$, $p = .034$, and $F(5, 1200) = 3.074$, $p = .009$ consecutively. The results of Post hoc tests are demonstrated in the table below. (See Table 6.33)

Table 6.29 One-way ANOVA summary table: Crime Concern, Informational Privacy Satisfaction, Sense of Community, Reinforcement, and Emotional Connection Scores, by Occupation

N=1206

		Crime Concern	*Informational Privacy Stfn.*	*Sense of Community*	*Reinforcement*	*Emotional Connection*
Occupation 1: Student	*M*	2.453	3.893	3.258	3.142	3.389
	S.D.	1.090	.954	.778	.981	.911
Occupation 2: Private Employee	*M*	2.754	4.009	3.276	3.180	3.351
	S.D.	1.085	.852	.703	.857	.847
Occupation 3: Gov. Employee	*M*	2.602	3.908	3.430	3.341	3.534
	S.D.	.995	.100	.703	.873	.835
Occupation 4: Owner/Freelance	*M*	2.613	4.011	3.362	3.310	3.384
	S.D.	1.133	.965	.767	.937	.954
Occupation 5: Retired/Housewife	*M*	2.591	3.899	3.524	3.441	3.718
	S.D.	1.146	1.039	.674	.937	.890
Occupation 6: Others	*M*	2.867	3.375	3.194	3.275	3.175
	S.D.	1.162	1.099	.775	.734	1.092
	F(5,1200)	2.913	2.405	2.784	2.414	3.074
	p	.013*	.035*	.017*	.034*	.009*
	Post hoc Tests	Scheffe 2>1	LSD 6<1,2,3,4,5	LSD 5>1,2; 3>1,2	LSD 3,4,5>1; 5>2	Scheffe 5>2

*$p \leq .05$, ** $p \leq .005$, *** $p \leq .001$

***Note**: All predictive regression models were under the conditions that all variables were measured with the defined units of PE assessment and PEP questionnaire.*

All data sets were proved conforming to the primary assumption of a normal distribution *by means of considering the skewness and kurtosis of data sets, which were in between ±2.*

The Cohen's magnitude of effect size and statistical power of all significant differences affected by occupation of the respondents were calculated and described in Section 6.4.

6.3.3.10 Household's Income

As one of the personal attributes, the household income per month was measured in Thai Baht regarding the PEP questionnaire. The simple linear regression calculation was applied in order to investigate the significant impacts of income on the psychological status of high-rise dwellers. The statistical sub-hypotheses 1.21 are described below.

Null Hypothesis $H(1.21)_0$: There is no significant prediction of dependent variables: safety concern, privacy satisfaction, and sense of community by household's income/ month

Alternative Hypothesis H(1.21)$_1$: There is significant prediction of dependent variables: safety concern, privacy satisfaction, and sense of community by household's income/ month

According to the SLR results, the negative effects of household income on the privacy satisfaction were detected at p-value < 0.05. Nevertheless, the effect size and power of these influences did not reach the minimum requirement of the study. (See Section 6.4) Therefore, this kind of effect on high-rise residents is remained unconfirmed based on this dataset.

6.3.4 Influences of Personal Factors on the Psychological Status of High-rise Dwellers: Personal Attributes: Dwelling Behaviours

- **Dwelling Behaviour**

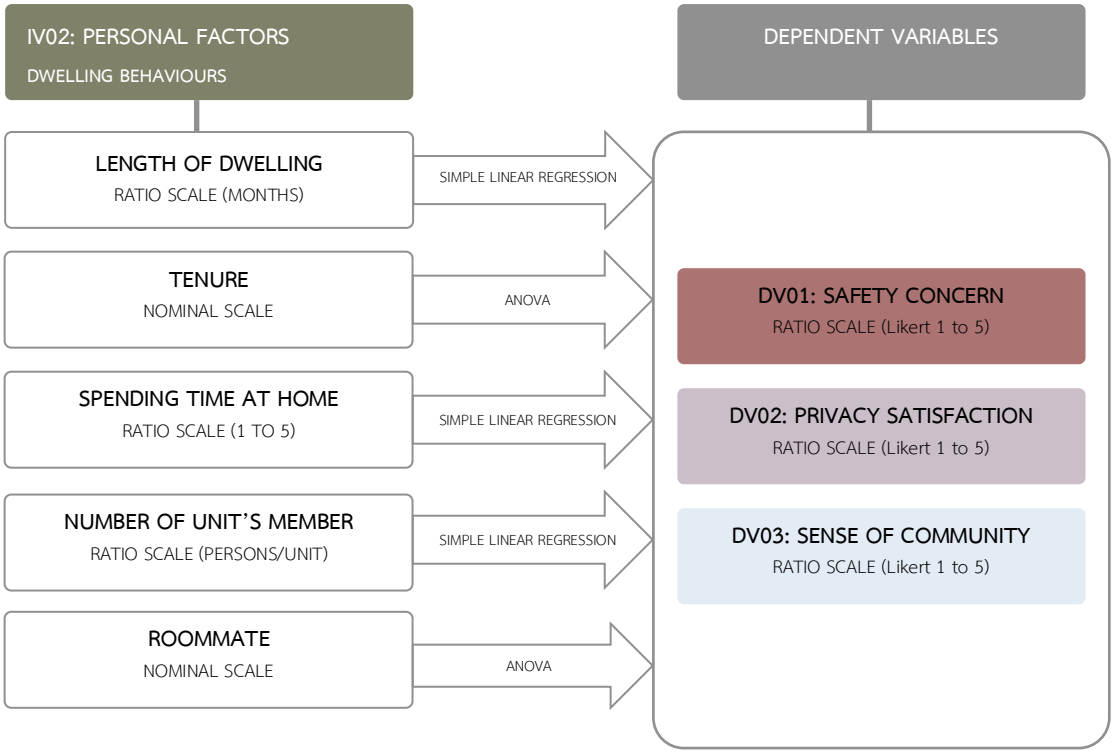


Figure 6.17 Diagram of analytical approach for personal attribute variables

The table below summarises the statistically significant effects of all independents variables under the genre of dwelling behaviours. The further explanations about the statistical analytical process of each independent variable are provided separately in the next section.

Table 6.30 Summary of Statistical Effects of Dwelling Behaviour Variables on Dependent Variables Safety Concern, Privacy Satisfaction, and Sense of Community and their Sub-variables

IV02: Personal Factors *Dwelling Behaviour Variables*	Dependent Variables and Sub Variables														Notes
	Average Safety Concern	Crime Concern	Behavioural Disorder Concern	Emergency Concern	Average Privacy Satisfaction	Psychological Privacy Satisfaction	Informational Privacy Satisfaction	Physical Privacy Satisfaction	Social Privacy Satisfaction	Average Sense of Community	Membership	Influence	Reinforcement	Emotional Connection	
1. Length of Dwelling							✔			✔	✔	✔	✔	✔	SLR
2. Tenure					✔	✔	✔	✔		✔	✔	✔	✔	✔	ANOVA
3. Spending Time at Home										✔	✔	✔		✔	SLR
4. Number of Unit Member				✔	✔	✔	✔	✔					✔	✔	SLR
5. Roommate	✔	✔			✔	✔	✔	✔		✔			✔		ANOVA

✔ = Statistical effect detected at 95% Confidence Interval

6.3.4.1 Length of Dwelling

According to the previous studies, the length of residency was one of the factors assumed to have an impact on the sense of community. As well, in this research, the respondents' length of stay was investigated.

The respondents' length of stay was measured in the ratio unit, month(s). Based on the statistical sub-hypotheses 1.22 described below, the simple linear regression technique calculation was applied to examine the significant impacts of this indicator on the psychological status of high-rise dwellers.

Null Hypothesis $H(1.22)_0$ **:** There is no significant prediction of dependent variables: safety concern, privacy satisfaction, and sense of community by length of dwelling

Alternative Hypothesis $H(1.22)_1$ **:** There is significant prediction of dependent variables: safety concern, privacy satisfaction, and sense of community by length of dwelling

The SLR results rejected the null hypothesis at p-value < 0.05 and accepted that the length of residency positively affected the sense of community and the informational privacy satisfaction of the respondents, whereas, the effect of this indicators was not found on safety concern.

Considering the significant results along with the Cohen's magnitude and power of effect (See Section 6.4), the following linear regressive effects achieved the standardised criteria, whereas, the effects of this indicator on the informational privacy satisfaction and the feeling of influence did not.

The predictive model of the sense of community, membership, and emotional connection were found at $F(1,1204)= 16.608/ p = .000/ R^2= .014$, $F(1,1204)= 14.583/ p = .000/ R^2= .012$, $F(1,1204) = 10.370/ p = .001/ R^2= .009$, and $F(1,1204) = 17.297/ p = .000/ R^2= .014$ consecutively. (See Table 6.31)

The manner of these results was convergent in the same positive direction of which the participants' predicted sense of community, membership, reinforcement, and emotional connection increased 0.002 for each month of residency. The predictive equations are described as follows.

Sense of Community = 3.229 + (.002) (length of dwelling) months

Membership = 3.331 + (.002) (length of dwelling) months

Reinforcement = 3.143 + (.002) (length of dwelling) months

Emotional Connection = 3.294 + (.002) (length of dwelling) months

Table 6.31 Summary of simple linear regression models for Safety Concern, Privacy Satisfaction, and Sense of Community Scores including their sub-variables predicted by the predictor, Respondents' Length of Dwelling

N=1206

	Predictors Respondents' Length of Dwelling (Enter Method)						
Response variables	*F*	R^2	B	S.E.	β	*t*	*p*
Safety Concern	.344	.000	.000	.001	.017	.587	.557
Crime Concern	1.544	.001	.001	.001	.036	1.242	.214
Behavioural Concern	.078	.000	.000	.001	-.008	-.279	.780
Emergency Concern	.336	.000	.000	.001	.017	.580	.562
Privacy Satisfaction	1.432	.001	.001	.000	.034	1.197	.232
Psycho. Privacy Sat.	2.773	.002	.001	.001	.048	1.665	.096
Info. Privacy Sat.	6.143	.005	.001	.001	.071	2.479	.013*
Physical Privacy Sat.	1.088	.001	.001	.001	.030	1.043	.297
Social Privacy Sat.	1.334	.001	-.001	.001	-.033	-1.155	.248
Sense of Community	16.608	.014	.002	.000	.117	4.075	.000***
Membership	14.583	.012	.002	.001	.109	3.819	.000***
Influence	6.022	.005	.001	.001	.071	2.454	.014*
Reinforcement	10.370	.009	.002	.001	.092	3.220	.001***
Emotional Connection	17.297	.014	.002	.001	.119	4.159	.000***

*$p \leq .05$, ** $p \leq .005$, *** $p \leq .001$

***Note**: All predictive regression models were under the conditions that all variables were measured with the defined units of PE assessment and PEP questionnaire.*

All data sets were proved conforming to the primary assumptions of 1) linear relationship (by Scatter plot), 2) no auto-correlation (by Durbin-Watson test $d \leq 4\text{-}d_L$), 3) error terms had mean zero and constant variance uncorrelated (by residual statistics), and 4) multivariate normality *(by Normal P-P plot).*

6.3.4.2 Tenure

The tenure of the dwelling unit was categorised as the personal factors related to the status of the residents inside the living unit. This element implied their sense of belonging and commitment to the house and assumed to have an impact on their level of mental status as well. As mentioned earlier, there were three types of tenure in this field survey, namely, 1) owner, 2) tenant, and 3) guest. To investigate the influence of tenure on the psychological status of the respondents, the one-way ANOVA was performed. The statistical sub-hypotheses 1.23 are described below.

Null Hypothesis H(1.23)$_0$: There is no significant difference in safety concern, privacy satisfaction, and sense of community between Owner, Tenant, and Guest

Alternative Hypothesis H(1.23)$_1$: There is significant difference in safety concern, privacy satisfaction, and sense of community between Owner, Tenant, and Guest

The one-way ANOVA analysis rejected the null hypothesis H_0 and accepted the alternative hypothesis H_1 that there were significant differences in privacy satisfaction and sense of community between the three groups of tenure.

The findings indicated that the differences of variance of privacy satisfaction between three groups significantly existed at $F(2, 1158) = 9.869$, $p = .000$. In more detail, the differences of variance of psychological, informational physical, and social privacy satisfaction were detected at $F(2, 1158) = 8.622/ p = .000$, $F(2, 1158) = 10.569/ p = .000$, $F(2, 1158) = 7.836/ p = .000$, $F(2, 1158) = 3.922/ p = .000$ consecutively.

Furthermore, the differences of variance of sense of community including membership, influence, reinforcement, and emotional connection were also detected at $F(2, 1158) = 5.275/ p = .005$, $F(2, 1158) = 5.511/ p = .004$, $F(2, 1158) = 3.234/ p = .040$, $F(2, 1158) = 3.265/ p = .039$, $F(2, 1158) = 4.459/ p = .012$ consecutively.

The Post hoc tests suggested that the group of owners significantly had higher satisfaction about privacy and stronger sense of community than the other two groups. (See Table 6.32)

Table 6.32 One-way ANOVA summary table: Privacy Satisfaction, Psychological Privacy Satisfaction, Informational Privacy Satisfaction, Physical Privacy Satisfaction, Sense of Membership Score, Reciprocal Influence Score, Communal Reinforcement Score and Emotional Connection Score by Tenure: Owner, Tenant, and Guest

N=1206

	Tenure 1: Owner		*Tenure l 2: Tenant*		*Tenure 3: Guest*				
Variables	*M*	*S.D.*	*M*	*S.D.*	*M*	*S.D.*	*F(2,1203)*	*p*	*Post hoc Tests*
Privacy Satisfaction	4.097	0.774	3.968	0.793	3.852	0.740	9.869	.000***	Scheffe 1>3
Psycho Privacy Stfn.	4.105	0.964	3.907	0.983	3.835	0.967	8.622	.000***	Scheffe 1>2,3
Info Privacy Stfn.	4.083	0.910	3.858	1.010	3.807	0.877	10.569	.000***	Scheffe 1>2,3
Physical Privacy Stfn.	4.325	0.838	4.241	0.858	4.078	0.878	7.836	.000***	Scheffe 1>3
Sense of Community	3.874	0.969	3.866	1.003	3.686	0.915	3.922	.020*	Scheffe 1>3
Membership	3.398	0.726	3.259	0.774	3.257	0.705	5.275	.005**	Scheffe 1>2,3
Influence	3.509	0.821	3.408	0.839	3.310	0.847	5.511	.004**	Scheffe 1>3
Reinforcement	3.288	0.864	3.163	0.916	3.151	0.866	3.234	.040*	LSD 1>2,3
Emotional Connection	3.306	0.881	3.158	0.964	3.186	0.902	3.265	.039*	LSD 1>2

*$p \leq .05$, ** $p \leq .005$, *** $p \leq .001$

Note*: All predictive regression models were under the conditions that all variables were measured with the defined units of PE assessment and PEP questionnaire.*

All data sets were proved conforming to the primary assumption of a normal distribution *by means of considering the skewness and kurtosis of data sets, which were in between ±2.*

The effect size and statistical power of all significant differences affected by tenure status of the respondents were compared and described in Section 6.4.

6.3.4.3 Spending Time at Home

The respondents' spending time at home was one of the variables involving the dwelling behaviour. Via the PEP questionnaire, they were allowed to self-report their time spending at home during the working days and weekend. The nominal answers of this question item were converted into three levels of spending time at home rated one to five, namely, 1) spending all day at home = 5, 2) spending daytime or nighttime only = 3, and 3) not at home all day = 1. After summarising total score of weekday and weekend, the score of spending time at home was analysed as a result of the simple linear regression. The statistical sub-hypotheses 1.24 are described below.

Null Hypothesis $H(1.24)_0$***:*** There is no significant prediction of dependent variables: safety concern, privacy satisfaction, and sense of community by score of spending time at home

Alternative Hypothesis $H(1.24)_1$***:*** There is significant prediction of dependent variables: safety concern, privacy satisfaction, and sense of community by score of spending time at home

The SLR outcomes rejected the null hypothesis and accepted the alternative hypothesis of which the respondents' spending time at home significantly

influenced the average score of the sense of community including the feeling of membership, reinforcement, and emotional connection. These effects achieved the minimum standard of the effect size and power defined in this study. (See Section 6.4, Table 6.57)

The predictive model of sense of community was found at $F(1,1204)= 11.970$, $p = .001$, with an R^2 of .010. (See Table 6.33) It meant that participants' predicted sense of community was equal to 3.115 + (.063) (score of spending time at home). In other words, participants' predicted informational privacy satisfaction increased 0.063 for each score of spending time at home. Meanwhile, the predictive model membership was found at $F(1,1204)= 11.440$, $p = .001$, with an R^2 of .009. (See Table 6.33) It meant that the participants' predicted informational privacy satisfaction increased 0.070 for each score of spending time at home.

The predictive model of reinforced feeling was found at $F(1,1204)= 8.589$, $p = .001$, with an R^2 of .007. (See Table 6.33) The participants' predicted reinforcement increased 0.066 for each score of spending time at home. In the meantime, the predictive model of emotional connection was found at $F(1,1204)= 11.241$, $p = .003$, with an R^2 of .009. (See Table 6.33) The participants' predicted informational privacy satisfaction increased 0.066 for each score of spending time at home. The predictive equations are described as follows.

Sense of Community = 3.115 + (.063) (score of spending time at home)
Membership = 3.201+ (.070) (score of spending time at home)
Reinforcement = 3.017+ (.066) (score of spending time at home)
Emotional Connection = 3.165+ (.074) (score of spending time at home)

Table 6.33 Summary of simple linear regression models for Safety Concern, Privacy Satisfaction, and Sense of Community Scores including their sub-variables predicted by the predictor, Respondents' Spending Time at Home

N=1206

	Predictors						
	Respondents' Spending Time at Home (Enter Method)						
Response variables	*F*	R^2	B	S.E.	β	*t*	*p*
Safety Concern	1.404	.001	.029	.024	.034	1.185	.236
Crime Concern	.562	.000	.020	.027	.022	.749	.454
Behavioural Concern	3.440	.003	.049	.026	.053	1.855	.064
Emergency Concern	.140	.000	.011	.030	.011	.374	.709
Privacy Satisfaction	.894	.001	.018	.019	.027	.946	.345
Psycho. Privacy Sat.	.243	.000	.012	.024	.014	.493	.622
Info. Privacy Sat.	.028	.000	.004	.023	.005	.168	.867
Physical Privacy Sat.	1.135	.001	.023	.021	.031	1.065	.287
Social Privacy Sat.	2.051	.002	.034	.024	.041	1.432	.152
Sense of Community	11.970	.010	.063	.018	.099	3.460	.001***
Membership	11.440	.009	.070	.021	.097	3.382	.001***
Influence	3.733	.003	.042	.022	.056	1.932	.054
Reinforcement	8.589	.007	.066	.023	.084	2.931	.003**
Emotional Connection	11.241	.009	.074	.022	.096	3.353	.001***

*$p \leq .05$, ** $p \leq .005$, *** $p \leq .001$

Note*: All predictive regression models were under the conditions that all variables were measured with the defined units of PE assessment and PEP questionnaire.*

All data sets were proved conforming to the primary assumptions of 1) linear relationship (by Scatter plot), 2) no auto-correlation (by Durbin-Watson test $d \leq 4\text{-}d_L$*), 3)* error terms had mean zero and constant variance uncorrelated (by residual statistics), and 4) multivariate normality *(by Normal P-P plot).*

6.3.4.4 Number of Unit's Member(s)

The number of unit's member was another personal dwelling condition that assumed to have an influence on the respondent's mental status especially the privacy satisfaction. The number of dwellers per unit implied the density of the house. This indicator was measured in the quantitative unit and analysed through the simple linear regression technique. The sub-hypotheses 1.25 are described below.

Null Hypothesis $H(1.25)_0$***:*** There is no significant prediction of dependent variables: safety concern, privacy satisfaction, and sense of community by number of unit's member

Alternative Hypothesis $H(1.25)_1$***:*** There is significant prediction of dependent variables: safety concern, privacy satisfaction, and sense of community by number of unit's member

The SLR result rejected the null hypothesis and revealed that the number of unit's members had a positive influence on the respondents' safety concern and sense of community as well as a negative effect on the privacy satisfaction. (See Table 6.34) Nonetheless, the effects of this indicator on the emergency concern,

informational privacy satisfaction, and emotional connection could not be confirmed in this study due to the extremely low R^2 and the subtle effect size and power (See Section 6.4). The significant effects that reached the conventional magnitude and power of effect were interpreted as follows.

The predictive model of privacy satisfaction by number of unit's members was found at $F(1,1200)= 8.278$, $p = .004$, with an R^2 of .007 (See Table 6.34), which mean participants' predicted privacy satisfaction decreased 0.058 for each person of unit's member. Also, the predictive models of psychological and physical privacy satisfaction were found at $F(1,1200)= 9.079$, $p = .003$, with an R^2 of .008 and $F(1,1200)= 9.652$, $p = .002$, with an R^2 of .008 respectively. The interpretation was that the participants' predicted psychological and physical privacy satisfaction decreased 0.076 and 0.069 consecutively for each person of unit's member. The predictive equations are demonstrated below.

Privacy Satisfaction = 4.131 + (-.058) (number of unit's member) person
Psychological Privacy Satisfaction = 4.156 + (-.076) (number of unit's member) person
Physical Privacy Satisfaction = 4.394 + (-.069) (number of unit's member) person

Meanwhile, the positive effect of the number of unit's members on the feeling of reinforcement was found at $F(1,1200)= 7.973$, $p = .005$, with an R^2 of .007 (See Table 6.34). Participants' predicted reinforcement score relatively increased 0.067 for each person of unit's member as described in the below equation.

Reinforcement = 3.081+ (.067) (number of unit's member) person

Table 6.34 Summary of simple linear regression models for Safety Concern, Privacy Satisfaction, and Sense of Community Scores including their sub-variables predicted by the predictor, Number of Unit's Member

N=1206

	Predictors Number of Unit's Member (Enter Method)						
Response variables	*F*	R^2	B	S.E.	β	*t*	*p*
Safety Concern	3.290	.003	.046	.025	.052	1.814	.070
Crime Concern	2.957	.002	.049	.029	.050	1.720	.086
Behavioural Concern	1.007	.001	.028	.028	.029	1.004	.316
Emergency Concern	4.914	.004	.069	.031	.064	2.217	.027*
Privacy Satisfaction	8.278	.007	-.058	.020	-.083	-2.877	.004**
Psycho. Privacy Sat.	9.079	.008	-.076	.025	-.087	-3.013	.003**
Info. Privacy Sat.	6.059	.005	-.060	.024	-.071	-2.461	.014*
Physical Privacy Sat.	9.652	.008	-.069	.022	-.089	-3.107	.002**
Social Privacy Sat.	1.129	.001	-.027	.025	-.031	-1.062	.288
Sense of Community	3.113	.003	.034	.019	.051	1.764	.078
Membership	.050	.000	.005	.022	.006	.223	.824
Influence	.375	.000	.014	.023	.018	.612	.540
Reinforcement	7.973	.007	.067	.024	.081	2.824	.005**
Emotional Connection	4.544	.004	.050	.023	.061	2.132	.033*

*$p \leq .05$, ** $p \leq .005$, *** $p \leq .001$

Note*: All predictive regression models were under the conditions that all variables were measured with the defined units of PE assessment and PEP questionnaire.*

All data sets were proved conforming to the primary assumptions of 1) linear relationship (by Scatter plot), 2) no auto-correlation (by Durbin-Watson test $d \leq 4\text{-}d_L$*), 3)* error terms had mean zero and constant variance uncorrelated (by residual statistics), and 4) multivariate normality *(by Normal P-P plot).*

6.3.4.5 Type of Roommate

The type of roommate was a personal factor involving the dwelling status and the relationship between house's members. Regarding the PEP questionnaire, there were five types of roommate, namely, 1) alone, 2) family members, 3) spouse/ girlfriend/ boyfriend, 4) non-family members, and 5) others. To investigate the influences of the type of roommate on the psychological status of the dwellers, the one-way ANOVA was performed. The statistical sub-hypotheses 1.26 are described below.

Null Hypothesis $H(1.26)_0$***:*** There is no significant difference in safety concern, privacy satisfaction, and sense of community between Type1: alone, Type2: family members, Type3: spouse/girlfriend/ boyfriend, Type4: non-family members, and Type5: others

Alternative Hypothesis $H(1.27)_1$***:*** There is significant difference in safety concern, privacy satisfaction, and sense of community between Type1: alone, Type2: family members, Type3: spouse/girlfriend/ boyfriend, Type4: non-family members, and Type5: others

The one-way ANOVA analysis rejected the null hypothesis H_0 and accepted the alternative hypothesis H_1 that there were significant differences in safety concern, privacy satisfaction, and sense of community amongst the groups of residents who were living with the different types of the roommate.

The findings revealed that the variances of safety concern, privacy satisfaction, and sense of community between groups were significantly different at $F(4, 1006) = 2.525$, $p = .039$, $F(4, 1006) = 2.513$, $p = .040$, and $F(4, 1006) = 2.564$, $p = .037$ consecutively. To be more specific, the effect of type of roommate on crime concern was found at $F(4, 1006) = 3.431$, $p = .009$, whereas, the psychological, informational, and physical privacy satisfaction were affected by type of roommate at $F(4, 1006) = 3.145$, $p = .014$, $F(4, 1006) = 2.598$, $p = .035$, and $F(4, 1006) = 3.758$, $p = .005$ consecutively. Meanwhile, the sense of community and reinforcement was significantly affected by type of roommate at $F(4, 1006) = 2.564$, $p = .037$, and $F(4, 1006) = 3.422$, $p = .009$ consecutively. The results of Post hoc tests were described in the table below. (See Table 6.35)

Table 6.35 One-way ANOVA summary table: Safety Concern, Crime Concern, Privacy Satisfaction, Psychological Privacy Satisfaction, Informational Privacy Satisfaction, Physical Privacy Satisfaction, Sense of Community, and Reinforcement Scores, by Type of Roommate

N=1206

		Safety Concern	*Crime Concern*	*Privacy Stfn.*	*Psycho Privacy*	*Info Privacy*	*Physical Privacy*	*Sense of Comm.*	*Reinforcement*
Roommate 1:	*M*	2.510	2.436	4.085	4.091	4.030	4.365	3.294	3.193
Alone	*S.D.*	0.962	1.063	0.806	1.017	0.917	0.832	0.740	0.923
Roommate 2:	*M*	2.586	2.595	3.962	3.966	3.949	4.135	3.419	3.378
Family Members	*S.D.*	0.991	1.069	0.829	1.006	1.015	0.944	0.798	0.915
Roommate 3:	*M*	2.733	2.753	4.046	4.031	4.016	4.269	3.279	3.162
Spouse/GF/BF	*S.D.*	0.945	1.098	0.697	0.888	0.832	0.825	0.721	0.873
Roommate 4:	*M*	2.727	2.684	3.854	3.746	3.742	4.084	3.235	3.092
Non-family	*S.D.*	1.046	1.146	0.736	0.913	0.966	0.834	0.687	0.914
Roommate 5:	*M*	2.375	2.667	3.875	3.833	3.667	4.167	4.000	3.833
Others	*S.D.*	0.545	0.882	0.250	1.041	1.528	0.764	0.217	0.764
	F(4,1006)	2.525	3.431	2.513	3.145	2.598	3.758	2.546	3.422
	p	.039*	.009*	.040*	.014*	.035*	.005**	.037*	.009*
	Post hoc Tests	LSD 1<3,4	Scheffe 1<2	LSD 4<1,3	Scheffe 4<1	Tamhane4 <1,3	Scheffe 1>2,4	LSD 2>1,3,4	LSD 2>1,3,4

*$p \leq .05$, ** $p \leq .005$, *** $p \leq .001$

***Note**: All predictive regression models were under the conditions that all variables were measured with the defined units of PE assessment and PEP questionnaire.*

All data sets were proved conforming to the primary assumption of a normal distribution *by means of considering the skewness and kurtosis of data sets, which were in between ±2.*

The effect size and statistical power of all significant differences influenced by the type of roommate were compared and described in Section 6.4.

6.3.5 Influences of Personal Factors on the Psychological Status of High-rise Dwellers: Psychological Background

- Psychological background

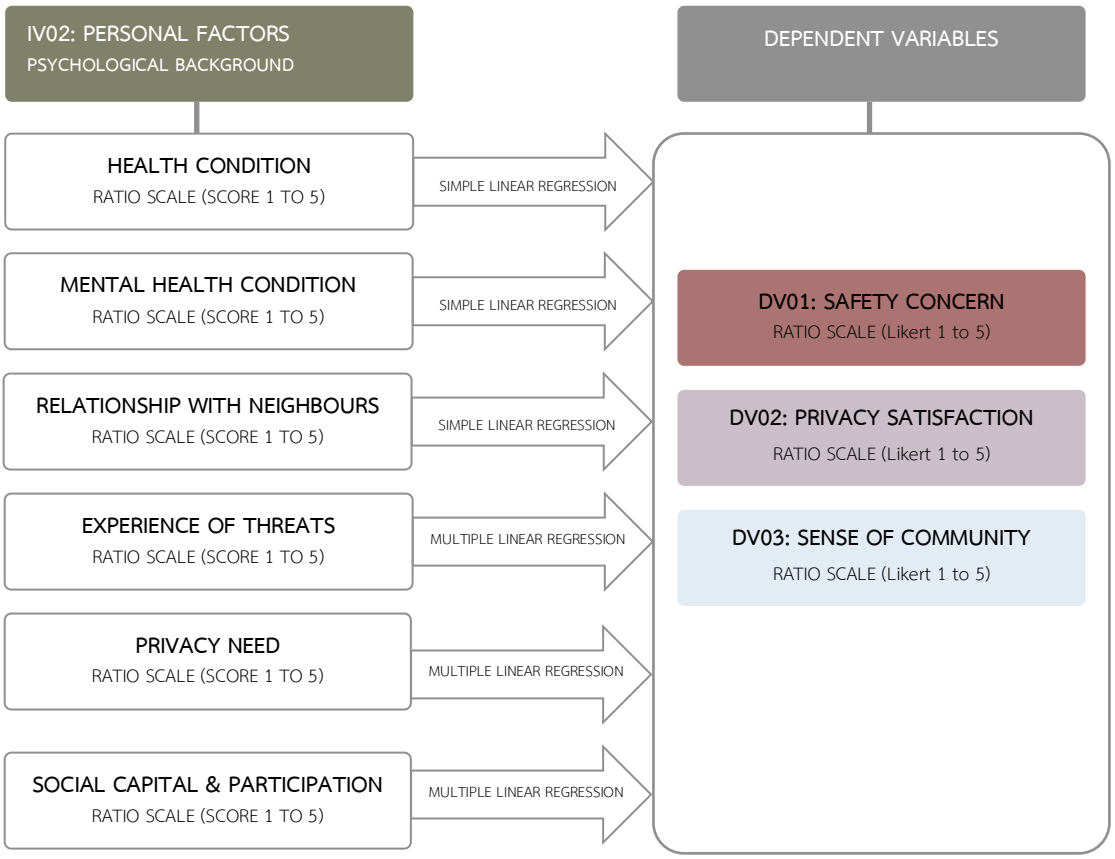


Figure 6.18 Diagram of analytical approach for psychological background variables

The table below summarises the statistically significant effects of all independents variables under the category of psychological background. The further explanations about the statistical analytical process of each independent variable are provided separately in the next section.

Table 6.36 Summary of Statistical Effects of Psychological Background Variables on Dependent Variables Safety Concern, Privacy Satisfaction, and Sense of Community and their Sub-variables

IV02: Personal Factors *Psychological Bkgd. Variables*	Dependent Variables and Sub Variables														Notes
	Average Safety Concern	Crime Concern	Behavioural Disorder Concern	Emergency Concern	Average Privacy Satisfaction	Psychological Privacy Satisfaction	Informational Privacy Satisfaction	Physical Privacy Satisfaction	Social Privacy Satisfaction	Average Sense of Community	Membership	Influence	Reinforcement	Emotional Connection	
1. Health Condition					✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	SLR
2. Mental Health Condition			✔		✔	✔	✔		✔	✔	✔	✔	✔	✔	SLR
3. Relationship with Neighbours			✔							✔	✔	✔	✔	✔	SLR
4. Experience of Threats	✔	✔	✔	✔											MLR
5. Privacy Need	✔	✔	✔	✔	✔		✔	✔	✔	✔	✔	✔	✔	✔	MLR
6. Social Capital/ Participation	✔	✔			✔	✔	✔	✔		✔	✔	✔	✔	✔	MLR

✔ = Statistical effect detected at 95% Confidence Interval

6.3.5.1 Health Condition

The physical health condition of the respondents was the personal factors assumed to have an influence on the residents' mental status. According to the field survey, the self-reported health status after moving into the current high-rise building was categorised into three levels, namely, 1) worse = 1, 2) same = 3, and 3) better = 5. The converted score 1 to 5 was analysed with the simple linear regression method to test the statistical sub-hypotheses 1.27 described below.

Null Hypothesis $H(1.27)_0$***:*** There is no significant prediction of dependent variables: safety concern, privacy satisfaction, and sense of community by score of health condition

Alternative Hypothesis $H(1.27)_1$***:*** There is significant prediction of dependent variables: safety concern, privacy satisfaction, and sense of community by score of health condition

The SLR results rejected the null hypothesis and indicated that the effects of the physical health score reported by the respondents statistically existed and impacted on their mental status, in particular, the privacy satisfaction and sense of community. Meanwhile, this indicator did not significantly affect safety concern.

Amongst the effects identified by SLR calculation, two results did not achieve the minimum requirement of the effect size and power, which were the positive effects of the health condition on the informational and physical privacy

satisfaction. (See more detail in Section 6.4, Table 6.54) The significant influences that reached the requirement are described as follows.

The predictive model of the privacy satisfaction by health condition was found at $F(1,1204)= 10.352$, $p = .001$, with an R^2 of .009, which could be interpreted that participants' privacy satisfaction score increased 0.072 for each health condition score. (See Table 6.37) Also, the predictive models of the psychological and social privacy satisfaction were found at $F(1,1204)= 8.811$, $p = .003$, with an R^2 of .007 and $F(1,1204)= 9.583$, $p = .002$, with an R^2 of .008, which mean participants' psychological and social privacy satisfaction increased 0.083 and 0.087 for each health condition score. (See Table 6.37) The predictive equations are described as follows.

Privacy Satisfaction = 3.747 + (.072)(health condition score)
Psychological Privacy Satisfaction = 3.694 + (.083) (health condition score)
Social Privacy Satisfaction = 3.523 + (.087) (health condition score)

Meanwhile, the positive effects of the health condition on the sense of community including the feeling of membership, influence, reinforcement, and emotional connection were identified at $F(1,1204)= 58.694$, $p = .000$, with an R^2 of .046, $F(1,1204)= 49.015$, $p = .000$, with an R^2 of .039, $F(1,1204)= 24.404$, $p = .000$, with an R^2 of . 020, $F(1,1204)= 34.810$, $p = .000$, with an R^2 of .028, and $F(1,1204)= 59.467$, $p = .000$, with an R^2 of .047 consecutively. In other words, the participants' sense of community, membership, influence, reinforcement, and emotional connection increased 0.161, 0.167, 0.125, 0.155, and 0.196 for each health condition score respectivelt. (See Table 6.37) The predictive equations are described as follows.

Sense of Community = 2.756 + (.161) (health condition score)
Membership = 2.843 + (.167) (health condition score)
Influence = 2.7774 + (.125) (health condition score)
Reinforcement = 2.690 + (.155) (health condition score)
Emotional Connection = 2.718+ (.196) (health condition score)

Table 6.37 Summary of simple linear regression models for Safety Concern, Privacy Satisfaction, and Sense of Community Scores including their sub-variables predicted by the predictor, Health Condition Score

N=1206

	Predictors Health Condition Score (Enter Method)						
Response variables	*F*	R^2	B	S.E.	β	*t*	*p*
Safety Concern	2.154	.002	-.042	.028	-.042	-1.468	.142
Crime Concern	1.085	.001	-.033	.032	-.030	-1.042	.298
Behavioural Concern	1.766	.001	-.041	.031	-.038	-1.329	.184
Emergency Concern	2.528	.002	-.056	.035	-.046	-1.590	.112
Privacy Satisfaction	10.352	.009	.072	.022	.092	3.217	.001***
Psycho. Privacy Sat.	8.811	.007	.083	.028	.085	2.968	.003**
Info. Privacy Sat.	4.921	.004	.060	.027	.064	2.218	.027*
Physical Privacy Sat.	5.556	.005	.059	.025	.068	2.357	.019*
Social Privacy Sat.	9.583	.008	.087	.028	.089	3.096	.002**
Sense of Community	58.694	.046	.161	.021	.216	7.661	.000***
Membership	49.015	.039	.167	.024	.198	7.001	.000***
Influence	24.404	.020	.125	.025	.141	4.940	.000***
Reinforcement	34.810	.028	.155	.026	.168	5.900	.000***
Emotional Connection	59.467	.047	.196	.025	.217	7.712	.000***

*$p \leq .05$, ** $p \leq .005$, *** $p \leq .001$

***Note**: All predictive regression models were under the conditions that all variables were measured with the defined units of PE assessment and PEP questionnaire.*

All data sets were proved conforming to the primary assumptions of 1) linear relationship (by Scatter plot), 2) no auto-correlation (by Durbin-Watson test $d \leq 4\text{-}d_L$), 3) error terms had mean zero and constant variance uncorrelated (by residual statistics), and 4) multivariate normality *(by Normal P-P plot).*

6.3.5.2 Mental Health Condition

Similar to health status, the mental health condition was measured in the nominal scale during the field survey then converted into the interval score one to five. The simple linear regression technique was applied to test the statistical sub-hypotheses 1.28 described below.

Null Hypothesis $H(1.28)_0$**:** There is no significant prediction of dependent variables: safety concern, privacy satisfaction, and sense of community by score of mental health condition

Alternative Hypothesis $H(1.28)_1$**:** There is significant prediction of dependent variables: safety concern, privacy satisfaction, and sense of community by score of mental health condition

The SLR result rejected the null hypothesis and indicated that the effects of the mental health score reported by the respondents statistically existed and influenced all three psychological dependent variables. (See Table 6.38) Nonetheless, the effects of this indicator on the behavioural disorder concern and

informational privacy satisfaction could not be confirmed in this study due to the extremely low R^2 and the subtle effect size. (See Section 6.4) The significant effects that reached the conventional magnitude and power of effect were interpreted as follows.

The positive effects of mental health score were also significantly found on the respondents' privacy satisfaction including psychological, informational, and social aspects. The predictive models of privacy satisfaction including psychological and social privacy satisfaction were found at $F(1,1204)= 11.055$, $p = .001$, with an R^2 of .009, $F(1,1204)= 11.662$, $p = .014$, with an R^2 of .010, and $F(1,1204)= 9.933$, $p = .002$, with an R^2 of .008 consecutively, which could be interpreted that participants' privacy satisfaction, psychological privacy satisfaction and social privacy satisfaction increased 0.069, 0.089, and 0.082 consecutively for each mental health condition score. (See Table 6.38) The predictive equations are described as follows.

Privacy Satisfaction = 3.748 + (.069)(mental health condition score)
Psychological Privacy Satisfaction = 3.661+ (.089)(mental health condition score)
Social Privacy Satisfaction = 3.528 + (.082)(mental health condition score)

Considering the sense of community, the positive effects of mental health were also found on all aspects of the sense of community. The predictive models of sense of community, membership, influence, reinforcement, and emotional connection were detected significantly at $F(1,1204)= 75.242$, $p = .000$, with an R^2 of .059, $F(1,1204)= 55.381$, $p = .000$, with an R^2 of .044, $F(1,1204)= 20.865$, $p = .000$, with an R^2 of .017, $F(1,1204)= 47.715$, $p = .000$, with an R^2 of .038, and $F(1,1204)= 99.762$, $p = .000$, with an R^2 of .077 consecutively, which could be interpreted that participants' sense of community, membership, influence, reinforcement, and emotional connection increased 0.168, 0.164, 0.107, 0.167, and 0.232 consecutively for each mental health condition score. (See Table 6.38) The predictive equations are described as follows.

Sense of Community = 2.707 + (.168)(mental health condition score)
Membership = 2.828 + (.164)(mental health condition score)

Influence = 2.820 + (.107)(mental health condition score)
Reinforcement = 2.622 + (.167)(mental health condition score)
Emotional Connection = 2.558 + (.232)(mental health condition score)

Table 6.38 Summary of simple linear regression models for Safety Concern, Privacy Satisfaction, and Sense of Community Scores including their sub-variables predicted by the predictor, Mental Health Condition Score

N=1206

	Predictors Mental Health Condition Score (Enter Method)						
Response variables	*F*	R^2	B	S.E.	β	*t*	*p*
Safety Concern	2.756	.002	-.044	.026	-.048	-1.660	.097
Crime Concern	1.236	.001	-.033	.030	-.032	-1.112	.266
Behavioural Concern	4.129	.003	-.058	.029	-.058	-2.032	.042*
Emergency Concern	1.413	.001	-.038	.032	-.034	-1.189	.235
Privacy Satisfaction	11.055	.009	.069	.021	.095	3.325	.001***
Psycho. Privacy Sat.	11.662	.010	.089	.026	.098	3.415	.001***
Info. Privacy Sat.	5.995	.005	.062	.025	.070	2.449	.014*
Physical Privacy Sat.	3.723	.003	.045	.023	.056	1.929	.054
Social Privacy Sat.	9.933	.008	.082	.026	.090	3.152	.002**
Sense of Community	75.242	.059	.168	.019	.243	8.674	.000***
Membership	55.381	.044	.164	.022	.210	7.442	.000***
Influence	20.865	.017	.107	.024	.131	4.568	.000***
Reinforcement	47.715	.038	.167	.024	.195	6.908	.000***
Emotional Connection	99.762	.077	.232	.023	.277	9.988	.000***

*$p \leq .05$, ** $p \leq .005$, *** $p \leq .001$

***Note**: All predictive regression models were under the conditions that all variables were measured with the defined units of PE assessment and PEP questionnaire.*

All data sets were proved conforming to the primary assumptions of 1) linear relationship (by Scatter plot), 2) no auto-correlation (by Durbin-Watson test $d \leq 4\text{-}d_L$), 3) error terms had mean zero and constant variance uncorrelated (by residual statistics), and 4) multivariate normality *(by Normal P-P plot).*

6.3.5.3 Relationship with Neighbours

The relationship with neighbours was one of the indicators presumed to influence the high-rise residents' mental wellbeing especially the sense of community. Similar to the health and mental health conditions, the relationship with neighbours was measured in the nominal scale type then converted into the interval score one to five. In this case, the simple linear regression was performed to investigate the effects of the quality of relationship with neighbours on the respondents' psychological status. The statistical sub-hypotheses 1.29 are described below.

Null Hypothesis H(1.29)$_0$:	There is no significant prediction of dependent variables: safety concern, privacy satisfaction, and sense of community by score of relationship with neighbours
Alternative Hypothesis H(1.29)$_1$:	There is significant prediction of dependent variables: safety concern, privacy satisfaction, and sense of community by score of relationship with neighbours

The SLR result rejected the null hypothesis and accepted that the score of relationship with neighbours negatively affected their behavioural disorder concern, whereas, positively affected all aspects of the sense of community.

The predictive model of behavioural disorder concern was found at $F(1,1204)= 8.142$, $p = .004$, with an R^2 of .007 (See Table 6.39), which meant that the participants' behavioural disorder concern decreased 0.066 for each relationship with neighbours score as described in the below equation.

Behavioural Disorder Concern = 2.685 + (-.066)(relationship with neighbours score)

The predictive models of sense of community, membership, influence, reinforcement, and emotional connection were detected significantly at $F(1,1204)= 105.743$, $p = .000$, with an R^2 of.081, $F(1,1204)= 95.156$, $p = .000$, with an R^2 of . 073, $F(1,1204)= 64.527$, $p = .000$, with an R^2 of .051, $F(1,1204)= 93.643$, $p = .000$, with an R^2 of . 072, and $F(1,1204)= 44.587$, $p = .000$, with an R^2 of .036 consecutively, which could be interpreted that participants' sense of community, membership, influence, reinforcement, and emotional connection increased 0.160, 0.172, 0.151, 0.187, and 0.129 consecutively for each relationship with neighbours score. (See Table 6.39) The predictive equations are described as follows.

Sense of Community = 2.872 + (.160)(relationship with neighbours score)

Membership = 2.945 + (.172)(relationship with neighbours score)

Influence = 2.789 + (.151)(relationship with neighbours score)

Reinforcement = 2.708 + (.187)(relationship with neighbours score)

Emotional Connection = 3.045 + (.129)(relationship with neighbours score)

Table 6.39 Summary of simple linear regression models for Safety Concern, Privacy Satisfaction, and Sense of Community Scores including their sub-variables predicted by the predictor, Relationship with Neighbours Score

N=1206

	Predictors Relationship with Neighbours Score (Enter Method)						
Response variables	*F*	R^2	B	S.E.	β	*t*	*p*
Safety Concern	3.314	.003	-.039	.022	-.052	-1.820	.069
Crime Concern	.362	.000	-.015	.024	-.017	-.601	.548
Behavioural Concern	8.142	.007	-.066	.023	-.082	-2.853	.004**
Emergency Concern	1.759	.001	-.035	.026	-.038	-1.326	.185
Privacy Satisfaction	.023	.000	-.003	.017	-.004	-.152	.879
Psycho. Privacy Sat.	.179	.000	-.009	.021	-.012	-.423	.672
Info. Privacy Sat.	.333	.000	-.012	.021	-.017	-.577	.564
Physical Privacy Sat.	.045	.000	.004	.019	.006	.213	.832
Social Privacy Sat.	.094	.000	.007	.021	.009	.306	.759
Sense of Community	105.743	.081	.160	.016	.284	10.283	.000***
Membership	95.156	.073	.172	.018	.271	9.755	.000***
Influence	64.527	.051	.151	.019	.226	8.033	.000***
Reinforcement	93.643	.072	.187	.019	.269	9.677	.000***
Emotional Connection	44.587	.036	.129	.019	.189	6.677	.000***

*$p \leq .05$, ** $p \leq .005$, *** $p \leq .001$

***Note**: All predictive regression models were under the conditions that all variables were measured with the defined units of PE assessment and PEP questionnaire.*

All data sets were proved conforming to the primary assumptions of 1) linear relationship (by Scatter plot), 2) no auto-correlation (by Durbin-Watson test $d \leq 4\text{-}d_l$), 3) error terms had mean zero and constant variance uncorrelated (by residual statistics), and 4) multivariate normality *(by Normal P-P plot).*

6.3.5.4 Experience of Threats

The experience of threats was a psychological indicator that was initiated in particular for this study. This indicator was assumed to impact directly on the respondents' safety concern positively.

According to the PEP questionnaire, the respondents were allowed to self-report their engagement and experience of the four types of threats, which were composed of 1) experience of crime, 2) experience of behavioural disorder, 3) experience of emergency caused by human, and 4) experience of emergency caused by nature/ disaster. The degree of engagement was measured into three nominal levels, namely, 1) never, 2) experienced, and 3) experienced and recognisable, and further converted into score (one to five) in order to find its impacts on the psychological status of the dwellers. In this case, a multiple linear regression (MLR) with stepwise method was performed to investigate the effects of multiple

experiences of threats on the respondents' psychological status. The statistical sub-hypotheses 1.30 are described below.

Null Hypothesis H(1.30)$_0$:	There is no significant prediction of dependent variables: safety concern, privacy satisfaction, and sense of community by scores of experience of crime, experience of behavioural disorder, experience of emergency caused by human, and experience of emergency caused by nature
Alternative Hypothesis H(1.30)$_1$:	There is significant prediction of dependent variables: safety concern, privacy satisfaction, and sense of community by scores of experience of crime, experience of behavioural disorder, experience of emergency caused by human, and experience of emergency caused by nature

The MLR analysis rejected the null hypothesis, whereas, accepted the alternative hypothesis that the significant effects of the experience of threats' score statistically existed and impacted solely on the respondents' safety concern as presumed earlier. Also, the magnitude and power of all effects achieved the minimum requirement of this study.

The MLR results indicated that the value of safety concern could be predicted by the experience of emergency caused by human, and experience of behavioural disorder scores at $F(1,1204)= 7.778$, $p = .000$, with an R^2 of .013. (See Table 6.40) The predictive equation implied that the respondents' safety concern increased by 0.075, and 0.069 for each point of experience of emergency caused by human and behavioural disorder consecutively.

The predictive MLR modelling could be interpreted in a form of equation below.

$$\mathrm{Y} = a + b_1X_1 + b_2X_2 + b_3X_3 + \cdots$$

$$\boldsymbol{Y} = \text{Predicted value of } dependent\ variables$$
$$a = (Alpha)\text{Constant or intercept}$$
$$b_{1,2,3,\ldots} = \text{Estimate of regression slope for } X_{1,2,3,\ldots}$$
$$X_{1,2,3,\ldots} = \text{Value of } independent\ variables\ 1,2,3, \ldots$$

Safety Concern = 2.437 + (.075)(Exp. of Emg. Human) + (.069)(Exp. of Behaviour)

Meanwhile, the respondents' crime concern could be predicted by their experience of emergency caused by nature scores, which was found significantly at $F(1,1204)= 9.283$, $p = .002$, with an R^2 of .008. (See Table 6.40) The predictive equation implied that the respondents' crime concern increased by 0.094 for each

point of experience of emergency caused by nature. The predictive equation is described below.

Crime Concern = 2.483 + (.094)(Exp. of Emg. Nature)

Table 6.40 Summary of multiple linear regression models for Safety Concern and Crime Concern Scores predicted by the predictor, Experience of Threats Score

N=1206

	Predictive Model for Safety Concern Score					Predictive Model for Crime Concern Score				
	Collinearity Statistics		(Stepwise Method: Model2)			Collinearity Statistics		(Stepwise Method: Model1)		
Predictors	Tol.	VIF	B	S.E.	β	Tol.	VIF	B	S.E.	β
Exp. of Behaviour	.861	1.162	.069	.035	.062*					
Exp. of Emg. by Human	.861	1.162	.075	.031	.075*					
Exp. of Emg. by Nature						1.000	1.000	.094	.031	.087**
	F (2, 1203)		7.778			*F (1, 1204)*		9.283		
	R^2		.013			R^2		.008		
	P		.000***			*P*		.002**		

*$p \leq .05$, ** $p \leq .005$, *** $p \leq .001$

Note: *All predictive regression models were under the conditions that all variables were measured with the defined units of PE assessment and PEP questionnaire, and the collinearity diagnostic showed that the multicollinearity between regressors was not found. (There were no independent variables that owned Variance Inflation Factor (VIF) greater than 4 as well as the Tolerance (Tol.) lower than 0.2)*

Moreover, the experience of behavioural disorder score also affected the respondents' behavioural disorder concern level at $F(1,1204)= 11.713$, $p = .001$, with an R^2 of .010. (See Table 6.41) The predictive equation implied that the respondents' behavioural concern increased by 0.120 for each point of experience of behavioural disorder concern, whereas, their emergency concern level was predicted by the experience of emergency caused by human significantly at $F(1,1204)= 15.026$, $p = .000$, with an R^2 of .012, which meant that the concern of emergency increased by 0.137 for each score of experience of emergency caused by human (See Table 6.41) The predictive equations are described below.

Behavioural Disorder Concern = 2.336 + (.120) (Exp. of Behaviour)

Emergency Concern= 2.669 + (.137)(Exp. of Emg. Human)

Table 6.41 Summary of multiple linear regression models for Behavioural Disorder Concern and Emergency Concern Scores predicted by the predictor, Experience of Threats Score

N=1206

	Predictive Model for Behavioural Concern Score					Predictive Model for Emergency Concern Score				
	Collinearity Statistics		(Stepwise Method: Model1)			Collinearity Statistics		(Stepwise Method: Model1)		
Predictors	Tol.	VIF	B	S.E.	β	Tol.	VIF	B	S.E.	β
Exp. of Behaviour	1.000	1.000	.120	.035	.098**					
Exp. of Emg. by Human						1.000	1.000	.137	.035	.111**
F (1, 1204)	*11.713*					*15.026*				
R^2	*.010*					*.012*				
P	*.001****					*.000****				

*$p \leq .05$, ** $p \leq .005$, *** $p \leq .001$

Note: *All predictive regression models were under the conditions that all variables were measured with the defined units of PE assessment and PEP questionnaire, and the collinearity diagnostic showed that the multicollinearity between regressors was not found. (There were no independent variables that owned Variance Inflation Factor (VIF) greater than 4 as well as the Tolerance (Tol.) lower than 0.2)*

6.3.5.5 Privacy Need

The privacy need was the psychological indicator related to an introvert personality of the high-rise residents. This indicator was constituted based on the theoretical concept of the privacy function and dimension. It was assumed to have an impact on the mental status of the respondents particularly on their privacy satisfaction.

Regarding the PEP questionnaire, the respondents were asked to self-report their feeling in response to the various situations involving the five privacy types. These questions were considered to reflect the respondents' need of privacy and their introvert personality. The five privacy types were as follows: 1) solitude, 2) reserved, 3) anonymous, 4) isolated, and 5) privacy with friends/ family. The degree of privacy need was measured in three nominal levels, namely, 1) feel uncomfortable, 2) feel nothing, and 3) feel good, then further converted into score one to five in order to statistically analyse its impacts on the psychological status of the dwellers. The sub-hypotheses 1.31 are described below.

Null Hypothesis $H(1.31)_0$: There is no significant prediction of dependent variables: safety concern, privacy satisfaction, and sense of community by scores of solitude, reserved, anonymous, isolated, and privacy with friends/ family

Alternative Hypothesis $H(1.31)_1$: There is significant prediction of dependent variables: safety concern, privacy satisfaction, and sense of community by scores of solitude, reserved, anonymous, isolated, and privacy with friends/ family

The MLR analysis rejected the null hypothesis, whereas, accepted the alternative hypothesis that the significant effects of the privacy need score

statistically existed and impacted the respondents' privacy satisfaction as presumed earlier. Moreover, its effects on safety concern and sense of community were also detected.

However, noted that, amongst the significant effects computed by MLR process, two results earned extremely small R^2 and did not achieve the minimum requirement of the power and effect size demanded in this study, namely, the effects of the privacy need score on the informational and physical privacy satisfaction.

The results of MLR indicated that the value of safety concern and crime concern could be predicted by the reserved privacy scores significantly at $F(1,1204)= 24.808$, $p = .000$, with an R^2 of .020, and $F(1,1204)= 20.265$, $p = .000$, with an R^2 of .017 (See Table 6.42) The predictive equation implied that the respondents' safety concern and crime concern increased by 0.153, and 0.155 for each point of reserved score. The predictive equations are described below.

Safety Concern = 2.217+ (.153)(Reserved Privacy Score)

Crime Concern = 2.198+ (.155)(Reserved Privacy Score)

Table 6.42 Summary of multiple linear regression models for Safety Concern and Crime Concern Scores predicted by the predictor, Privacy Need Score

N=1206

	Predictive Model for Safety Concern Score					Predictive Model for Crime Concern Score				
	Collinearity Statistics		(Stepwise Method: Model1)			Collinearity Statistics		(Stepwise Method: Model1)		
Predictors	Tol.	VIF	B	S.E.	β	Tol.	VIF	B	S.E.	β
Reserved	1.000	1.000	.153	.031	.142**	1.000	1.000	.155	.034	.129**
F (1, 1204)	24.808					20.265				
R^2	.020					.017				
P	*.000****					.000***				

*$p \leq .05$, ** $p \leq .005$, *** $p \leq .001$

Note: *All predictive regression models were under the conditions that all variables were measured with the defined units of PE assessment and PEP questionnaire, and the collinearity diagnostic showed that the multicollinearity between regressors was not found. (There were no independent variables that owned Variance Inflation Factor (VIF) greater than 4 as well as the Tolerance (Tol.) lower than 0.2)*

As well, it appeared that the respondents' privacy need score positively affected their behavioural disorder concern and emergency concern. The predictive models were found at $F(1,1204)= 20.135$, $p = .000$, with an R^2 of .016, and $F(2,1203)=$

11.222, p = .000, with an R^2 of .017 (See Table 6.43) The predictive equation implied that the respondents' behavioural concern increased by 0.150 for each score of reserved privacy, whereas, the respondents' emergency concern increased by 0.122 for each point of reserved and decreased 0.096 for each point of isolate privacy scores. The predictive equations are described below.

Behavioural Disorder Concern = 2.068+ (.150)(Reserved Privacy Score)

Emergency Concern = 2.839+ (.122)(Reserved Privacy Score) + (-.096)(Isolate Privacy Score)

Table 6.43 Summary of multiple linear regression models for Behavioural Disorder Concern and Emergency Concern Scores predicted by the predictor, Privacy Need Score

N=1206

	Predictive Model for Behavioural Concern Score					Predictive Model for Emergency Concern Score				
	Collinearity Statistics		(Stepwise Method: Model1)			Collinearity Statistics		(Stepwise Method: Model2)		
Predictors	Tol.	VIF	B	S.E.	β	Tol.	VIF	B	S.E.	β
Reserved	1.000	1.000	.150	.033	.128**	.892	1.122	.122	.040	.092**
Isolate						.892	1.122	-.096	.040	-.073*
	F (1, 1204)		20.135			*F (2, 1203)*		11.222		
	R^2		.016			R^2		.017		
	P		.000***			*P*		.000***		

*$p \leq .05$, ** $p \leq .005$, *** $p \leq .001$

Note: *All predictive regression models were under the conditions that all variables were measured with the defined units of PE assessment and PEP questionnaire, and the collinearity diagnostic showed that the multicollinearity between regressors was not found. (There were no independent variables that owned Variance Inflation Factor (VIF) greater than 4 as well as the Tolerance (Tol.) lower than 0.2)*

When considering the effect of privacy need on the respondents' privacy satisfaction, the MLR analysis indicated that the average score of privacy satisfaction was significantly predicted by the anonymous and reserved personality. The predictive models were found at $F(2,1203)= 5.735$, p = .003, with an R^2 of .009, and $F(1,1204)= 6.720$, p = .010, with an R^2 of .006. (See Table 6.44)

The predictive equation implied that the respondents' privacy satisfaction decreased by 0.042 and 0.051 for each score of reserved privacy and anonymous privacy, whereas, the respondents' informational privacy satisfaction declined by 0.062 for each point of the anonymous personality. The predictive equation is described below.

Privacy Satisfaction = 4.228+ (-.042)(Anonymous Privacy Score) + (-.051)(Reserved Privacy Score)

Besides, the results suggested that the scores of reserved and solitude personality also influenced the respondents' social privacy satisfaction. The

predictive models were found at $F(2,1203)= 12.881$, $p = .000$, with an R^2 of .021 (See Table 6.44) The predictive equation implied that the respondents' social privacy satisfaction decreased by 0.087 and 0.083 for each point of reserved and solitude personality scores. The predictive equations are described below.

Social Privacy Satisfaction = 4.263 + (-.083)(Solitude Privacy Score) + (-.087)(Reserved Privacy Score)

Table 6.44 Summary of multiple linear regression models for Privacy Satisfaction and Social Privacy Satisfaction Scores predicted by the predictor, Privacy Need Score

N=1206

	Predictive Model for Privacy Satisfaction Score					Predictive Model for Social Privacy Satisfaction Score				
	Collinearity Statistics		(Stepwise Method: Model2)			Collinearity Statistics		(Stepwise Method: Model1)		
Predictors	Tol.	VIF	B	S.E.	β	Tol.	VIF	B	S.E.	β
Anonymous	.914	1.094	-.042	.021	-.061*					
Reserved	.914	1.094	-.051	.026	-.059*	.877	1.140	-.087	.032	-.082**
Solitude						.877	1.140	-.083	.027	-.094**
	F (2, 1203)		5.735			*F (2, 1203)*		12.881		
	R^2		.009			R^2		.021		
	P		.003**			*P*		.000***		

*$p \leq .05$, ** $p \leq .005$, *** $p \leq .001$

Note: *All predictive regression models were under the conditions that all variables were measured with the defined units of PE assessment and PEP questionnaire, and the collinearity diagnostic showed that the multicollinearity between regressors was not found. (There were no independent variables that owned Variance Inflation Factor (VIF) greater than 4 as well as the Tolerance (Tol.) lower than 0.2)*

Furthermore, the findings also indicated that the respondents' privacy needs score also influenced the sense of community in every aspect. The predictive models for the average sense of community and the feeling of membership were significantly found at $F(3, 1202)= 38.204$, $p = .000$, with an R^2 of .087, and $F(3, 1202)= 22.830$, $p = .000$, with an R^2 of 0.054 respectively. (See Table 6.45) In other words, the respondents' sense of community decreased by 0.132, 0.087, and 0.068 for point score of reserved, anonymous, and solitude personality, whereas, the respondents' feeling of membership decreased by 0.114, 0.045, and 0.094 for each point of reserved, anonymous, and solitude personality respectively. The predictive equations are described below.

Sense of Community = 4.032 + (-.132)(Reserved Privacy Score) + (-.087) (Anonymous Privacy Score) + (-.068)(Solitude Privacy Score)

Membership = 4.056 + (-.114)(Reserved Privacy Score) + (-.045)(Solitude Privacy Score) + (-.094) (Anonymous Privacy Score)

Table 6.45 Summary of multiple linear regression models for Sense of Community and Membership Scores predicted by the predictor, Privacy Need Score

N=1206

	Predictive Model for Sense of Community Score					Predictive Model for Membership Score				
	Collinearity Statistics		(Stepwise Method: Model3)			Collinearity Statistics		(Stepwise Method: Model3)		
Predictors	Tol.	VIF	B	S.E.	β	Tol.	VIF	B	S.E.	β
Reserved	.840	1.191	-.132	.024	-.163**	.840	1.191	-.114	.028	-.124**
Anonymous	.830	1.204	-.087	.021	-.128**	.865	1.156	-.045	.022	-.061**
Solitude	.865	1.156	-.068	.019	-.105**	.830	1.204	-.094	.024	-.123*
		F (3, 1202)	38.204				*F (3, 1202)*	22.830		
		R^2	.087				R^2	.054		
		P	.000***				*P*	.000***		

*$p \leq .05$, ** $p \leq .005$, *** $p \leq .001$

Note: *All predictive regression models were under the conditions that all variables were measured with the defined units of PE assessment and PEP questionnaire, and the collinearity diagnostic showed that the multicollinearity between regressors was not found. (There were no independent variables that owned Variance Inflation Factor (VIF) greater than 4 as well as the Tolerance (Tol.) lower than 0.2)*

The respondents' privacy needs also affected their feeling of influence, reinforcement, and emotional connection as well. The predictive models were detected at $F(2, 1203)= 36.046$, $p = .000$, with an R^2 of .057, $F(3, 1202)= 40.043$, $p = .000$, with an R^2 of .091, and $F(3, 1202)= 21.353$, $p = .000$, with an R^2 of .051 respectively. (See Table 6.46 and Table 6.47) The predictive equations could be interpreted that the predicted respondents' feeling of influence decreased by 0.071 and 0.186 for each point of solitude and reserved personality. (See Table 6.46) Meanwhile, the reinforcement decreased by 0.121, 0.135, and 0.104 for each point of solitude, reserved, and anonymous privacy needs respectively. (See Table 6.46) Furthermore, the emotional connection decreased by 0.071, 0.103, and 0.090 for each point of solitude, reserved, and anonymous privacy needs respectively. The predictive equations are described below. (See Table 6.47)

Influence = 3.892 + (-.071) (Solitude Privacy Score) + (-.186) (Reserved Privacy Score)

Reinforcement = 4.107 + (-.121)(Solitude Privacy Score) + (-.135)(Reserved Privacy Score) + (-.104)(Anonymous Privacy Score)

Emotion = 4.045 + (-.071)(Solitude Privacy Score) + (-.103)(Reserved Privacy Score) + (-.090)(Anonymous Privacy Score)

Table 6.46 Summary of multiple linear regression models for Influence and Reinforcement Scores predicted by the predictor, Privacy Need Score

N=1206

	Predictive Model for Influence Score					Predictive Model for Reinforcement Score				
	Collinearity Statistics		(Stepwise Method: Model2)			Collinearity Statistics		(Stepwise Method: Model3)		
Predictors	Tol.	VIF	B	S.E.	β	Tol.	VIF	B	S.E.	β
Solitude	.877	1.140	-.071	.024	-.087**	.830	1.204	-.121	.025	-.144**
Reserved	.877	1.140	-.186	.029	-.193**	.840	1.191	-.135	.030	-.134**
Anonymous						.865	1.156	-.104	.024	-.130**
	F (2, 1203)		36.046			*F (3, 1202)*		40.043		
	R^2		.057			R^2		.091		
	P		.000***			*P*		.000***		

*$p \leq .05$, ** $p \leq .005$, *** $p \leq .001$

Note: *All predictive regression models were under the conditions that all variables were measured with the defined units of PE assessment and PEP questionnaire, and the collinearity diagnostic showed that the multicollinearity between regressors was not found. (There were no independent variables that owned Variance Inflation Factor (VIF) greater than 4 as well as the Tolerance (Tol.) lower than 0.2)*

Table 6.47 Summary of multiple linear regression models for Emotional Connection Score predicted by the predictor, Privacy Need Score

N=1206

	Predictive Model for Emotional Connection Score				
	Collinearity Statistics		(Stepwise Method: Model3)		
Predictors	Tol.	VIF	B	S.E.	β
Anonymous	.865	1.156	-.090	.024	-.114**
Reserved	.840	1.191	-.103	.030	-.105**
Solitude	.830	1.204	-.071	.025	-.086*
	F (3, 1202)		21.353		
	R^2		.051		
	P		.000***		

*$p \leq .05$, ** $p \leq .005$, *** $p \leq .001$

Note: *All predictive regression models were under the conditions that all variables were measured with the defined units of PE assessment and PEP questionnaire, and the collinearity diagnostic showed that the multicollinearity between regressors was not found. (There were no independent variables that owned Variance Inflation Factor (VIF) greater than 4 as well as the Tolerance (Tol.) lower than 0.2)*

6.3.5.6 Social Capital and Participation

The social capital and participation score was the factor that was assumed to have a positive impact on the respondents' mental wellbeing principally the sense of community. During the field survey, the respondents were asked to report their frequency of contributing to society and community. This section of the PEP questionnaire comprised three types of social capital and participation, namely, 1) sharing, 2) volunteering, and 3) achieving civic duty. These indicators were measured

in the nominal scale as follows 1) never, 2) sometimes, and 3) always, and converted into the interval score one to five to investigate their effects on the psychological status of the respondents by the MLR calculation. The sub-hypotheses 1.32 are described below.

Null Hypothesis H(1.32)$_0$:	There is no significant prediction of dependent variables: safety concern, privacy satisfaction, and sense of community by scores of sharing, volunteering, and achieving civic duty
Alternative Hypothesis H(1.32)$_1$:	There is significant prediction of dependent variables: safety concern, privacy satisfaction, and sense of community by scores of sharing, volunteering, and achieving civic duty

The MLR analysis rejected the null hypothesis and accepted that the significant effects of the social capital and participation score statistically existed and not only impacted on the respondents' sense of community as presumed earlier but also on safety concern and privacy satisfaction.

Nevertheless, noted that the positive effects of the degree of social capital and participation on the safety concern and crime concern as well as the negative effect of this indicator on the average privacy satisfaction could not be confirmed in this study due to their extremely low R^2 and the unachieved magnitude of effect requirement.

When considering the effects of social capital and participation on the privacy satisfaction, the findings suggested that the sharing, volunteering, and duty scores significantly affected the respondents' psychological, informational, physical privacy satisfaction. The predictive models for psychological privacy satisfaction was detected at $F(3, 1202)= 6.646$, $p = .000$, with an R^2 of .016 respectively (See Table 6.48). The equations could be interpreted that the predicted psychological privacy satisfaction increased by 0.073 and 0.084 for each of point of sharing and duty score but decreased by 0.134 for each point of volunteering scores. The predictive equation is described below.

Psychological Privacy Satisfaction = 3.830 + (.073) (Sharing Score) + (.084) (Duty Score) + (-.134) (Volunteering Score)

Similarly, the social capital and participation score also influenced the respondents' informational and physical privacy satisfaction scores. The predictive models were found at $F(2, 1203)= 6.764$, $p = .001$, with an R^2 of .011, and $F(2, 1203)=$

5.575, p = .004, with an R^2 of .009 respectively (See Table 6.48 and Table 6.49). The equations could be interpreted that the predicted informational privacy satisfaction score increased by 0.098 for each of point of duty score but decreased by 0.086 for each volunteering score, whereas, the predicted physical privacy satisfaction degree decreased by 0.072 for each of point of volunteering score but increased by 0.084 for each sharing score. The predictive equations are described below.

Informational Privacy Satisfaction = 3.856 + (.098)(Duty Score) + (-.086) (Volunteering Score)

Physical Privacy Satisfaction = 4.161 + (-.072) (Volunteering Score) + (.084) (Sharing Score)

Table 6.48 Summary of multiple linear regression models for Privacy Satisfaction and Psychological Privacy Satisfaction Scores predicted by the predictor, Social Capital and Participation Score

N=1206

	Predictive Model for Psycho Privacy Stfn Score					Predictive Model for Info. Privacy Stfn. Score				
	Collinearity Statistics		(Stepwise Method: Model3)			Collinearity Statistics		(Stepwise Method: Model2)		
Predictors	Tol.	VIF	B	S.E.	β	Tol.	VIF	B	S.E.	β
Sharing	.787	1.270	.073	.031	.077*					
Duty	.768	1.302	.084	.030	.092**	.789	1.268	.098	.028	.112**
Volunteering	.697	1.435	-.134	.035	-.131**	.789	1.268	-.086	.032	-.087**
	F (3, 1202)		6.646			*F (2, 1203)*		6.764		
		R^2	.016				R^2	.011		
		P	.000***				*P*	.001***		

*$p \leq .05$, ** $p \leq .005$, *** $p \leq .001$

Note: *All predictive regression models were under the conditions that all variables were measured with the defined units of PE assessment and PEP questionnaire, and the collinearity diagnostic showed that the multicollinearity between regressors was not found. (There were no independent variables that owned Variance Inflation Factor (VIF) greater than 4 as well as the Tolerance (Tol.) lower than 0.2)*

Table 6.49 Summary of multiple linear regression models for Informational Privacy Satisfaction and Physical Privacy Satisfaction Scores predicted by the predictor, Social Capital and Participation Score

N=1206

	Predictive Model for Physical Privacy Stfn. Score				
	Collinearity Statistics		(Stepwise Method: Model2)		
Predictors	Tol.	VIF	B	S.E.	β
Volunteering	.808	1.237	-.072	.029	-.079*
Sharing	.808	1.237	.084	.027	.099**
F (2, 1203)	5.575				
R^2	.009				
P	.004**				

*$p \leq .05$, ** $p \leq .005$, *** $p \leq .001$

Note: *All predictive regression models were under the conditions that all variables were measured with the defined units of PE assessment and PEP questionnaire, and the collinearity diagnostic showed that the multicollinearity between regressors was not found. (There were no independent variables that owned Variance Inflation Factor (VIF) greater than 4 as well as the Tolerance (Tol.) lower than 0.2)*

Besides, the effects of social capital and participation on the respondents' sense of community and the feeling of membership were also found at $F(2, 1203) = 75.626$, $p = .000$, with an R^2 of .112, and $F(2, 1203) = 44.272$, $p = .000$, with an R^2 of .069 respectively (See Table 6.50).

The equations could be interpreted that the predicted sense of community score increased by 0.186 and 0.110 for each point of volunteering and sharing scores, whereas, the predicted sense of membership score increased by 0.146 and 0.117 for each point of volunteering and sharing scores. The predictive equations are described below.

Sense of Community = 2.638 + (.186)(Volunteering Score) + (.110) (Sharing Score)

Membership = 2.810 + (.146)(Volunteering Score) + (.117) (Sharing Score)

Table 6.50 Summary of multiple linear regression models for Sense of Community and Membership Scores predicted by the predictor, Social Capital and Participation Score

N=1206

	Predictive Model for Sense of Community Score					Predictive Model for Membership Score				
	Collinearity Statistics		(Stepwise Method: Model2)			Collinearity Statistics		(Stepwise Method: Model2)		
Predictors	Tol.	VIF	B	S.E.	β	Tol.	VIF	B	S.E.	β
Volunteering	.808	1.237	.186	.024	.239**	.808	1.237	.146	.027	.166**
Sharing	.808	1.237	.110	.022	.152**	.808	1.237	.117	.025	.143**
F (2, 1203)	75.626					44.272				
R^2	.112					.069				
P	.000***					.000***				

*$p \leq .05$, ** $p \leq .005$, *** $p \leq .001$

Note: *All predictive regression models were under the conditions that all variables were measured with the defined units of PE assessment and PEP questionnaire, and the collinearity diagnostic showed that the multicollinearity between regressors was not found. (There were no independent variables that owned Variance Inflation Factor (VIF) greater than 4 as well as the Tolerance (Tol.) lower than 0.2)*

Likewise, the social capital and participation scores also significantly influenced the feeling of influence, reinforcement, and emotional connection of the respondents. The predictive models for feeling of influence, reinforcement, and emotional connection were detected at $F(2, 1203)= 56.814$, $p = .000$, with an R^2 of .086, $F(2, 1203)= 63.183$, $p = .000$, with an R^2 of .095, and $F(2, 1203)= 44.599$, $p = .000$, with an R^2 of .069 (See Table 6.51 and Table 6.52). To be more specific, the predicted influence score increased by 0.228 and 0.075 for each point of volunteering and sharing scores, the predicted reinforcement score increased by 0.227 and 0.109 for each point of volunteering and sharing scores, and the predicted emotional connection score increased by 0.143 and 0.140 for each point of volunteering and sharing scores. The predictive equations are described as follows.

Influence = 2.540 + (.228)(Volunteering Score) + (.075) (Sharing Score)

Reinforcement = 2.469 + (.227)(Volunteering Score) + (.109) (Sharing Score)

Emotion = 2.734 + (.143)(Volunteering Score) + (.140) (Sharing Score)

Table 6.51 Summary of multiple linear regression models for Influence and Reinforcement Scores predicted by the predictor, Social Capital and Participation Score

N=1206

	Predictive Model for Influence Score					Predictive Model for Reinforcement Score				
	Collinearity Statistics		(Stepwise Method: Model2)			Collinearity Statistics		(Stepwise Method: Model2)		
Predictors	Tol.	VIF	B	S.E.	β	Tol.	VIF	B	S.E.	β
Volunteering	.808	1.237	.228	.028	.246**	.808	1.237	.227	.029	.235**
Sharing	.808	1.237	.075	.027	.086**	.808	1.237	.109	.027	.121**
F (2, 1203)	56.814					63.183				
R^2	.086					.095				
P	.000***					.000***				

*$p \leq .05$, ** $p \leq .005$, *** $p \leq .001$

Note: *All predictive regression models were under the conditions that all variables were measured with the defined units of PE assessment and PEP questionnaire, and the collinearity diagnostic showed that the multicollinearity between regressors was not found. (There were no independent variables that owned Variance Inflation Factor (VIF) greater than 4 as well as the Tolerance (Tol.) lower than 0.2)*

Table 6.52 Summary of multiple linear regression models for Emotional Connection Score predicted by the predictor, Social Capital and Participation Score

N=1206

	Predictive Model for Emotional Connection Score				
	Collinearity Statistics		(Stepwise Method: Model2)		
Predictors	Tol.	VIF	B	S.E.	β
Volunteering	.808	1.237	.143	.029	.151**
Sharing	.808	1.237	.140	.027	.159**
F (2, 1203)	44.599				
R^2	.069				
P	.000***				

*$p \leq .05$, ** $p \leq .005$, *** $p \leq .001$

Note: *All predictive regression models were under the conditions that all variables were measured with the defined units of PE assessment and PEP questionnaire, and the collinearity diagnostic showed that the multicollinearity between regressors was not found. (There were no independent variables that owned Variance Inflation Factor (VIF) greater than 4 as well as the Tolerance (Tol.) lower than 0.2)*

At the end of the statistical analysis for influential factors, the 216 significant effects between 32 independent variables and 14 dependent variables and sub-variables were detected as described above. Amongst all these effects, there were 63 effects found impacting the safety concern variables, 53 results affecting the privacy satisfaction variables, and 100 effects dominating the sense of community variables. Although the level of statistical significance (*p-value* < 0.05) could confirm the rejection of null hypothesis and indicate the existence of these effects, it was not sufficient to explain the degree of such effects on the sampling group or population.(Sullivan and Feinn, 2012)

In the next section, the magnitude of effect and the statistical power of each effect were calculated and interpreted for giving a more understanding of how much each factor potentially dominated the psychological status of high-rise dwellers.

6.4 Effect Size and Statistical Power

This section aims to measure and analyse the magnitude of all 216 effects detected in this analytical stage in beneficial to robust the tendency of these effects and to approve which factor deserve a prior contemplation or identify which factor could be omitted as a subordinate factor. Employing the effect size and statistical power calculations allowed a transformation of the analytical outcomes derived from the various statistical methods to a similar metrical platform which could compose the evaluation of size and chance of the particular effect more accurately. Moreover, these two coefficients also enhanced the understanding of each influence more than considering only the *p-value* or R^2, which is biased due to the sample size. (Cunningham and McCrum-Gardner, 2007)

Due to the fact that this research encompassed a large sample size of 1,206 cases, therefore, the minimum requirement of effect size and power needed to be judged based on both the Cohen's magnitude of effect referring to an alpha level and a beta level, and the number of 1,206 samples. Regarding the Cohen's conventional effect size, the alpha (α) probability for Type I error was set out at 0.05, whereas, the beta level for Type II error probability of 0.20 was required or power (1-β) of 0.80. (G*Power 3.1 manual, [3.1], 2017) Furthermore, the standardised effect size for each common statistical test also required the different measurements and formula.

6.4.1 Measuring the effect size and the statistical power

As discussed earlier, there were four major statistical solutions applied in the influential analysis of this study, namely, 1) independent sample t-test, 2) one-way analysis of variance (one-way ANOVA), 3) simple linear regression, and 4)

multiple linear regression. According to Cohen's rules of thumb on the magnitude of effect size, the three major coefficients are clarified as follows:

- ***Cohen's f^2 effect size*** was applied for assessing the magnitude of effect extracted from the F-test produced by the simple linear regression and multiple linear regression statistics. The formula for calculating the f^2 is described below.

$$f^2 = \frac{R^2}{1 - R^2}$$

R^2 = The squared multiple correlation coefficient

The criteria for evaluate the size of the effect was in the following line.

Small size = 0.02, Medium size = 0.15, Large size = 0.35

(G*Power 3.1 manual, [3.1], 2017, Sullivan and Feinn, 2012)

Besides giving R^2 into the above equation, to define the appropriate f^2 or to calculate the sufficient power of effect by using the sensitivity calculating tool (G*Power3.1), it was essential to enter also the number of predictors and the number of sample size. Since the variety of simple linear regression and multiple linear regression statistics, which applied a different number of predictors for each test, the minimum requirement of f^2 in this analysis was varied from 0.0065 (one predictor) to 0.0091 (three predictors). Table 6.53, 6.54, and 6.55 had already indicated the required the Cohen's f^2 effect size for every single linear regression test found significant in this chapter.

- **Cohen's f effect size** was applied for evaluating the magnitude of an effect derived from the F-test produced by the one-way analysis of variance statistics. The formula is described below.

$$f = \frac{\sum_{j=1}^{k} \sum (\mu_j - \mu)^2}{k\sigma_{error}^2}$$

μ_j = The population mean for an individual group

μ = The overall mean

k = The number of groups

σ_{error} = The error variance is the within-group variance

The criteria for evaluate the size of the effect was in the following line.

Small size = 0.10, Medium size = 0.25, Large size = 0.40

(G*Power 3.1 manual, [3.1], 2017, Sullivan and Feinn, 2012)

In a similar way to the f^2 calculation, to indicate the proper Cohen's f and the sufficient power of effect by using the sensitivity calculating tool (G*Power3.1), it was necessary to input also the number of groups and the number of sample size. Since the variety of independent factors applied in the ANOVA tests in this research, the minimum requirement of f value in this analysis was varied from 0.0895 (three groups) to 0.1034 (six groups). Table 6.53, 6.54, and 6.55 had already indicated the required the Cohen's f effect size for every single one-way ANOVA test found significant in this chapter.

- **Cohen's *d* effect size** was applied for assessing the magnitude of effect derived from the t-test produced the independent sample t-test statistics. The formula is described below.

$$d = \frac{M_1 - M_2}{s}$$

$M_1 - M_2$ = The difference between the group means (M)

s = The standard deviation of either group

The criteria for evaluate the size of the effect was in the following line.

Small size = 0.20, Medium size = 0.50, Large size = 0.80

(G*Power 3.1 manual, [3.1], 2017, Sullivan and Feinn, 2012)

Similar to f^2 and f measurements, to set out the acceptable the Cohen's d effect size by using the sensitivity calculating tool (G*Power3.1), it was required to input also the number of each independent group for each t-test and the number of sample size. Because the number of the independent groups of each t-test in this research was not equal, the minimum requirement of d value in this analysis was varied from 0.1615 to 0.3154. Table 6.53, 6.54, and 6.55 had already indicated the minimum required the Cohen's d effect size for every single independent sample t-test found significant in this chapter.

6.4.2 Interpretation of effect size and power

After performing the Post hoc analysis for computing the power and effect size of each statistical test, the results of 216 tests were reported separately for safety concern, privacy satisfaction, and sense of community in Table 6.53, Table 6.54, and Table 6.55 respectively. The following main idea and the examples of interpretation could be typically applied for all tests described in these tables.

- The number shown in the Effect size column demonstrated the small, medium, or large size of effect according to the Cohen's criterion. For example, if the computed f equaled .1248, it implied that this one-way ANOVA test showing the small to medium size effect of the independent variable on the dependent variable.
- The number appeared in the Power (1-beta) column referred to the percentage of chance of detecting such effect size in this sampling group which could be referred to the population of high-rise dwellers in Bangkok. For instance, power (1-β) equaled .9792 meant there was approximately 98% chance of detecting this effect size.

The information given by these tables could enhance more understanding about the influence of each factor on the psychological status of the high-rise residents. Notably, the trend of the dataset was that the large sampling group allowed more chance of detecting the small effect size than the smaller sampling group. (Cunningham and McCrum-Gardner, 2007) Therefore, in this study, several small-sized effects, for instance, the significant linear regression effect with low R^2 less than 0.01 was exposed. Somehow, its p-value, which was less than 0.05 insisted that its existence was meaningful and not caused by chance or the sampling variability. (Sullivan and Feinn, 2012)

Consequently, to include or exclude the effects of independent variables in or out of the consideration, the reliable metric was demanded to make an accurate decision. Employing the Cohen's magnitude of effect and defining the minimum of adequate power in this section were considered not only necessary but also valuable for increasing the robustness of these effects as well as evaluating which one could be confirmed or unconfirmed.

6.4.1.1 Safety Concern

Regarding the safety concern, there were 63 significant effects detected during the various statistical analyses such as the independent sample t-test, one-way ANOVA, and simple and multiple linear regressions. The Cohen's magnitude of effect size and the statistical power emphasised and pointed out 41 forceful factors that had the remarkable impacts on safety concern of the respondent, whereas, the 21 effects are remained unconfirmed. All calculations are described in the table below.

For the urban and community variables, it appeared that the land use policy and Bangkok municipal zoning exposed their significant impacts on the safety concern and its sub-variables. The effect size and power analysis indicated that there were more than 99% chance of detecting the small to medium size of effect like this in this sampling group. Meanwhile, the effect of density of population was also found, yet the chance of detecting these effects was lower than 80%. Therefore, this research could not confirm that this kind of effect could be expected in the entire population of high-rise dwellers in Bangkok. (See Table 6.53)

Amongst all architectural factors, the level of property: low-selling price, middle-selling price, and high-selling price condominiums, seemed to have the more potent effects on the safety concern issue. Regarding Table 6.53, there was more than 99% chance of discovering the small to medium size of the differences between these three groups of the condominium amongst the respondents. The defensible characteristic of the condominium also showed its power of more than 80% chance of detecting its effect especially on the crime concern of the residents. As well, the privacy supportive characteristic score owned more than 80% chance of finding its effects on the total safety concern and the behavioural disorder concern amongst the dwellers. Meanwhile, the access control: gated/ no-gated compound was also detected as another factor altering the level of safety concern. Somehow the chances of finding each effect amongst the residents were varied. The exact percentage of opportunity is described more in Table 6.53.

For the personal attributes of the respondents, it appeared that gender, stage of life, marital status, nationality, religion, and educational level of the participants demonstrated their small to medium size effects on the safety concern

with more than 85% chance of detecting. In the meantime, the only personal dwelling behaviours that showed its small to medium size of effect with more than 80% chance was the type of roommate.

The psychological background of the residents also had powerful effects on the level safety concern. The two salient psycho-factors were the experience of threats and the privacy need. The Cohen's f^2 and statistical power indicated that the regression effects caused by the experience of threats owned more than 95% to be detected in this sampling group. The privacy need or the introvert personality of the respondents was even more potent by holding more than 99% chance of detecting its small to medium size regression effect in this sampling group. (See Table 6.59)

All results of the statistical effect size and power on the safety concern could be seen in Table 6.53. The in-depth discussion about the remarkable effect will be discussed more in Chapter 8.

Table 6.53 Summary table of the effect size and the statistical power of all significant effects on Safety Concern including Crime Concern, Behavioural Disorder Concern, and Emergency Concern

N = 1206, α err prob = 0.05, Power (1- β err prob) = 0.8

Criteria for f^2 (Linear Regression)		Small size = 0.02, Medium size = 0.15, Large size = 0.35
Criteria for f	(ANOVA)	Small size = 0.10, Medium size = 0.25, Large size = 0.40
Criteria for d	(T-test)	Small size = 0.20, Medium size = 0.50, Large size = 0.80

				Average Safety Concern		Crime Concern		Behavioural Disorder Concern		Emergency Concern	
Independent Variables and Sub Variables	Statistic	Required Effect size (no. of predictor)		Obtained Effect size	Power (1- β)	Obtained Effect size	Power (1- β)	Obtained Effect size	Power (1- β)	Obtained Effect size	Power (1- β)
IV01: Environmental Factors *Urban and Community Variables*											
1. Density of Population	SLR	f^2 (1)	**.0065**	.0030^{XS}	.4775^{LL}			.0050^{XS}	.6914^{LL}		
2. Land Use Policy	ANOVA	f (3)	**.0895**	.1302^{SM}	.9868**	.1369^{SM}	.9928***	.1129^{SM}	.9484	.0868^{XS}	.7740^{LL}
3. Bangkok Municipal Zoning	ANOVA	f (6)	**.1034**	.1275^{SM}	.9469			.1523^{SM}	.9924***	.1079^{SM}	.8378
IV01: Environmental Factors *Architectural Variables*											
1. Height of Building	SLR	f^2 (1)	**.0065**	.0040^{XS}	.5945^{LL}	.0070	.8298				
2. Floor Level of Dwelling Unit	SLR	f^2 (1)	**.0065**							.0040^{XS}	.5945^{LL}
3. Type of Property	T-test	d	**.1615**	.1294^{XS}	.6121^{LL}	.1268^{XS}	.5948^{LL}			.1671	.8262
4. Level of Property	ANOVA	f (3)	**.0895**	.1272^{SM}	.9829**	.1455^{SM}	.9969***	.0938	.8380	.1309^{SM}	.9875**
5. Type of Dwelling Unit	ANOVA	f (5)	**.0997**					.0938^{XS}	.7432^{LL}		
6. Defensible Score Bldg.	SLR	f^2 (1)	**.0065**	.0050^{XS}	.6914^{LL}	.0070	.8298			.0040^{XS}	.5945^{LL}
7. Privacy Supportive Score Bldg.	SLR	f^2 (1)	**.0065**	.0070	.8298			.0081	.8762	.0060^{XS}	.7691^{LL}
8. Communal Score Bldg.	SLR	f^2 (1)	**.0065**								
IV02: Personal Factors *Personal Attribute Variables*											
1. Gender	T-test	d	**.1663**	.1834	.8706	.1971	.9131			.1810	.8620
2. Age	SLR	f^2 (1)	**.0065**								
3. Stage of life	ANOVA	f (6)	**.1034**	.1159^{SM}	.8931	.1140^{SM}	.8815	.1021^{XS}	.7888^{LL}	.1085^{SM}	.8427
4. Nationality	T-test	d	**.3154**	.2974^{XS}	.7523^{LL}	.3408^{SM}	.8571			.2840^{XS}	.7130^{LL}
5. Religion	ANOVA	f (5)	**.0997**	.1323^{SM}	.9718**	.1273^{SM}	.9593**	.1103^{SM}	.8823	.1169^{SM}	.9192
6. Marital Status	ANOVA	f (3)	**.0895**	.0962	.8570	.1058^{SM}	.9179	.0807^{XS}	.7074^{LL}		
7. Parental Status	T-test	d	**.1876**								
8. Education	ANOVA	f (3)	**.0895**	.0954	.8507	.0748^{XS}	.6373^{LL}	.0905	.8090	.0884^{XS}	.7893^{LL}
9. Occupation	ANOVA	f (6)	**.1034**			.1102^{SM}	.8550				
10. Household Incomes/ month	SLR	f^2 (1)	**.0065**								
IV02: Personal Factors *Dwelling Behaviour Variables*											
1. Length of Dwelling	SLR	f^2 (1)	**.0065**								
2. Tenure	ANOVA	f (3)	**.0895**								
3. Spending Time at Home	SLR	f^2 (1)	**.0065**								
4. Number of Unit Member	SLR	f^2 (1)	**.0065**							.0040^{XS}	.5945^{LL}
5. Roommate	ANOVA	f (5)	**.0997**	.1002^{SM}	.8047	.1168^{SM}	.9189				
IV02: Personal Factors *Psychological Background Variables*											
1. Health Condition	SLR	f^2 (1)	**.0065**								
2. Mental Health Condition	SLR	f^2 (1)	**.0065**					.0030^{XS}	.4775^{LL}		
3. Relationship with Neighbours	SLR	f^2 (1)	**.0065**					.0070	.8298		
4. Experience of Threats	MLR	f^2 (1)	**.0065**			(1) .0081	.8762	(1) .0101	.9367	(1) .0121	.9689**
		f^2 (2)	**.0080**	(2) .0132	.9549**						
5. Privacy Need	MLR	f^2 (1)	**.0065**	(1) .0204^{SM}	.9986***	(1) .0173	.9954***	(1) .0163	.9931***		
		f^2 (2)	**.0080**							(2) .0173	.9882**
6. Social Capital/ Participation	MLR	f^2 (1)	**.0065**	(1) .0030^{XS}	.4775^{LL}	(1) .0060^{XS}	.7691^{LL}				
		f^2 (2)	**.0080**								
		f^2 (3)	**.0091**								

XS = Effect size smaller than minimum requirement
SM = Small to medium effect size
LL = Power (1- β) less than 80% chance
** = Power (1- β) more than 95% chance
*** = Power (1- β) more than 99% chance

6.4.1.2 Privacy Satisfaction

In considering of the privacy satisfaction, there were 53 significant effects detected during the various statistical analyses. The Cohen's magnitude of effect size and the statistical power indicated 34 forceful variables that had the important effects on privacy satisfaction of the respondent, whereas, the 19 effects are remained unconfirmed. All calculations are described in the table below.

For the urban and community aspect, the only variable, which was defined as an influential factor on the respondents' privacy satisfaction was the city zoning. It appeared that there was more than 85% chance of which the small to medium level of differences in physical privacy satisfaction would be found amongst these residents who were living in the different zones of Bangkok. (See Table 6.54)

For the architectural factors, the outstanding variables that hold the stronger effects than others were the privacy supportive characteristic score of the condominium followed by the type of dwelling unit and the communal characteristic score of the condominium. The Cohen's f coefficient indicated that there were more than 87% chance of detecting the small size effects of privacy supportive characteristic score on the respondents' privacy satisfaction and its sub-variables except for the social interactional privacy satisfaction of which p-value > 0.05. Also, the small to medium size effect of the dwelling unit type on the physical privacy satisfaction was holding more than 80% chance to be detected. Similarly, the small effect of the communal characteristic of the condominium was holding more than 80% chances to be found. The effect of the level of condos was also significant. Somehow, its effect size and power were lower than the conventional criteria regarding Cohen's rule of thumb. Detecting this kind of effect amongst this population, therefore, could not be expected. (See Table 6.54)

Regarding the personal factors, the relevant variables pointed out by this calculation were educational level, gender, stage of life, and nationality of the respondents. In more details, the Cohen's f coefficient showed that there were more than 97% chance of finding the small to medium size of differences amongst the respondents' by their educational level on the privacy satisfaction including the psychological and informational privacy satisfaction. The small to medium size effect of nationality and stage of life owned more than 85% chance of being detected on

the respondents' social privacy satisfaction, whereas, the small to medium size differences between religions on the respondents' physical privacy satisfaction held more than 85% chance to be found. (See Table 6.54)

In connection with the respondents' dwelling behaviours, the tenure status was indicated as the most powerful effect amongst other variables in the same group. The effect size and power calculation showed that the impacts of tenure status: owner, tenant, and guest held more than 99% chance of being detected amongst this sampling group. The similar size and power of influences impacted on the respondents' privacy satisfaction and all sub-variables except for the social privacy satisfaction. Additionally, the small size effects of the number of unit's member and type of roommate were also found on privacy satisfaction with more than 80% chance. (See Table 6.54)

Amongst the psychological factors, it appeared that the privacy need and the social capital/ participation of the respondents owned more than 95% of bechancing on the privacy satisfaction of this sampling group. The more details of each effect could be examined in Table 6.54.

Table 6.54 Summary table of the effect size and the statistical power of all significant effects on Privacy Satisfaction including Psychological, Informational, Physical, and Social/ Interactional Privacy Satisfaction

N = 1206, α err prob = 0.05, Power (1- β err prob) = 0.8

Criteria for f^2 (Linear Regression)	Small size = 0.02, Medium size = 0.15, Large size = 0.35
Criteria for f (ANOVA)	Small size = 0.10, Medium size = 0.25, Large size = 0.40
Criteria for d (T-test)	Small size = 0.20, Medium size = 0.50, Large size = 0.80

				Average Privacy Satisfaction		Psychological Privacy Satisfaction		Informational Privacy Satisfaction		Physical Privacy Satisfaction		Social Privacy Satisfaction	
Independent Variables and Sub Variables	Statistic	Required Effect size (no. of predictor)		Obtained Effect size	Power (1-β)	Obtained Effect size	Power (1- β)	Obtained Effect size	Power (1- β)	Obtained Effect size	Power (1- β)	Obtained Effect size	Power (1- β)
IV01: Environmental Factors ***Urban and Community Variables***													
1. Density of Population	SLR	f^2 (1)	**.0065**										
2. Land Use Policy	ANOVA	f (3)	**.0895**										
3. Bangkok Municipal Zoning	ANOVA	f (6)	**.1034**	.0984[XS]	.7531[LL]			.1029[XS]	.7959[LL]	.1109[SM]	.8606		
IV01: Environmental Factors ***Architectural Variables***													
1. Height of Building	SLR	f^2 (1)	**.0065**										
2. Floor Level of Dwelling Unit	SLR	f^2 (1)	**.0065**										
3. Type of Property	T-test	d	**.1615**										
4. Level of Property	ANOVA	f (3)	**.0895**			.0872[XS]	.7777[LL]						
5. Type of Dwelling Unit	ANOVA	f (5)	**.0997**					.0926[XS]	.7306[LL]	.1029[SM]	.8279		
6. Defensible Score Bldg.	SLR	f^2 (1)	**.0065**										
7. Privacy Supportive Score Bldg.	SLR	f^2 (1)	**.0065**	.0081	.8762	.0091	.9110	.0050[XS]	.6914[LL]	.0101	.9367		
8. Communal Score Bldg.	SLR	f^2 (1)	**.0065**			.0070	.8298						
IV02: Personal Factors ***Personal Attribute Variables***													
1. Gender	T-test	d	**.1663**	.1208[XS]	.5300[LL]	.1927	.9010	.1376[XS]	.6402[LL]				
2. Age	SLR	f^2 (1)	**.0065**										
3. Stage of life	ANOVA	f (6)	**.1034**									.1082	.8405
4. Nationality	T-test	d	**.3154**									.3742[SM]	.9137
5. Religion	ANOVA	f (5)	**.0997**							.1059[SM]	.8512	.0970[XS]	.7749[LL]
6. Marital Status	ANOVA	f (3)	**.0895**										
7. Parental Status	T-test	d	**.1876**										
8. Education	ANOVA	f (3)	**.0895**	.1248[SM]	.9792**	.1599[SM]	.9994***	.1260[SM]	.9810**	.0743[XS]	.6305[LL]		
9. Occupation	ANOVA	f (6)	**.1034**					.1001[XS]	.7698[LL]				
10. Household Incomes/ month	SLR	f^2 (1)	**.0065**							.0040[XS]	.5945[LL]		
IV02: Personal Factors ***Dwelling Behaviour Variables***													
1. Length of Dwelling	SLR	f^2 (1)	**.0065**					.0050[L]	.6914[LL]				
2. Tenure	ANOVA	f (3)	**.0895**	.1306[SM]	.9871**	.1220[SM]	.9739**	.1351[SM]	.9915***	.1163[SM]	.9597**		
3. Spending Time at Home	SLR	f^2 (1)	**.0065**										
4. Number of Unit Member	SLR	f^2 (1)	**.0065**	.0070	.8298	.0081	.8762	.0050[XS]	.6914[LL]	.0081	.8762		
5. Roommate	ANOVA	f (5)	**.0997**	.1000	.8025	.1118[SM]	.8917	.1016[SM]	.8173	.1222[SM]	.9424		
IV02: Personal Factors ***Psychological Background Variables***													
1. Health Condition	SLR	f^2 (1)	**.0065**	.0091	.9110	.0070	.8298	.0040[XS]	.5945[LL]	.0050[XS]	.6914[LL]	.0081	.8762
2. Mental Health Condition	SLR	f^2 (1)	**.0065**	.0091	.9110	.0101	.9367	.0050[XS]	.6914[LL]			.0081	.8762
3. Relationship with Neighbours	SLR	f^2 (1)	**.0065**										
4. Experience of Threats	MLR	f^2 (1) f^2 (2)	**.0065** **.0080**										
5. Privacy Need	MLR	f^2 (1) f^2 (2)	**.0065** **.0080**	(2) .0091	.8501			(1) .0060[XS]	.7691[LL]	(1) .0040[XS]	.5945[LL]	(2) .0215[SM]	.9972***
6. Social Capital/ Participation	MLR	f^2 (1) f^2 (2) f^2 (3)	**.0065** **.0080** **.0091**	(1) .0040[XS]	.5945[LL]	(3) .0163	.9721**	(2) .0111	.9161	(2) .0091	.8501		

XS = Effect size smaller than minimum requirement
SM = Small to medium effect size
LL = Power (1- β) less than 80% chance
** = Power (1- β) more than 95% chance
*** = Power (1- β) more than 99% chance

6.4.1.3 Sense of Community

Under the sense of community, there were 100 significant effects reported during the various statistical analyses. The Cohen's magnitude of effect size and the statistical power had confirmed and pointed out 74 dominant factors that had the remarkable impacts on the sense of community of the respondent, whereas, the 26 effects are remained unconfirmed. All calculations are described in the table below.

Considering the urban and community factors, the Cohen's magnitude of effect and statistical power confirmed all 15 significant effects of density of population, land use policy, and city zoning on the respondents' sense of community and all sub-variables. These small to medium-sized impacts also maintained the high statistical power of 100% chances to be identified amongst this sampling group. (See Table 6.55)

The most distinguished architectural factor that impacted the safety concern of the high-rise dwellers defined in this process was the type of access control -gated and non-gated condominium-. The calculation indicated that there were more than 95% chances of detecting the small o medium-sized effect of the type of property on the residents' feeling of membership, and more than 90% chances of finding its small effects on the total score of the sense of community and the emotional connection of the respondents. (See Table 6.55)

Meanwhile, the influential variables of the personal attributes reported by the Cohen's magnitude of effect were the stage of life, parental status, occupation, religion, and nationality of the respondents. It was found that there were more than 82%-98% chances of finding the small-medium sized effect of the stage of life on the residents' sense of community and its sub-variables. It also confirmed the 97% chances of detecting the small to medium size regression effect of age on the total sense of community of the respondent. Additionally, the small-medium sized effect of the parental status of the respondents' feeling of influence and reinforcement were confirmed with the 85% and 97% chances consecutively. The rest of the effects could be seen in more details in Table 6.55.

For the personal dwelling behaviours, the calculation indicated that the length of residency in the condominium was the most outstanding factors amongst others of which small to medium sized effects were found in the total sense of

community, feeling of membership, and emotional connection with the 98%, 96%, and 99% detecting chance respectively. Besides, the small to medium-sized effects of type of roommate and the small-sized effects of spending time at home, the number of unit's member, and tenure were also confirmed. (See Table 6.55)

For the factors related to the psychological background of the respondents, the Cohen's calculation confirmed the whole set of the 25 small to medium sized effects announced by the simple linear regression and multiple linear regression results described earlier. Moreover, the statistical power of these psychological bonds was obviously stronger than other groups of factors. All effects accomplished 100% chances of detecting when applied to this sampling group. (See Table 6.55)

Table 6.55 Summary table of the effect size and the statistical power of all significant effects on Sense of Community including Membership, Influence, Reinforcement, and Emotional Connection

N = 1206, α err prob = 0.05, Power (1- β err prob) = 0.8

Criteria for f^2 (Linear Regression)	Small size = 0.02, Medium size = 0.15, Large size = 0.35
Criteria for f (ANOVA)	Small size = 0.10, Medium size = 0.25, Large size = 0.40
Criteria for d (T-test)	Small size = 0.20, Medium size = 0.50, Large size = 0.80

				Average Sense of Community		Membership		Influence		Reinforcement		Emotional Connection	
Independent Variables and Sub Variables	Statistic	Required Effect size (no. of predictor)		Obtained Effect size	Power (1- β)	Obtained Effect size	Power (1- β)	Obtained Effect size	Power (1- β)	Obtained Effect size	Power (1- β)	Obtained Effect size	Power (1- β)
IV01: Environmental Factors ***Urban and Community Variables***													
1. Density of Population	SLR	f^2 (1)	**.0065**	.0449^{SM}	1.00***	.0288^{SM}	1.00***	.0246^{SM}	.9998***	.0277^{SM}	.9999***	.0438^{SM}	1.00***
2. Land Use Policy	ANOVA	f (3)	**.0895**	.1329^{SM}	.9896**	.1030^{SM}	.9025	.1158^{SM}	.9583**	.1253^{SM}	.9799**	.1089^{SM}	.9327
3. Bangkok Municipal Zoning	ANOVA	f (6)	**.1034**	.2169^{SM}	1.00***	.1863^{SM}	.9998***	.1734^{SM}	.9991***	.1811^{SM}	.9996***	.2127^{SM}	1.00***
IV01: Environmental Factors ***Architectural Variables***													
1. Height of Building	SLR	f^2 (1)	**.0065**									.0030^{XS}	.4775^{LL}
2. Floor Level of Dwelling Unit	SLR	f^2 (1)	**.0065**										
3. Type of Property	T-test	d	**.1615**	.1922	.9154	.2090^{SM}	.9522**			.1458^{XS}	.7158^{LL}	.1930	.9174
4. Level of Property	ANOVA	f (3)	**.0895**			.0789^{XS}	.6867^{LL}			.0889^{XS}	.7945^{LL}		
5. Type of Dwelling Unit	ANOVA	f (5)	**.0997**										
6. Defensible Score Bldg.	SLR	f^2 (1)	**.0065**	.0050^{XS}	.6914^{LL}	.0091	.9110			.0060^{XS}	.7691^{LL}		
7. Privacy Supportive Score Bldg.	SLR	f^2 (1)	**.0065**							.0040^{XS}	.5945^{LL}		
8. Communal Score Bldg.	SLR	f^2 (1)	**.0065**	.0040^{XS}	.5945^{LL}							.0060^{XS}	.7691^{LL}
IV02: Personal Factors ***Personal Attribute Variables***													
1. Gender	T-test	d	**.1663**									.1170^{XS}	.5042^{LL}
2. Age	SLR	f^2 (1)	**.0065**	.0121	.9689**	.0121	.9689**	.0081	.8762	.0050^{XS}	.6914^{LL}	.0091	.9110
3. Stage of life	ANOVA	f (6)	**.1034**	.1403^{SM}	.9791**	.1262^{SM}	.9424	.1059^{SM}	.8221	.1376^{SM}	.9742**	.1246^{SM}	.9362
4. Nationality	T-test	d	**.3154**									.4151^{SM}	.9579**
5. Religion	ANOVA	f (5)	**.0997**	.0947^{XS}	.7524^{LL}					.0918^{XS}	.7216^{LL}	.1081^{SM}	.8674
6. Marital Status	ANOVA	f (3)	**.0895**	.0862^{XS}	.7675^{LL}	.0789^{XS}	.6875^{LL}	.0753^{XS}	.6437^{LL}	.0894^{XS}	.7988^{LL}		
7. Parental Status	T-test	d	**.1876**	.2244^{SM}	.9178	.1587^{XS}	.6593^{LL}	.2003^{SM}	.8486	.2620^{SM}	.9746**		
8. Education	ANOVA	f (3)	**.0895**	.0761^{XS}	.6526^{LL}					.0737^{XS}	.6230^{LL}	.0797^{XS}	.6959^{LL}
9. Occupation	ANOVA	f (6)	**.1034**	.1077^{SM}	.8364					.1003^{XS}	.7716^{LL}	.1132^{SM}	.8758
10. Household Incomes/ month	SLR	f^2 (1)	**.0065**										
IV02: Personal Factors ***Dwelling Behaviour Variables***													
1. Length of Dwelling	SLR	f^2 (1)	**.0065**	.0142	.9852**	.0121	.9689**	.0050^{XS}	.6914^{LL}	.0091	.9110	.0142	.9852**
2. Tenure	ANOVA	f (3)	**.0895**	.0955	.8513	.0976	.8671	.0747^{XS}	.6364^{LL}	.0751^{XS}	.6409^{LL}	.0878^{XS}	.7833^{LL}
3. Spending Time at Home	SLR	f^2 (1)	**.0065**	.0101	.9367	.0091	.9110			.0070	.8298	.0091	.9110
4. Number of Unit Member	SLR	f^2 (1)	**.0065**							.0070	.8298	.0040^{XS}	.5945^{LL}
5. Roommate	ANOVA	f (5)	**.0997**	.1010^{SM}	.8114					.1166^{SM}	.9181		
IV02: Personal Factors ***Psychological Background Variables***													
1. Health Condition	SLR	f^2 (1)	**.0065**	.0482^{SM}	1.00***	.0406^{SM}	1.00***	.0204^{SM}	.9986***	.0288^{SM}	1.00***	.0493^{SM}	1.00***
2. Mental Health Condition	SLR	f^2 (1)	**.0065**	.0627^{SM}	1.00***	.0460^{SM}	1.00***	.0173^{SM}	.9954***	.0395^{SM}	1.00***	.0834^{SM}	1.00***
3. Relationship with Neighbours	SLR	f^2 (1)	**.0065**	.0881^{SM}	1.00***	.0787^{SM}	1.00***	.0537^{SM}	1.00***	.0776^{SM}	1.00***	.0373^{SM}	1.00***
4. Experience of Threats	MLR	f^2 (1) f^2 (2)	**.0065** **.0080**										
5. Privacy Need	MLR	f^2 (1) f^2 (2) f^2 (3)	**.0065** **.0080** **.0091**	(3) .0953^{SM}	1.00***	(3) .0571^{SM}	1.00***	(2) .0604^{SM}	1.00***	(3) .1001^{SM}	1.00***	(3) .0537^{SM}	1.00***
6. Social Capital/ Participation	MLR	f^2 (1) f^2 (2) f^2 (3)	**.0065** **.0080** **.0091**	(2) .1261^{SM}	1.00***	(2) .0741^{SM}	1.00***	(2) .0941^{SM}	1.00***	(2) .1050^{SM}	1.00***	(2) .0741^{SM}	1.00***

XS = Effect size smaller than minimum requirement
SM = Small to medium effect size
LL = Power (1- β) less than 80% chance
** = Power (1- β) more than 95% chance
*** = Power (1- β) more than 99% chance

In the next chapter, the part 2 of the analytical process related to the analysis of the interrelationship between three dependent variables: safety concern, privacy satisfaction, and sense of community, will continue. Afterwards, the in-depth explanation involving the effects of the independent variables on the core dependent variables revealed in this chapter will be further analysed and discussed more in Chapter 8.

CHAPTER 7

THE ENVIRONMENTAL PSYCHOLOGICAL ASSESSMENT

Part 2:

The Analysis of Interdependence of Safety Concern, Privacy Satisfaction, and Sense of Community

Chapter Summary

This chapter continues the data analysis, in particular, the interdependency amongst the three psychological dependent variables -safety concern, privacy satisfaction, and sense of community- along with endorsing the formation of the associations between these three core variables. Mainly, the statistical method employed in this chapter is the Structural Equation Modelling (SEM), which is considered as the most appropriate method for examining and depicting the relationships between multiple latent and observed variables at once. More than that, the SEM is further exploited to investigate the influences of the physical and psychological parameters originated in this study on the three core variables in pursuance of examining the combination of all effects in a single model. Besides, it is to compare the inclusive model with the conceptual model proposed at the beginning of the study.

At the end of the chapter, the Multiple Linear Regression (MLR) is applied along with the SEM to re-confirm the reliability of the statistical associations revealed in the SEM models and to finalise and propose all dominant factors influencing each dependent variable based on the linear-statistical perspective. In the same manner, the Cohen's magnitude of effect calculation is as well implemented in Section 7.5.4 to evaluate the mentioned MLR effects for enhancing the robustness of the conclusion, which will be further discussed in Chapter 8.

According to the second research question and its hypotheses, the existence of interrelationships between the three psychological dependent variables were assumed earlier as described below.

Null Hypothesis $H2_0$:	The safety concern, privacy satisfaction, and sense of community do not associate with each other
Alternative Hypothesis $H2_1$:	The safety concern, privacy satisfaction, and sense of community associate with each other

Due to the fact that the presumptive relationships between the psychological variables were considered as the reciprocal causations amongst multiple latent variables, in this case, the method of structural equation modelling, which is an extension of multiple regression and general linear model, was applied to determine, confirm, and develop the initial conceptual model. (See Figure 7.1.)

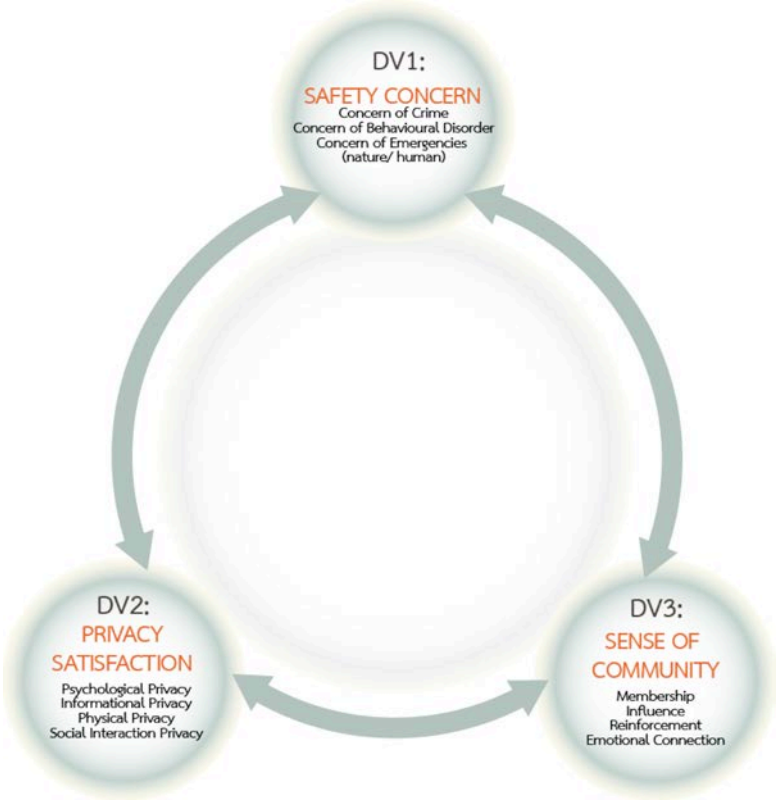


Figure 7.1 Conceptual diagram of interrelationships between dependent variables

The above illustration explains the reciprocal directions of relationships between psychological dependent variables: 1) safety concern, 2) privacy satisfaction, and 3) sense of community based on literature and theoretical concept mentioned in chapter 2.

Statement of Model Assumption

In context of housing, the feeling of safety and privacy are inseparable as both of them are the fundamental senses of home for human beings. The unsuccessful privacy control in the dwelling place repetitively can motivate the unsecured feeling amongst the dwellers and rise up their concern about safety as a consequence. Meanwhile, the satisfied privacy control in the dwelling place is foreseen for decreasing the concern about safety amongst the dwellers as well.

In this research, the intertwining between privacy satisfaction and sense of community were considered as the supportive factor for each other. The satisfied privacy control in the dwelling unit can strengthen the psychological bonding between dwellers and their surroundings referred to neighbourhood and community, whereas, the quality of relationship with neighbours and the positive attitude towards neighbours can stabilise their privacy control both inside dwelling units and in the common areas of the buildings.

The association between safety concern and sense of community in this study was foreseen as a reversal relationship. The robust sense of community can reinforce trustfulness, reciprocity, and more effective surveillance amongst the dwellers themselves, which is assumed to reduce the concern about safety as a consequence. Meanwhile, the strong concern about safety can be a suppressor of the dwellers' interpersonal relations and become unengaged to community.

In agreement with the mentioned above hypothesis, the conceptual psychological model was tested, by administrating the Structural Equation Modelling (SEM). Technically, the SEM analysis consisted of the four major procedures as follows:

- Data screening is to exclude the missing values and unengaged cases out of the input dataset.
- Exploratory Factor Analysis (EFA) is to determine the correlation amongst the variables in a dataset. It provided a factor structure based on the strength of correlations.
- Confirmatory Factor Analysis (CFA) is the further step of exploratory factor analysis to determine the convergent validity, the discriminant validity, and the reliability of the factor structure.

- Structural Equation Modelling (SEM) is the major step of the SEM process in which the hypothesised model or conceptual model was input to calculate the model's Goodness of Fit Indices namely absolute fit, incremental fit, and parsimonious fit. During the process, the model adjustments are allowed to achieve the best value of the Goodness of Fit Indices.
  (Hair, 2013, Lowry and Gaskin, 2014)

7.1 Exploratory Factor Analysis

After screening cases and variables, the indicators derived from the 24 items defined in the PEP questionnaire were examined by means of an exploratory factor analysis in order to determine the factorable adequacy of all indicators. A Maximum Likelihood (ML) with a Promax (oblique) rotation of the 24 Likert scale questions from the PEP questionnaire was conducted on data 1,197 gathered from 1,206 participants due to the missing value and unengaged cases were abandoned. An examination of the Kaiser-Meyer Olkin measure of sampling adequacy suggested that the sample was marvelously factorable at KMO = .895. (Andale, 2017)The pattern matrix of the oblique rotation of the solution is demonstrated in Table 5.58. When loadings less than 0.30 were excluded, the analysis yielded a three-factor solution with a simple structure (factor loadings =>.30).

Table 7.1 Summary of multiple linear regression models for Emotional Connection Score predicted by the predictor, Social Capital and Participation Score

N=1206

Pattern Matrix

	Question Items		Factor 1 SAFETY CONCERN	Factor 2 PRIVACY SATISFACTION	Factor 3 SENSE OF COMMUNITY
1	Crime might happen in a parking space of this building	Crime1	.724		
2	Lack of CCTV (Closed circuit television) camera	Crime2	.732		
3	Stranger in the building. He/she might be a criminal	Crime3	.794		
4	Someone might fall or jump off this building	Behav1	.710		
5	Drug-abusing, violent, or drunken in the building	Behav2	.781		
6	Unhygienic condition of sharing swimming pool, gym room	Behav3	.725		
7	Elevator's malfunctioning in this building	Emer1	.723		
8	Failed rescue operation in case of emergency	Emer2	.717		
9	To express your emotional conditions in your unit	Psycho1		.756	
10	To work on a concentration-required work in your unit	Psycho2		.793	
11	To talk or having a private conversation in your unit	Info1		.844	
12	To receive a classified document via the building's mailbox	Info2		.688	
13	To do your personal activities i.e. shower, undressing	Physic1		.711	
14	To be loose or relax in your unit. No one can get in	Physiv2		.735	
15	To relax with family/friend in the building's common area	SocialP1		.500	
16	To invite your friend or guest to your dwelling unit	SocialP2		.644	
17	You are a member of this building, and being treated well	Mem1			.549
18	Your neighbours can recognise you, and vice versa	Mem2			.661
19	Your request or complaint are always listened here	Influ1			.682
20	Your neighbours' opinions are useful and beneficial	Influ2			.777
21	You are happy to participate the events hosted by the bldg.	Rein1			.810
22	Your neighbours are kind and helpful	Rein2			.783
23	You will be angry if someone criticise or defame this building	Emo1			.694
24	You feel bound with this place and hope to live here as long as you can	Emo2			.573

Extraction Method: Maximum Likelihood, Fixed number of factors, Factors to extract = 3
Rotation Method: Promax with Kaiser Normalization.[a]
a. Rotation converged in 4 iterations.

7.2 Confirmatory Factor Analysis

The confirmatory factor analysis (CFA) was performed in order to determine the factorable structure of the dataset explored in the EFA as well as to confirm the structure of the model comprised of such factors.

According to the EFA pattern matrix described above, all 24 observed variables and three latent variables namely safety concern (SAF), privacy satisfaction (PRV), and sense of community (SOC) were entered into a pooled CFA process.

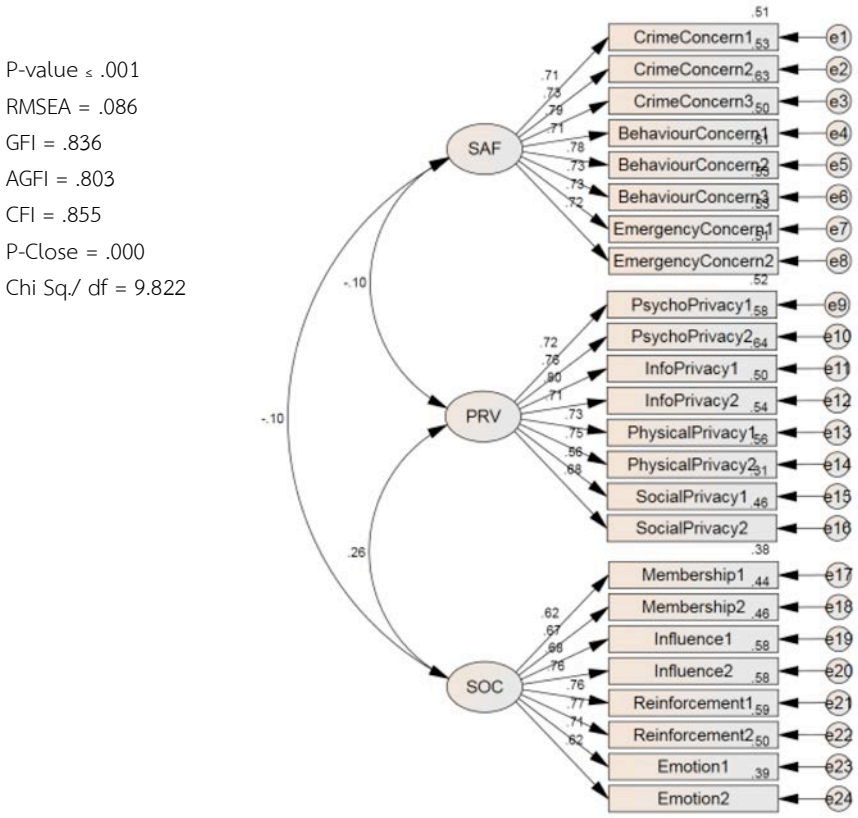


Figure 7.2 The Initial Model of Pooled CFA

The fitness indices of the above initial model shown in Figure 7.2 did not achieve the required level (Lowry and Gaskin, 2014, Hu and Bentler, 1999) as well as the initial model faced the problem of convergent validity (Average Variance Extracted (AVE) less than 0.50). To improve the fitness and validity of the model, some problematic items were examined and dropped out of the model due to their low factor loadings, which were less than 0.6. After the problematic items were identified, the following items were abandoned from the initial model.

Table 7.2 Summary table of the abandoned question items from the initial model

	Abandoned Items	Label	Group	Loading
15	To relax with family/friend in the building's common area	SocialP1	Privacy Satisfaction	.500
16	To invite your friend or guest to your dwelling unit	SocialP2	Privacy Satisfaction	.644
17	You are a member of this building, and being treated well	Mem1	Sense of Community	.549
24	You feel bound with this place and hope to live here as long as you can	Emo2	Sense of Community	.573

The final pooled CFA model is illustrated below. (See Figure 7.3.)

P-value ≤ .001
RMSEA = .038
GFI = .965
AGFI = .953
CFI = .978
P-Close = 1.000
Chi Sq./ df = 2.765

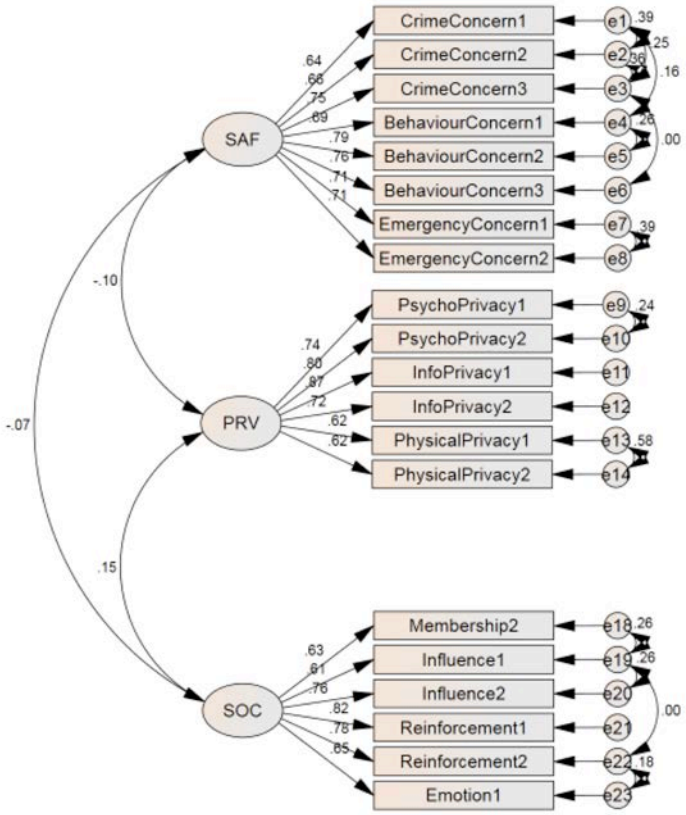


Figure 7.3 The Final Model of Pooled CFA

After model adjusting, the fitness indexes of the final pooled CFA model achieved all requirements as follows. (Awang, 2012)

Table 7.3 Summary of the Goodness of Fit indices of the final pooled CFA model

Category	Index	Index Name	Requirements	Model's Value	Comments
1. Absolute fit	RMSEA	Root Mean Square of Error Approximation	< .05 = Good, > .05, < .10= moderate > .10 = bad	0.038	Achieved
	GFI	Goodness of Fit Index	> .90	0.965	Achieved
2. Incremental fit	CFI	Comparative Fit Index	>.90	0.978	Achieved
3. Parsimonious fit	χ^2/df	Chi Square/ Degrees of Freedom	< 3.00	2.765	Achieved

Source: (Awang, 2012)

7.2.1 Assessing the Validity and Reliability of the Model

Before performing a casual model, the following criteria were examined to assure that the model were validity and reliability.

- Unidimensionality

According to the requirement, the low factor loading items were deleted from the model. The new developed model was adjusted and complied with the suggestion of modification indices until the fitness indices achieved the required level as well as all factor loadings were positive values.

- Validity and Reliability

To accomplish the validity criteria, the following measures were examined. The results of the calculation are described in Table 7.4, and Table 7.5.

Table 7.4 Summary of model's validity compared to the required level

Category	Index	Index Name	Requirements	Model's Value	Comments
1. Convergent Validity	AVE	Average Variance Extracted	All values of AVE > .50	AVE (SAF) = .512 AVE (PRV) = .539 AVE (SOC) = .512	Achieved
2. Construct Validity	RMSEA, GFI, CFI, χ^2/df	Fitness Indices	All fitness indices meet required level	RMSEA = .038 GFI = .965 CFI = .978 χ^2/df = 2.765	Achieved
3. Discriminant Validity	MSV	Maximum Shared Variance	MSV < AVE	MSV (SAF) = .009 MSV (PRV) = .022 MSV (SOC) = .022	Achieved

Source: (Awang, 2012, Lowry and Gaskin, 2014, Hu and Bentler, 1999)

Table 7.5 Summary of model's reliability compared to the required level

Category	Index	Index Name	Requirements	Model's Value	Comments
1. Composite Reliability	CR	Comparative Fit Index	>.70	CR (SAF) = .893 CR (PRV) = .873 CR (SOC) = .859	Achieved

Source: (Awang, 2012, Lowry and Gaskin, 2014, Hu and Bentler, 1999)

All the validity and reliability measurement achieved the required criteria. Thus, this CFA model was further brought into the structural equation modelling.

7.3 Structural Equation Modelling

This section contributes to the last step of the structural equation modelling in order to investigate and summarise the internal associations between the dependent variables -safety concern, privacy satisfaction, and sense of community-. Based on the final model of pooled CFA (Figure 7.3) generated in section 7.2, the hypothesised paths of the relationship were added and transformed into the initial model. The initial model is described in the form of standardised estimation coefficients as shown in figure 7.4. Then it was developed in order to eliminate the insignificant paths and negative R^2 as shown in the adjusted standardised estimated model (Figure 7.5). After the latest adjustment, the final standardised estimated model (Figure 7.6) was confirmed with the best Goodness of Fit Indices, which achieved all the criteria required for the good fit model. The processes and details of the SEM are described step by step as follows.

7.3.1 Step 1: Initial modelling

Regarding the aforementioned assumptions, in this step, the initial casual model was entered into the SEM process as illustrated in Figure 7.4 The regression paths defined in this initial model demonstrated the reciprocal causation between three variables. The model was considered as a non-recursive model composed of three latent variables namely 1) SAF = Safety Concern, 2) PRV = Privacy Satisfaction, and 3) SOC = Sense of Community and 20 observed variables namely Crime Concern 1-3, Behaviour Concern 1-3, Emergency Concern 1-2, Psycho Privacy 1-2, Info Privacy 1-2, Physical Privacy 1-2, Emotion 1, Reinforcement 1-2, Influence 1-2, and Membership 2.

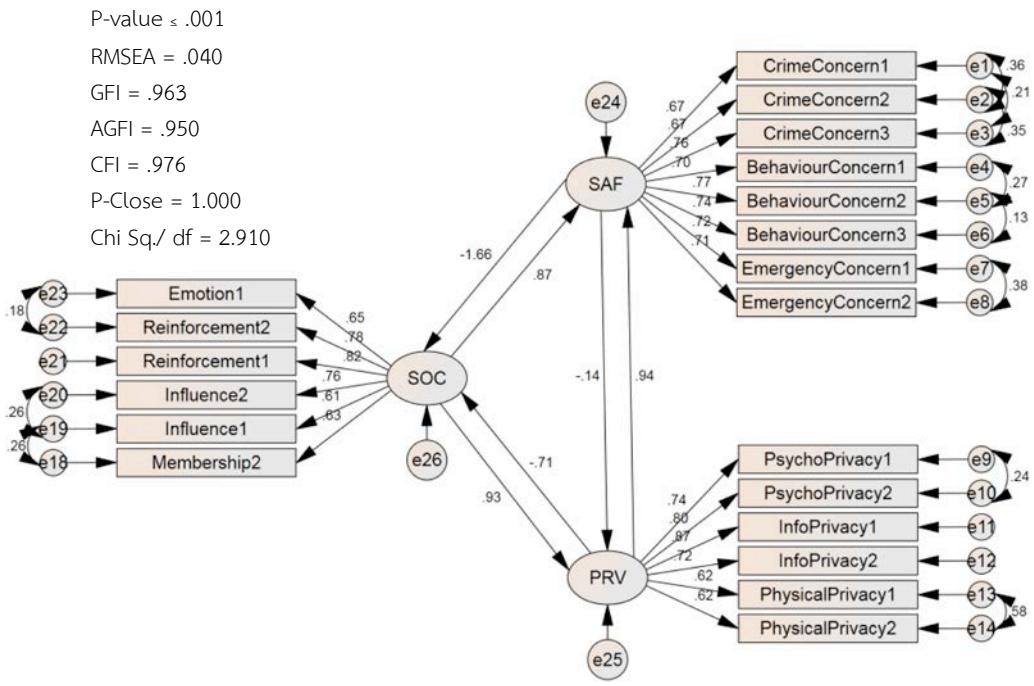


Figure 7.4 The initial standardised estimated model

After adding covariances as suggested in the modification indices, the initial model achieved the good fitness indices as shown in the Figure 7.4. However, it was found that the standardised regression weight of the path from SAF to SOC was greater than ±1, which implied to the multicollinearity amongst the variables. The examination of multicollinearity amongst the 20 observed variables was performed afterwards. The results of the collinearity test indicated that there were no variables in the model that owned Variance Inflation Factor (VIF) greater than 4 as well as the Tolerance (Tol.) lower than 0.2, which could be interpreted that there was no multicollinearity in the model.

7.3.2 Step 2: Model adjusting

In this step, the p-value of each path was examined to control the standardised regression weights. The findings indicated that the regression path from SAF to PRV was not statistically significant (p = .060) as well as its standardised regression weight was equal to -0.14, which was lower than 0.20. Therefore, the regression path from SAF to PRV was removed from the model.

After removing the insignificant path and adding covariances as suggested in the modification indices, the model achieved the better Goodness of Fit Indices, and all standardised regression weights were not greater than ±1. (See Figure 7.5.) However, the problematic issue of negative R-squared due to the loop producing, which occurred in the non-recursive modelling (Hayduk, 2006) still appeared. Regarding the adjusted model (Figure 7.5), the standardised estimated R-squared of latent variables were negative, SAF = -0.68, PRV = -0.24, and SOC = -1.26.

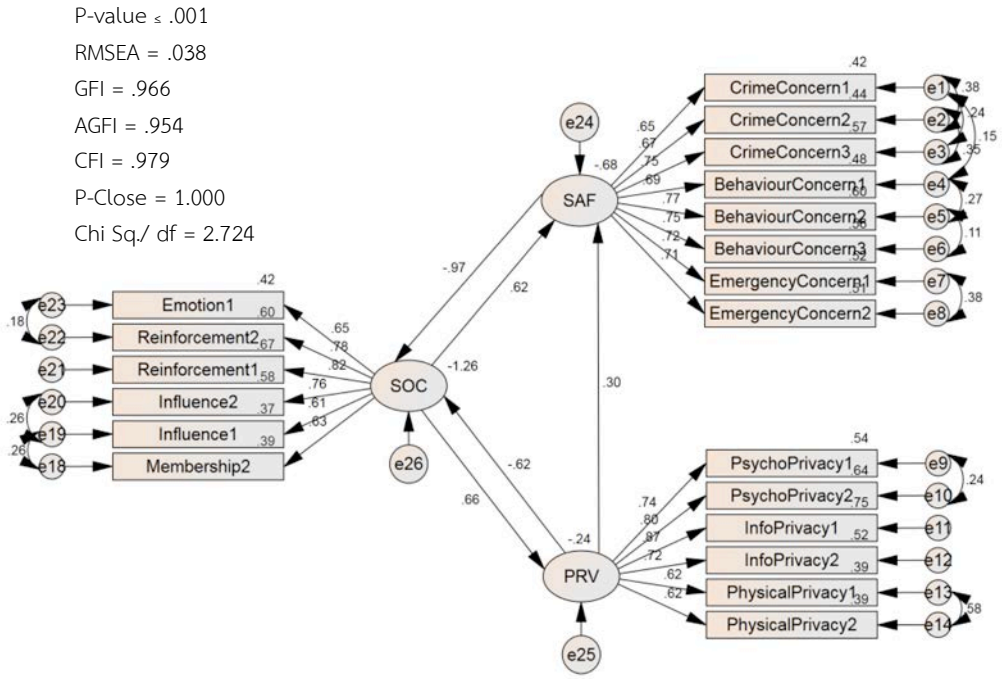
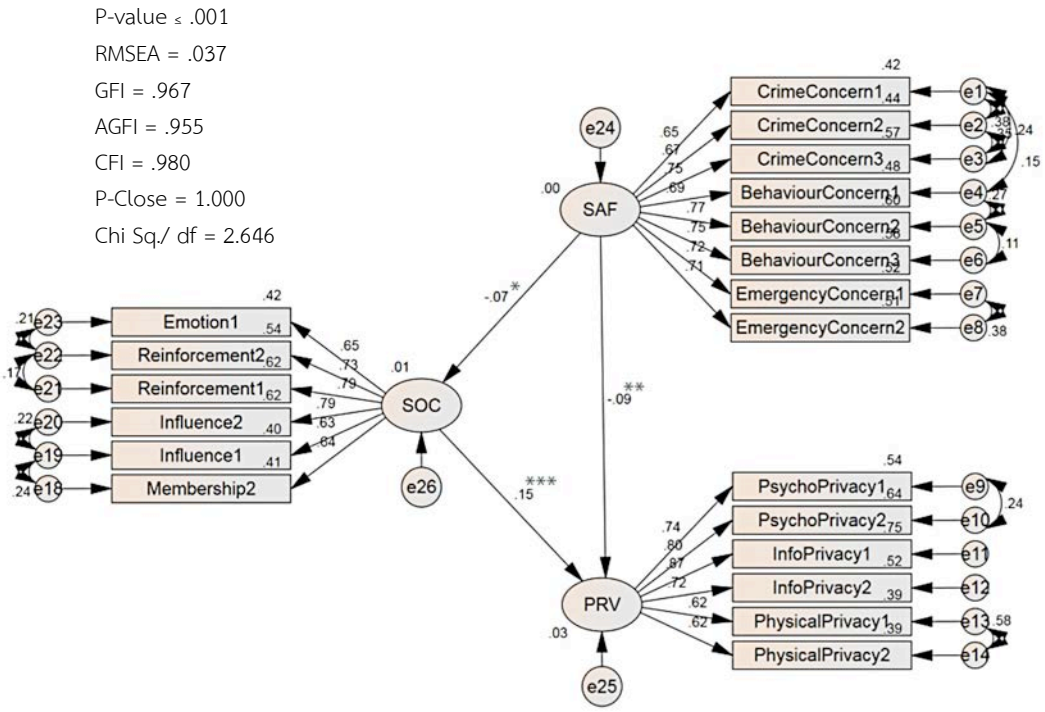


Figure 7.5 The adjusted standardised estimated model

7.3.3 Step 3: Model finalising

In this step, the reverse regression paths (SOC --> SAF, PRV --> SOC, and SAF --> PRV) were removed from the model, and only the significant recursive paths were remained to compromise and ease the model interpretation of which the paths were adjusted based on the recursive pattern. The final interrelationship diagram between the psychological dependent variables is demonstrated below (See figure 7.6).



Note *$p \leq .05$, **$p \leq .01$, ***$p \leq .001$

Figure 7.6 The final standardised estimated model

Regarding Figure 7.6, the final standardised estimated model achieved the better Goodness of Fit Indices (as described in Table 7.6) than the first two models as well as there were no negative R^2 or standardised regression weights greater than ±1.

Table 7.6 **S**ummary of the Goodness of Fit indices of the final structural equation model of the interrelationship between three psychological dependent variables

Category	Index	Index Name	Requirements	Model's Value	Comments
1. Absolute fit	RMSEA	Root Mean Square of Error Approximation	< .05 = Good, > .05, < .10= moderate > .10 = bad	0.037	Achieved
	GFI	Goodness of Fit Index	> .90	0.967	Achieved
2. Incremental fit	CFI	Comparative Fit Index	>.90	0.980	Achieved
3. Parsimonious fit	χ^2/df	Chi Square/ Degrees of Freedom	< 3.00	2.646	Achieved

Source: (Awang, 2012, Lowry and Gaskin, 2014, Hu and Bentler, 1999)

- **Model Interpretation**

According to the final standardised estimated model (Figure 7.6), the model was considered as an inconsistent mediation type, which meant a mediating variable (***M*** = sense of community) transmitted the effect of an independent variable (***X*** = safety concern) on a dependent variable (***Y*** = privacy satisfaction) as well as

there was at least one mediated effect had a different sign than other mediated or direct effects in a model. (MacKinnon, Fairchild, et al., 2007) The mediation test by using the Wald statistic confirmed the mediating pattern of this model at $p = .034$.

Regarding the model, a direct effect from ***X*** to ***Y*** was significantly negative sign, which meant when safety concern goes up by 1 standard deviation, privacy satisfaction goes down by 0.09 standard deviations.

An indirect effect from ***X*** to ***Y*** mediated by ***M*** was significantly negative sign, which meant when safety concern goes up by 1 standard deviation, sense of community goes down by 0.073 standard deviations. Meanwhile, the indirect effect from ***M*** to ***Y*** was significantly positive sign, which meant sense of community goes up by 1 standard deviation, privacy satisfaction goes up by 0.151 standard deviations.

In other words, the psychological construct of the high-rise dwellers in this field survey was confirmed existing by the Structural Equation Modelling method. As regards, the safety concern per se deterred the privacy satisfaction directly, yet the indirect effect of sense of community affected the privacy satisfaction positively. Despite the safety concern that reduced the sense of community amongst the respondents, the sense of community, which was acting as the mediator, suppressed the effect of safety concern and motivated the satisfaction of privacy amongst the respondents.

- **Model Conditions**

As mention earlier, the findings of the Exploratory Factors Analysis, the Confirmatory Factors Analysis, and the Structural Equation Modelling indicated that the dataset derived from this filed survey endorsed the model assumption and the second hypothesis (H_2) of the research, which assumed that safety concern, privacy satisfaction, and sense of community were associated with each other under the following statistical conditions.

- The items number 4.2.7 and 4.2.8 that belonged to the section 4.2: Privacy Satisfaction of the PEP questionnaire were excluded from the model due to the low factor loadings to the latent variable PRV that were problematic to the convergent validity of the model.
- The items number 4.3.1 and 4.3.8 that belonged to the section 4.3: Sense of Community of the PEP questionnaire were excluded from

the model due to the low factor loadings to the latent variable SOC that were problematic to the convergent validity of the model.

- The predictive influence of safety concern by the predictor privacy satisfaction (PRV-->SAF), safety concern by the predictor sense of community (SOC-->SAF), and sense of community by the predictor privacy satisfaction (PRV-->SOC) existed yet were unaccounted for the final structural equation model due to the limitations of non-recursive modelling that produced the loop of multiple squared correlations calculation and caused the negative R^2 as a consequence.

7.4 The Inclusive Structural Equation Modelling for the Psychological Mechanism of High-rise Dwellers

Based on the final standardised estimated model (Figure 7.6), the SEM was further performed to investigate the influences of the physical and psychological parameters originated in this study on the three core variables in pursuance of examining the combination of all effects in a single model. The inclusive model generated in this section was compared to the conceptual variables construct proposed at the beginning of the study.

To begin with, the physical environmental indicators and the personal indicators as defined in the research theoretical constructs model (See Figure 7.7.) were inserted into the model.

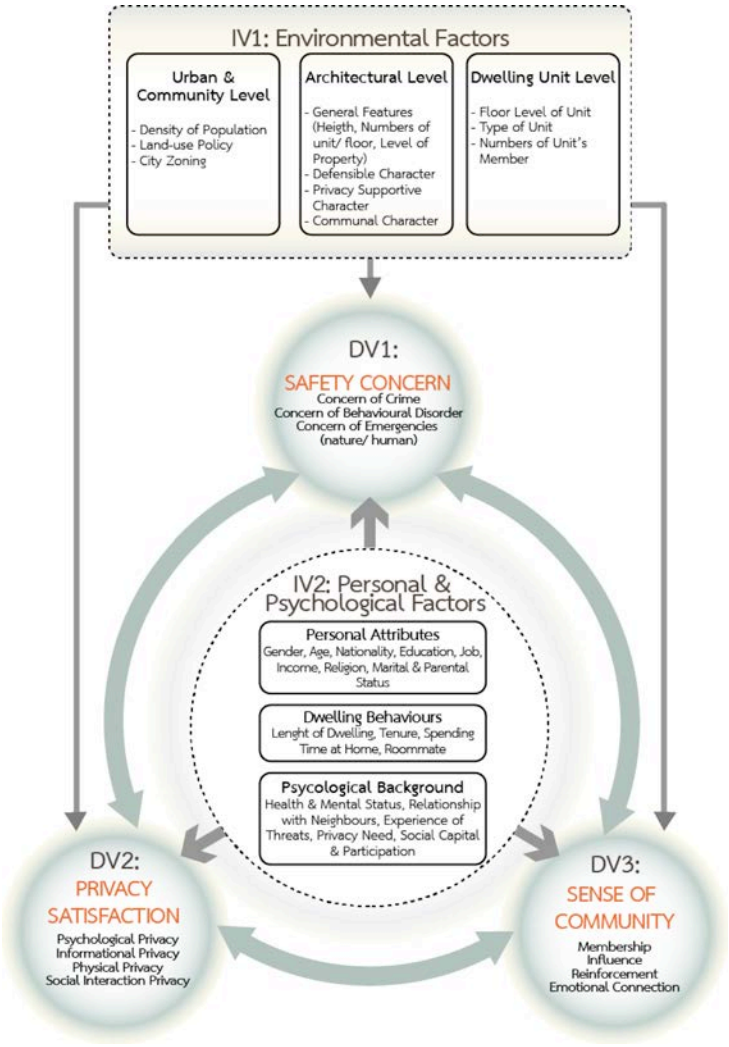


Figure 7.7 The research theoretical constructs model of the environmental psychological assessment for high-rise dwellers

To operate the inclusive structural equation modelling, the following six observed variables were additionally entered in the model as shown in Figure 7.8.

- *The Environmental Indicators:*
  1. Defensible characteristics score of the building (ENV_DEF)
  2. Privacy characteristics score of the building (ENV_PRIVubAV)
  3. Communal characteristics score of the building (ENV_COMMB)
- *The Personal Indicators:*
  1. Experience of threats score (EXPscore)
  2. Privacy need score (PRVNDscore)
  3. Social capital and participation score (SOCAPscore)

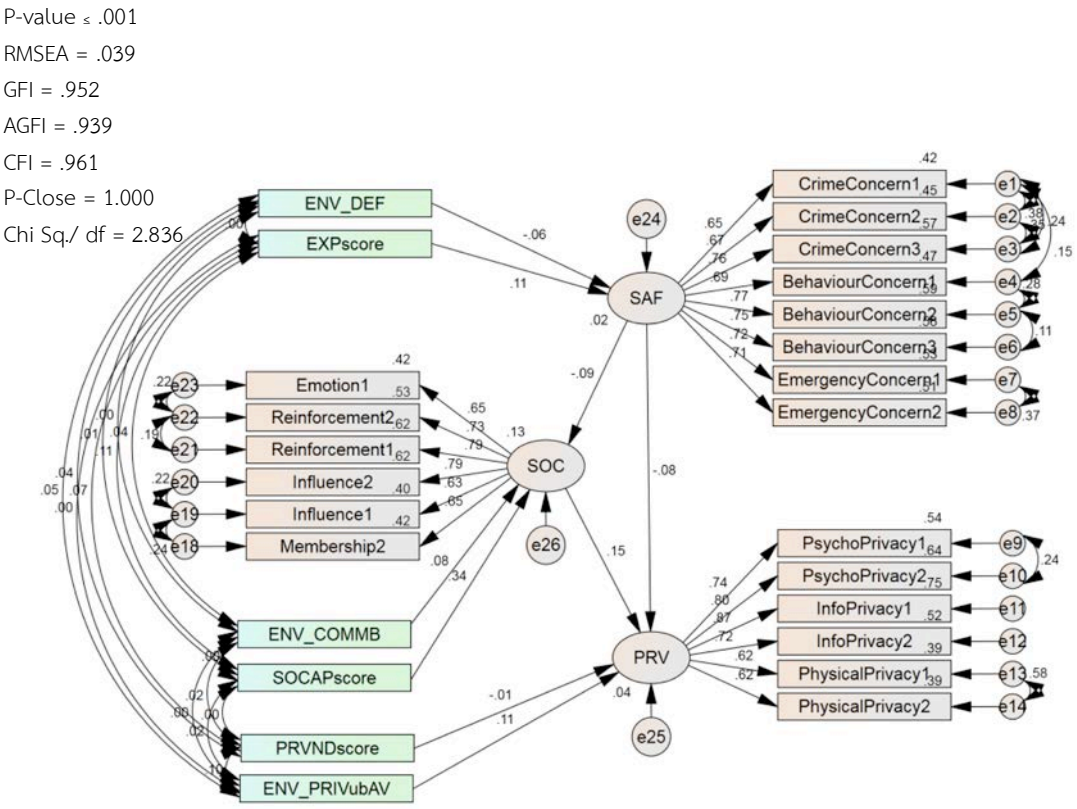
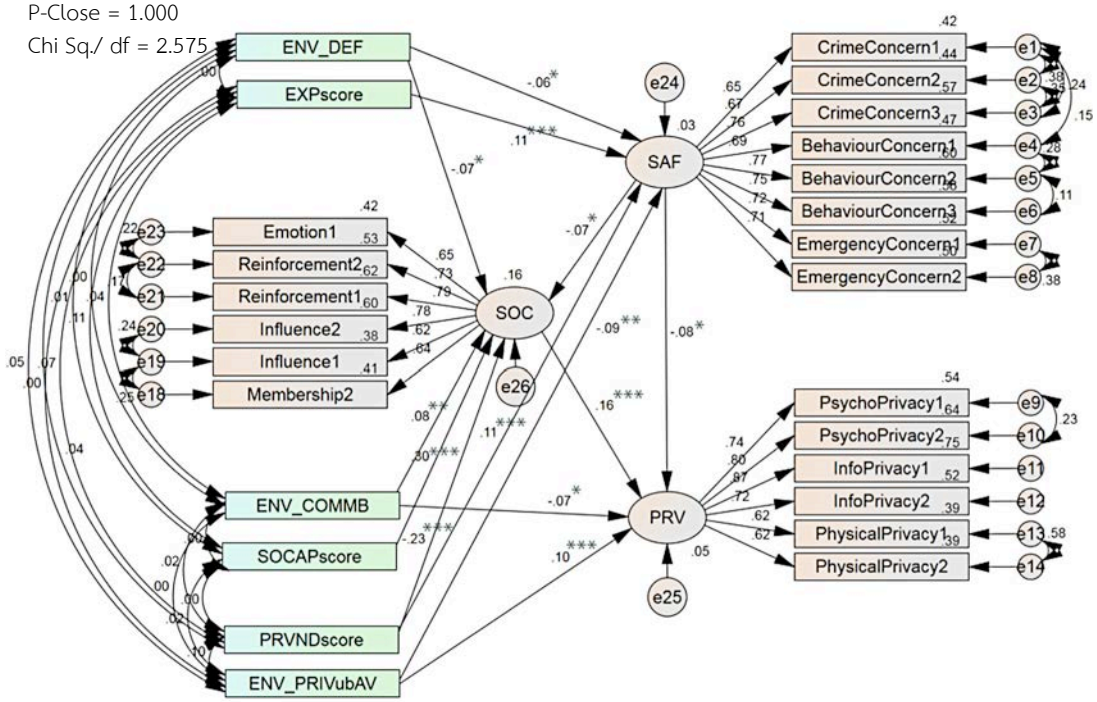


Figure 7.8 The initial inclusive model of the environmental psychological assessment for high-rise dwellers

The above figure indicated that the initial inclusive model achieved the required level. However, some insignificant regression paths (*p-value* > .05) with the low standardised regression weights were reported. The model estimates and modification indices suggested that the path from PRVNDscore to PRV was insignificant at p = .837 and its standardised regression weight was small at -0.01. Nevertheless, the PRVNDscore appeared to have the influences on SAF and SOC. Therefore, the adjustment was performed.

According to the modification indices and estimates, the regression path that was dropped out of the model was PRVNDscore-->PRV. Meanwhile, the following regression paths: PRVNDscore-->SAF, PRVNDscore-->SOC, ENV_PRIVubAV-->SAF, ENV_COMMB-->PRV, and ENV_DEF-->SOC, were added into the model.

P-value ≤ .001
RMSEA = .036
GFI = .957
AGFI = .945
CFI = .967
P-Close = 1.000
Chi Sq./ df = 2.575



Note *$p \leq .05$, **$p \leq .01$, ***$p \leq .001$

Figure 7.9 The final inclusive model of the environmental psychological assessment for high-rise dwellers in context of urban Bangkok

After model adjusting, the final inclusive model, which included the multiple effects of the environmental and personal factors on the structured latent variables: safety concern, privacy satisfaction, and sense of community, received the better Goodness of Fit statistics than the initial inclusive model as described in the table below. (See Table 7.7.) Furthermore, all regression paths were confirmed to achieve the significant level p-value < .05.

Table 7.7 Summary of the Goodness of Fit indices of the final structural equation model of the environmental psychological assessment for high-rise dwellers in context of urban Bangkok

Category	Index	Index Name	Requirements	Model's Value	Comments
1. Absolute fit	RMSEA	Root Mean Square of Error Approximation	< .05 = Good, > .05, < .10= moderate > .10 = bad	0.036	Achieved
	GFI	Goodness of Fit Index	> .90	0.957	Achieved
2. Incremental fit	CFI	Comparative Fit Index	>.90	0.967	Achieved
3. Parsimonious fit	χ^2/df	Chi Square/ Degrees of Freedom	< 3.00	2.575	Achieved

Source: (Awang, 2012, Lowry and Gaskin, 2014, Hu and Bentler, 1999)

- **Model Interpretation**

Regarding the final inclusive model of the environmental psychological assessment for high-rise dwellers (Figure 7.9), the inconsistent mediation relationship between the dependent variables were unchanged, yet their new coefficients were lower than the previous model due to yielding for the additional effect paths.

According to the inclusive model, the SEM had estimated the pattern of entire psychological constructs simultaneously in a single model and confirmed its statistical structure by accomplishing the Goodness of Fit Indices (See Table 7.7). When considering the standardised estimated R^2, all latent variables -safety concern, privacy satisfaction, and sense of community- were better explained by the external variables -environmental and personal factors- than the final standardised estimated model generated in section 7.3.

In accordance with the final inclusive model (Figure 7.9), the four variables that directly affected safety concern were 1) defensible score of the building (ENV_DEF), 2) privacy supportive score of the building (ENV_PRIVubAV), 3) experience of threats score (EXPscore), and 4) privacy need score (PRVNDscore). According to the software's original interpretation, when the experience of threats score and the privacy need score rose up by one standard deviation, the safety concern also arose by 0.106 and 0.11 standard deviations consecutively. Whereas, when the privacy supportive score of the building went up by one standard deviation, the safety concern went down by 0.09 and 0.061 standard deviations consecutively. (Amos, [23], 2014)

Concerning the privacy satisfaction, there were four predictors which explained the alteration of its standard deviations as follows: 1) privacy need score (PRVNDscore), 2) privacy supportive score of the building (ENV_PRIVubAV), 3) safety concern, and 4) sense of community. In more details, when the sense of community and the privacy supportive score of the building increased by one standard deviation, the privacy satisfaction went up by 0.155 and 0.101 standard deviations respectively. Whereas, when the safety concern and the communal score of the building went up by one standard deviation, privacy satisfaction decreased by 0.076 and 0.066 standard deviations respectively. (Amos, [23], 2014)

After all, sense of community was the most explainable endogenous variable in the inclusive model. There were five regression paths towards this one: 1) communal score of the building (ENV_COMMB), 2) social capital and participation score (SOCAPscore) , 3) defensible score of the building (ENV_DEF), 4) privacy needs score (PRVNDscore), and 5) safety concern. The positive effects indicated that when the communal score of the building and the social capital and participation score rose by one standard deviation, the sense of community as well went up by 0.079 and 0.302 standard deviations consecutively. Meanwhile, the adverse effects on sense of community are interpreted as follows. When the defensible score of the building, privacy need score, and safety concern went up by one standard deviation sense of community reduced by 0.072, 0.233, and 0.069 standard deviations. (Amos, [23], 2014) Notably, the interrelationships between the dependent variables were stable.

Regarding the results mentioned above, considering the environmental factors, it appeared that the defensible characteristic of the buildings could alleviate the respondents' concern about safety as well as it could weaken their sense of community. In the meantime, the privacy supportive features of the condominiums could increase the residents' satisfaction of privacy and reduce their concern about safety. Whereas, the communal characteristic of the compound could strengthen the residents' sense of community but it could deter their privacy satisfaction at the same time.

In terms of psychological factors, the SEM confirmed that the more personal experience of threats that the respondents reported, the more safety concern was predicted. The more social capital and participation score the residents reported, their stronger sense of community was predicted. Meanwhile, the privacy need of the respondents could affect their sense of community and safety concern. In this study, the respondents who sought for more privacy for themselves tended to have more concern for their safety, but weaker sense of community was predicted.

All interpretation of the SEM process indicated that the dataset was congruent with the theoretical model stated at the beginning of the research. Moreover, there were unforeseen influences discovered particularly in this sampling group of high-rise dwellers living in Bangkok Metropolitan area.

- **Model Conditions**

The findings of the Structural Equation Modelling indicated that the dataset derived from this field survey endorsed the first hypothesis (H_1), which assumed that safety concern, privacy satisfaction, and sense of community are significantly affected by the physical and personal factors. As well, it confirmed the second hypothesis of the research (H_2), which assumed that these three psychological dependent variables associate with each other under the following statistical conditions.

- The predictive influence of privacy satisfaction by the predictor privacy need score (PRVNDscore-->PRV) existed yet was unaccounted for the final structural equation model due to the low standardized regression weights and insignificant *p-value* = .837.
- The model adjustment abided by the modification indices led to the new regress path as follows.
  1. The predictive influence of safety concern by the predictor privacy need score (PRVNDscore-->SAF)
  2. The predictive influence of sense of community by the predictor privacy need score (PRVNDscore-->SOC)
  3. The predictive influence of safety concern by the predictor privacy supportive characteristics of the building score (ENV_PRIVubAV-->SAF)
  4. The predictive influence of privacy satisfaction by the predictor communal characteristics score of the building (ENV_COMMB-->PRV)
  5. The predictive influence of sense of community by the predictor defensible characteristics score of the building (ENV_DEF-->SOC)

7.5 Refining the Effective Numerical Variables for the Psychological Dependent Variables: Safety Concern, Privacy Satisfaction, and Sense of Community

After testing all hypotheses and revealing the statistical pattern of the psychological mechanism of high-rise dwellers, this section continues the primary objective to enhance the robustness of research results and to explore the factors that had prior influence on each psychological dependent variable. The Multiple Linear Regression (MLR) statistic was implemented at this step to double-check and endorse the dominant factors, which might not be identified by the Structural Equation Modelling.

At this final stage, all numerical variables including the dependent variables themselves were put into the MLR equations using the Stepwise method to extract the most efficient numerical factors on the three psychological fundamentals. Therefore, this refining stage comprised three MLR modellings: 1) the predictive model of the safety concern, 2) the predictive model of the privacy satisfaction, and 3) the predictive model for the sense of community. The details of each MLR model are described separately in the next session.

7.5.1 The multiple linear regression predictive model of safety concern

According to the results of the MLR modelling for the safety concern (as shown in Table 7.7 below), the predictive model was significant at F (6, 1104)= 7.835, p = .000, with an R^2 of .04. It suggested six numerical variables that significantly affected the safety concern, namely 1) defensible score of the building, 2) privacy supportive score of the building, 3) experience of threats score, 4) privacy need score, 5) social capital and participation, and 6) average score sense of community.

Table 7.8 Summary of multiple linear regression models for Safety Concern predicted by the predictors, all numerical variables

N=1206

	Predictive Model for Safety Concern Score				
	Collinearity Statistics		(Stepwise Method: Model 8)		
Predictors	Tol.	VIF	B	S.E.	β
Architectural Factors					
Defensible Score of Building	.985	1.015	-.094	.040	-.069*
Privacy Supportive Score of Building	.988	1.012	-.149	.050	-.088**
Personal Psychological Factors					
Experience of Threats Score	.982	1.018	.035	.012	.087*
Privacy Need Score	.911	1.098	.031	.011	.090**
Social Capital/ Participation	.868	1.152	.014	.005	.091**
Environmental psychological Factors					
Average Sense of Community	.850	1.177	-.124	.043	-.093**
	F (6,1104)= 7.835				
	R^2	.041			
	P	.000***		*Constant* =	3.052

*$p \leq .05$, **$p \leq .005$, ***$p \leq .001$

Note: *All predictive regression models were under the conditions that all variables were measured with the defined units of PE assessment and PEP questionnaire, and the collinearity diagnostic showed that the multicollinearity between regressors was not found. (There were no independent variables that owned Variance Inflation Factor (VIF) greater than 4 as well as the Tolerance (Tol.) lower than 0.2)*

The results could be interpreted that the predicted safety concern scores of the respondents increased by 0.035, 0.031, and 0.014 for each increasing point of their experience of threats, privacy need, and social capital/ participation respectively. In the meantime, their predicted safety concern decreased by -0.094, 0.149, and 0.124 for each increasing point of the defensible score of the building, privacy supportive score of the building, and their own average score of sense of community. The predictive equation is described below.

Safety Concern = 3.052 + (.035)(Exp. of threats) + (.031) (Privacy Need) + (-.149) (Privacy score Bldg.) + (.014) (Social Capital) + (-.124) (Avr. Sense of Comm.) + (-.094) (Defense score Bldg.)

The similarity between the results of the MLR and SEM models was that both statistics endorsed the influences of same four factors, namely 1) defensible score of the building, 2) privacy supportive score of the building, 3) experience of threats score and 4) privacy needs score of the respondents on the safety concern.

The differences between the MLR and SEM models are as follows:

1) The MLR model suggested one more internal relationship between safety concern and sense of community, which was excluded from the SEM process. The results indicated that the sense of community of the residents could scale down their concern of safety.

2) The MLR model suggested one more personal psychological factor that impacted the respondents' safety concern, which was the social capital and participation. It appeared that the more respondents frequently participate in social activities and sharing with the community, the more concern of safety was predicted.

According to these results, sense of community had proved its capacity of suppressing the safety concern amongst the high-rise dwellers. Other than that, the positive effect of social capital and participation on the safety concern of the respondents was also suggested by the MLR model, which did not appear in the SEM modelling.

7.5.2 The multiple linear regression predictive model of privacy satisfaction

Regarding the MLR modelling for the privacy satisfaction (See Table 7.9), the predictive model was detected at F (4, 908)= 22.291, p = .000, with an R^2 of .089. The model suggested four numerical variables that significantly affected the privacy satisfaction of the respondents, namely 1) privacy supportive score of the building, 2) communal score of the building, 3) average sense of community, and 4) household income.

Table 7.9 Summary of multiple linear regression models for Privacy Satisfaction predicted by the predictors, all numerical variables

N=1206

	Predictive Model for Privacy Concern Score				
	Collinearity Statistics		(Stepwise Method: Model 4)		
Predictors	Tol.	VIF	B	S.E.	β
Architectural Factors					
Privacy Supportive Score of Building	.981	1.009	.140	.042	.107***
Communal Score of Building	.988	1.012	-.055	.020	-.086*
Personal Psychological Factors					
Average Sense of Community	.996	1.004	.277	.034	.262***
Personal Attribute Factors					
Household Income (per month)	.998	1.002	-1.4E-07	.000	-.066*
	F (4, 908) = 22.291				
	R^2	.089			
	P	.000***		*Constant* =	2.786

*$p \leq .05$, **$p \leq .005$, ***$p \leq .001$

Note: *All predictive regression models were under the conditions that all variables were measured with the defined units of PE assessment and PEP questionnaire, and the collinearity diagnostic showed that the multicollinearity between regressors was not found. (There were no independent variables that owned Variance Inflation Factor (VIF) greater than 4 as well as the Tolerance (Tol.) lower than 0.2)*

The data from the above table could be interpreted that the predicted privacy satisfaction score of the respondents increased by 0.140 and 0.277 for each increasing point of privacy supportive score of the building and their own the average score of the sense of community. Meanwhile, the privacy satisfaction decreased 0.055 and 1.4E-07 for each increasing point of the communal score of the building and increasing Baht of household income per month. The predictive equation is described below.

Privacy Satisfaction = 2.786 + (.227) (Avr. Sense of Comm.) + (.140) (Privacy score Bldg.) + (-.055) (Communal score Bldg.) + (-1.359E-07) (House income/mth.)

The similar results, which were endorsed by both MLR and SEM methods were 1) the positive effect of privacy supportive score of the building, 2) the negative effect of the communal score of the building, and 3) the positive effect of sense of community on the privacy satisfaction. (See Table 7.9)

The differences between the results derived from the MLR and the SEM are as follows:

1) The MLR procedure did not demonstrate the negative effect of safety concern on the privacy satisfaction as the SEM did earlier.

2) The MLR model suggested another numerical variable into the equation, which was the household income per month. The result indicated that the more household income per month, the less satisfaction of privacy was predicted.

7.5.3 The multiple linear regression predictive model of sense of community

Concerning the MLR modelling for the sense of community (See Table 7.10), the significance of the predictive model was confirmed at F (10, 1191) = 49.505, p = .000, with an R^2 of 0.294. The MLR result suggested ten numerical variables as the efficient factors affected on the respondents' sense of community, namely 1) density of population, 2) defensible score of building, 3) privacy supportive score of building, 4) communal score of building, 5) privacy need score, 6) social capital and participation, 7) mental condition score, 8) relationship with neighbours score, 9) average safety concern, and 10) average privacy satisfaction.

Table 7.10 Summary of multiple linear regression models for Sense of Community predicted by the predictors, all numerical variables

N=1206

	Predictive Model for Sense of Community Score				
	Collinearity Statistics		(Stepwise Method: Model 10)		
Predictors	Tol.	VIF	B	S.E.	β
Urban and Community Factors					
Density of Population	.932	1.073	-3.3E-05	.000	-.155***
Architectural Factors					
Defensible Score of Building	.931	1.074	-.063	.026	-.062*
Privacy Supportive Score of Building	.949	1.054	-.062	.031	-.049*
Communal Score of Building	.970	1.031	.039	.015	.063*
Personal Psychological Factors					
Privacy Need Score	.901	1.110	-.033	.007	-.127***
Social Capital/ Participation	.873	1.146	.023	.003	.200***
Personal Attribute Factors					
Mental Condition Score	.931	1.075	.086	.017	.125***
Relationship with Neighbours Score	.853	1.172	.090	.015	.159***
Environmental psychological Factors					
Average Safety Concern	.963	1.039	-.043	.019	-.056*
Average Privacy Satisfaction	.971	1.030	.253	.024	.266***
	F (10, 1191) = 49.505				
	R^2	.294			
	P	.000***		*Constant* =	2.390

*$p \leq .05$, **$p \leq .005$, ***$p \leq .001$

Note: *All predictive regression models were under the conditions that all variables were measured with the defined units of PE assessment and PEP questionnaire, and the collinearity diagnostic showed that the multicollinearity between regressors was not found. (There were no independent variables that owned Variance Inflation Factor (VIF) greater than 4 as well as the Tolerance (Tol.) lower than 0.2)*

As described in the above table, it could be interpreted that the predicted sense of community score of the respondents increased by 0.039, 0.023, 0.086, 0.090, and 0.253 for each increasing point of communal score of the building, social capital and participation score, mental condition score, relationship with neighbours score, and the average score of privacy satisfaction consecutively. Meanwhile, the sense of community decreased -3.3E-05, 0.063, 0.062, 0.033 and 0.043 for each increasing person of population density of the district, increasing point of the defensible score of the building, privacy supportive score of the building, privacy needs score, and the average of safety concern respectively. The predictive equation is described below.

Sense of Community = 2.390 + (.023) (Social Capital) + (.253) (Avr. Privacy Stfn.) + (.09) (Relation Nghbr. Score) + (-3.324E-05) (Pop Dens.) + (-.033) (Privacy Need) + (.086) (Mental Condition) + (.039) (Communal score Bldg.) + (-.063) (Defense score Bldg.) + (-.043) (Avr. Safety Concern) + (-.062) (Privacy score Bldg.)

The similar outcomes of the MLR and SEM models were that both means confirmed the negative internal effect of the average safety concern, which suppressed the strength of the average sense of community. Besides, both statistics also confirmed the negative effects of defensible characteristic of the building and privacy need score on sense of community as well as the positive effects of communal characteristic of the building and social capital and participation on sense of community.

The differences between the MLR and SEM were that

1) The MLR indicated that the density of population as another urban factor which could reduce sense of community amongst the respondents.

2) The MLR suggested that the privacy supportive characteristic of the building also had negative effect on the residents' sense of community.

3) The MLR indicated that the better mental condition and relationship with neighbours of the respondents, the stronger sense of community of the respondents was predicted.

4) The MLR revealed the positive internal effect of the average privacy satisfaction on sense of community of the residents of which the more privacy satisfaction, their stronger sense of community was predicted.

From the interpretation described above, the outcomes of this MLR equation embraced all the results proposed by the SEM modelling. Moreover, it suggested more numerical variables that make the prediction more effective with higher R^2.

7.5.4 MLR models' effect size and statistical power

This section aims to evaluate the magnitude and power of effects derived from the multiple linear regression analysis by employing the Cohen's standardised magnitude of effect size. The detail of minimum requirements and received coefficients are described in Table 7.11 below.

Table 7.11 Summary table of the effect size and the statistical power of multiple linear regression models for Safety Concern, Privacy Satisfaction, and Sense of Community

N = 1206, α err prob = 0.05, Power (1-β err prob) = 0.8
Criteria for f^2 (Linear Regression) Small size = 0.02, Medium size = 0.15, Large size = 0.35

Evaluated Models	Statistic	N	Coefficient	Numbers of Predictor	Minimum Required Effect size	Effect size	Power (1-β)
SAFETY CONCERN	MLR	1206	f^2	5	.0107	$.0428^{SM}$	1.00***
PRIVACY SATISFACTION	MLR	1206	f^2	4	.0099	$.0977^{SM}$	1.00***
SENSE OF COMMUNITY	MLR	1206	f^2	10	.0136	$.4164^{XL}$	1.00***

SM = $0.02 < f^2 < 0.15$ (Small to medium effect size) XL = $f^2 > 0.35$ (Large effect size)
*** = Power (1-β) more than 99% chance

According to the above table, it is noticeable that all three MLR models generated in this stage received much larger effect size and stronger statistical power than the single effect analysis performed in Chapter 6. The MLR model for predicting the safety concern contained five predictors as mentioned earlier earned a small to medium-sized effect which was four times larger than the minimum required effect size (for 1,206 sampling group, five predictors) and the maximum power of 100% chance of detecting.

As well, the MLR model for the privacy satisfaction, which consisted of four predictors, received a small to medium-sized effect which was ten times larger than the minimum required effect size (for 1,206 sampling group, four predictors) and the maximum power of 100% chance of detecting.

Meanwhile, the MLR model for predicting the sense of community, which comprised ten predictors, achieved a large effect size with f^2 more than 0.35 as defined by the Cohen's criteria and thirty times greater than the minimum required effect size (for 1,206 sampling group, ten predictors). Likewise, it achieved the maximum power of 100% chance of detecting.

The next chapter will provide the in-depth discussion based on the results of this chapter. The effects of both numerical and categorical variables will also be considered and explained.

CHAPTER 8
DISCUSSION

Chapter Summary

The primary objectives of this chapter are to interpret the findings from both qualitative and quantitative analyses conducted in the previous chapters as well as to discuss the aspects that connected to the research questions and context of Bangkok Metropolitan area. This chapter is divided into seven sections.

Section 8.1 emphasises the explanation of the survey results by the geographical clusters, six zones of Bangkok. The distinctive outcomes of all zones are compared in three subsections: 1) the aspect of safety concern, 2) the aspect of privacy satisfaction, and 3) the aspect of the sense of community respectively. In the same manner, Section 8.2 discusses the survey results based on the economic clusters: low, middle, and high selling price condominiums, and clarifies in three similar subsections.

Afterwards, the discussion related to the influences of all independent variables on the three psycho-dependent variables: safety concern, privacy satisfaction, and sense of community, are addressed separately in Section 8.3, 8.4, and 8.5 consecutively. Moreover, to systematically facilitate the discussion, each section is subdivided into five subsections, according to the five groups of factors, namely, 1) urban and community factors, 2) architectural factors, 3) personal attribute factors, 4) dwelling behavioural factors, and 5) psychological background factors.

Section 8.6 contributes to discussing the paramount outcomes established on the SEM and MLR modelling for the interdependence and statistical associations of the safety concern, privacy satisfaction, and sense of community, which interweave with the proposed components of high-rise housing enhancing the

psychological well-being of the residents in the context Bangkok placed in the last section.

8.1 Comparative Analysis of the Psychological Status of High-rise Dwellers by Bangkok Urban Zoning

Regarding the multi-stage sampling technique which geographically clustered Bangkok urban area into six zones, the statistical analysis of variance (ANOVA) indicated that the urban zoning significantly influenced the respondents' safety concern, privacy satisfaction, and sense of community as described below.

8.1.1 The Aspect of Safety Concern

The result of one-way ANOVA revealed the significant effects of Bangkok municipal zoning on the dwellers' average safety concern at $F(5, 1200) = 3.899$, $p = .002$. After considering the sub-variables of safety concern: 1) crime, 2) behavioral disorder, and 3) emergency, it was discovered that the city zoning affected the variances of behavioural disorder concern score at $F(5, 1200) = 5.566$, $p = .000$, and emergency concern score at $F(5, 1200) = 2.794$, $p = .016$. Post hoc analyses using the Scheffé and Tamhane criteria also indicated that the degree of concern about behavioural disorder amongst the high-rise residents living on the western side of Chao Phraya River, namely, Zone 5: Northwestern Bangkok, and Zone 6: Southwestern Bangkok was significantly greater than those living on the eastern side of the river Zone 1 to 4. The calculation of Cohen's magnitude of effect (f) and statistical power also confirmed this small to medium-sized difference at more than 99% chance of detecting.

The means of all safety concern scores of each zone are compared and demonstrated in the below graph (See Figure 8.1).

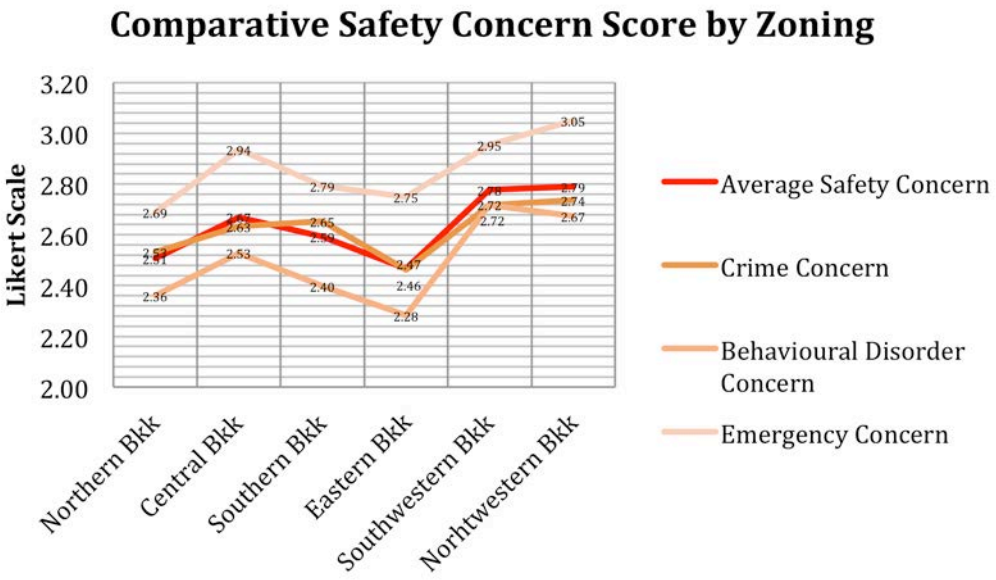


Figure 8.1 The diagram of safety concern score compared by Bangkok zoning

According to the site observations, the western side of Bangkok encompassing Zone 5 and Zone 6 was a newly urbanised area. In 1970, it was considered as Thailand's second largest city called Thonburee, which remained an independent province, until it was consolidated into Bangkok in 1971. Besides the natural boundary, Chao Praya River, that separates the area from the city centre, people living on the western side of Bangkok, Thonburee side, are still facing difficulties to access public services, amenities, mass transportation, and seasonal floods along the riverbanks. (Thaiwater, 2011) Apart from that, the dispersion and proportion of derelict land in the western side are more frequent and larger than the eastern side of the city, regarding the observation.

Figure 8.2 The pictures showed the condominiums in the Northwestern Bangkok flooded in 2011

Source: (Top left, Top right, and Middle right) www.facebook.com

(Below left, below right) http://www.prachachat.net

The geography of Thonburee area which is adjacent to the industrial estates in Samutprakarn and Samutsakorn provinces have drawn numbers of legal and illegal migrant labours from neighbour countries, for example, Myanmar, Cambodian, Laos, etc. into the area. (Office of foreign workers administration, 2016) Moreover, the presence of drug dealers, teenage motorcycle gangs are also perceived amongst the residents of Thonburee area. (Post today, 2013) These are the existing circumstances happening in the Western Bangkok, which are considered as the cofactors that could provoke the negative perceptions of safety amongst the high-rise dwellers in the Western Bangkok.

Figure 8.3 The pictures showed the conditions of Western Bangkok

Sources (Top Left) http://www.smeleader.com/ตลาดนัดโลตัส-พระราม-2/, (Top Right) http://www.ภูธรออนไลน์.com/15551940/บุกจับโรงงานย่านชัยมงคล-ใช้แรงงานผิด-กมต่างด้าว-78-คน (Below Left) http://news.sanook.com/1266202/, (Below Right) http://www.manager.co.th/Crime/ViewNews.aspx?NewsID=9560000053640

Besides the existing geographical conditions of the Eastern and Western Bangkok, the demographic pattern of the dataset was also analysed. Comparing the demographics of the sampling groups representing high-rise dwellers from the Eastern and Western Bangkok, the results of independent t-test indicated that the average length of stay of respondents from Eastern Bangkok (50 months) was significantly longer than the respondents from the western side (41 months) at *p-value* = .000 as well as the average of eastern respondents (34 years old) was significantly older than the western respondents (30 years old) at *p-value* = .000. Furthermore, the results of the field survey revealed that the condominiums located in the Western Bangkok significantly had the higher density of dwelling units per floor (29 units/floor) than the condominiums located in Eastern Bangkok (18 units/floor) at *p-value* = .000. These statistical differences led to the presumptive conclusion that the length of stay, the age of dwellers, and the floor density can be the cofactors urging the level of safety concern of high-rise dwellers in the Western Bangkok.

8.1.2 The Aspect of Privacy Satisfaction

The statistical results declared in Chapter 6 also revealed the significant effects of Bangkok zoning on the respondents' average privacy satisfaction score at $F(5, 1200) = 2.324$, $p = .041$. It was found that the city zoning affected the variances of informational privacy satisfaction score at $F(5, 1200) = 2.542$, $p = .027$, and physical privacy satisfaction score at $F(5, 1200) = 2.954$, $p = .012$. Nonetheless, it is noteworthy that the powers of the first two effects were 75% and 79% chance of detecting which was less than 80%. Therefore, the calculation could confirm only the last result, which was the effect of the city zoning on the physical privacy satisfaction at 86% chance of detecting this small to medium-sized effect.

According to Post hoc comparisons, it indicated that the respondents who were living in Zone 1 (Northern Bangkok) had a greater physical privacy satisfaction than the respondents in Zone 3: Southern Bangkok and Zone 6: Southwestern Bangkok significantly.

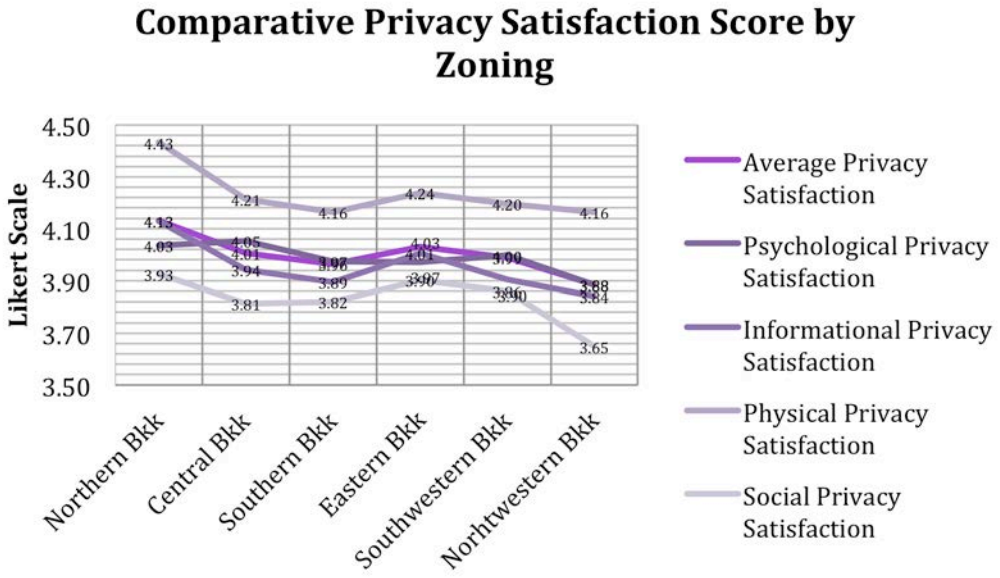


Figure 8.4 The diagram of privacy satisfaction score compared by Bangkok zoning

Considering the city planning and land use policy of these two urban zones, it appears that the majority areas of Northern Bangkok are the low-density residential neighbourhoods; meanwhile, Southwestern part of Bangkok is more heterogeneous since it comprises of low and medium-density residential neighbourhoods, industrial districts, and rural agricultural areas.

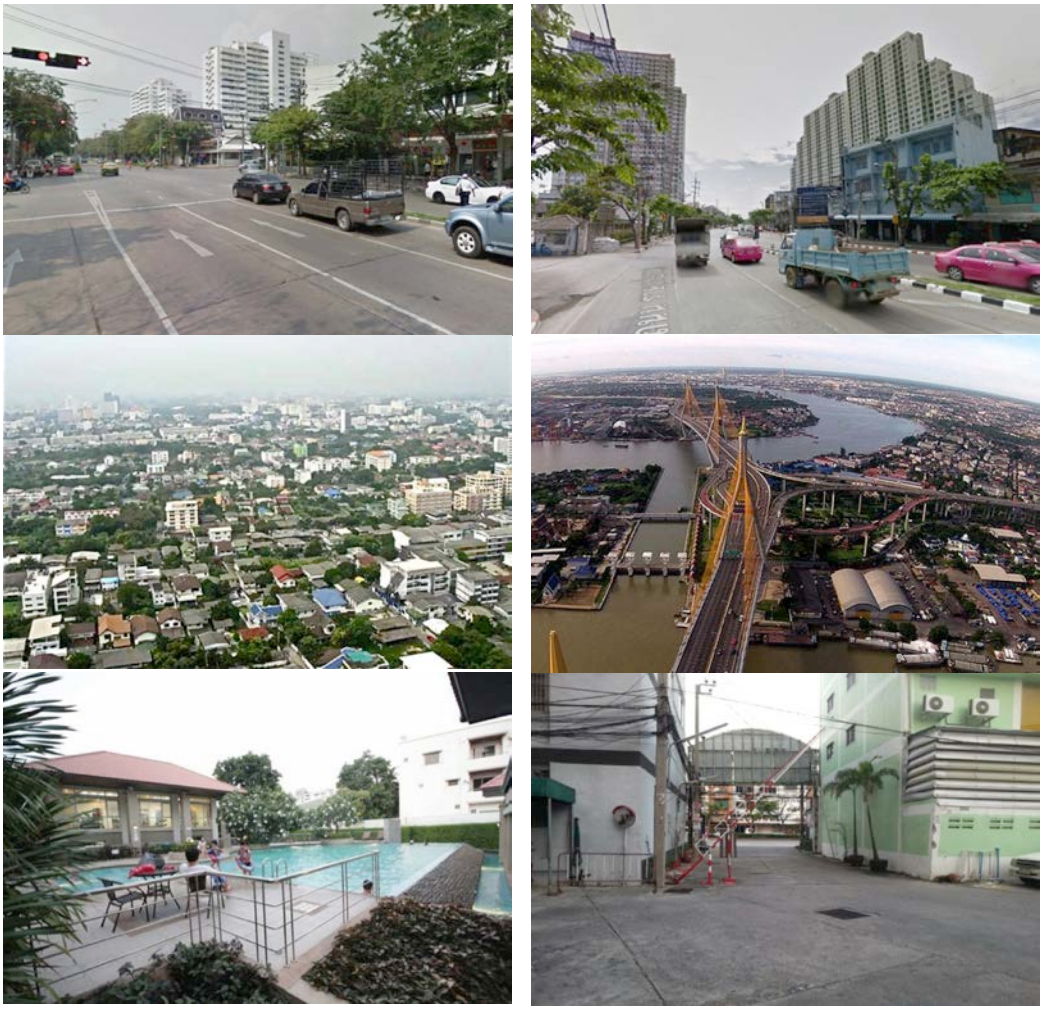


Figure 8.5 (3 left pictures) The pictures showed the conditions of Northern Bangkok

Sources: (Top) http://www.chillpainai.com, (Middle) https://s3-ap-southeast-1.amazonaws.com, (Below) http://www.baan2day.com

Figure 8.6 (3 right pictures) The pictures showed the conditions of Southwestern Bangkok

Sources: (Top) https://www.google.com/maps, (Middle) http://www.thaiskyvision.com

A comparative analysis indicated that the Southwestern Bangkok had a higher population density (5,332 persons/ km^2) than the Northern Bangkok (4,847 persons/ km^2), meanwhile, the results of t-test calculation revealed that the condominiums located in the Southwestern Bangkok significantly had a greater number of dwelling units per floor (24 units/floor) than the condominiums located in the Northern Bangkok (20 units/floor) at *p-value* = .000. Besides, the results of t-test analysis also indicated that the respondents living in the Northern Bangkok had an average household's income per month equal to 86,511 THB (approximately €2,298/ month), which was significantly higher than the Southwestern Bangkok (63,167 THB or about €1,678/ month) at *p-value* = .018 as well as the average age of the respondents of the Northern Bangkok was significantly higher than the Southwestern

Bangkok at *p-value* = .009. These statistical differences led to the causal possibility that these qualifications of the Northern Bangkok could together make it different and become a more supportive environment for the satisfaction of privacy.

8.1.3. The Aspect of Sense of Community

As well, the statistical results described in Chapter 6 endorsed the significant effects of Bangkok's urban zoning on the respondents' sense of community including its sub-variables: feelings of 1) membership, 2) influence, 3) reinforcement, and 4) emotional connection. The one-way ANOVA revealed that the city zoning affected the respondents' feeling of membership at $F(5, 1200) = 8.326$, $p = .000$, influence at $F(5, 1200) = 7.216$, $p = .000$, reinforcement at $F(5, 1200) = 7.848$, $p = .000$, and emotional connection at $F(5, 1200) = 10.857$, $p = .000$. Compared to five Bangkok urban zones, the Post hoc tests specified that the respondents residing in Zone 2 (Central Bangkok) significantly had the weakest feeling of membership, influence, reinforcement, and emotional connection. Furthermore, the magnitude and power calculations for these results confirmed that there were 100% chance of detecting these small to medium-sized effects.

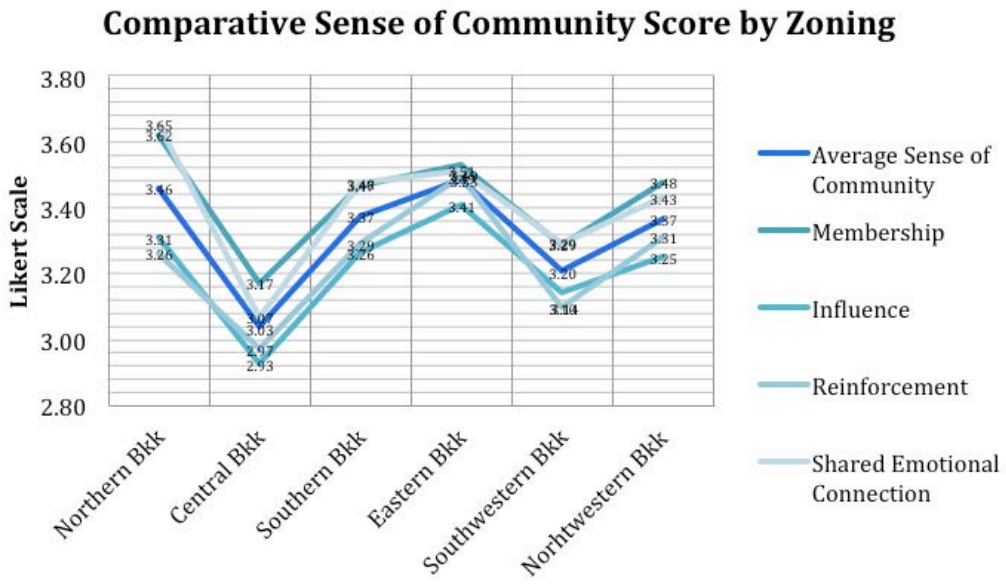


Figure 8.7 The diagram of privacy satisfaction score compared by Bangkok zoning

When contemplating the existing conditions and land use policy of Central Bangkok, it is well known that this area is the central business district of the city and the country. Although it is the hub of amenities, infrastructures, and conveniences, the people who live in Central Bangkok have to confront several life dilemmas, for instance, a high cost of living compared to their salaries, severe traffic congestion, air and noise pollution, etc. This struggling urban lifestyle can cause them exhaustive conditions, and lack of vitality to get involved with the community.

Figure 8.8 The pictures showed the conditions of Central Bangkok

Sources: (Top Left) http://www.bmwsociety.com, (Top Right) http://www.ipostproperty.com, (Below Left) http://3.bp.blogspot.com, (Below Right) http://crossboxs.com

The comparative analysis of the dataset also indicated that Central Bangkok significantly had double time of population density (13,677 persons/ km^2) than the average of other zones of Bangkok (6,244 persons/ km^2) at *p-value* = .000. The average age of respondents living in Central Bangkok (30 years old) was less than the average of other zones (33 years old) at *p-value* = .000 as well as their average length of stay (40.36 months) was less than the average of other zones (49.02 months) at *p-value* = .000. The comparative mean analysis applying t-test method also revealed that the respondents who was living in Central Bangkok reported their

frequency of participating in social activities less than the other zones significantly at *p-value* = .000. Meanwhile, the number of units per floor and the communal characteristic score of the condominiums located in Central Bangkok were also found significantly lower than other zones at *p-value* = .000. These aspects were presumed to be the cofactors that influenced the variance of sense of community between groups of respondents living in business and non-business areas of Bangkok.

8.2 Comparative Analysis of the Psychological Status of High-rise Dwellers by Levels of Condominiums

As mentioned earlier, this study used the multi-stage sampling technique, which economically sub-clustered the condominiums in Bangkok into three levels: 1) low selling price, 2) middle selling price and 3) high selling price condominiums. The outcomes of the statistical analysis (ANOVA) indicated that the economic level of condominium significantly influenced the respondents' safety concern, privacy satisfaction, and sense of community as described below.

8.2.1 The Aspect of Safety Concern

As mentioned earlier in Chapter 6, the results of ANOVA revealed that the significant effect of the property's level on the dwellers' safety concern was detected at $F(2, 1203) = 9.736$, $p = .000$. To discuss this in more detail, it appeared that the level of property affected the average score of crime concern at $F(2, 1203) = 12.738$, $p = .000$, behavioural disorder concern at $F(2, 1203) = 5.292$, $p = .005$, and emergency concern at $F(2, 1203) = 10.307$, $p = .000$ respectively. The considerable results derived from the Post hoc comparison (Scheffé and Tamhane criteria) indicated that the degree of concern about crime, behavioural disorder, and emergency incidents amongst the respondents living in the low selling price condominiums was significantly higher than those living in the middle and high selling price condominiums. These small to medium-sized impacts of the architectural-economic features on safety concern including its sub-variables were confirmed at more than 98% chance of detecting except for the behavioural disorder concern which was confirmed at 84% chance.

Figure 8.9 The diagram of safety concern score compared by Level of Property

According to the PE assessment and the observation, the physical conditions of the low selling price condominiums were mostly less well-maintained than the middle and high selling price condominiums. It was clear that the average defensible characteristic score of the low selling price condominiums (2.904 from 5) was significantly lower than the average of the middle and high selling price condominiums (4.041 from 5) at *p-value* = .000.

- **Access Control**

The results of PE assessment mentioned in Chapter 5 also indicated that the low selling price condominiums, namely, NB01, CB01, and SW01 earned the lowest score of access control compared to other two condominiums in the same zone. They were more easily allowed a stranger and unregistered vehicle to access their property plus fewer security checkpoints than the other two condominiums in the same zone.

Figure 8.10 The pictures demonstrated access controlling of the Condominium
NB01 (Left), SWB01 (Top Right), and CB03 (Below Right)

- **Surveillance**

For the issue of surveillance, it appeared that the low selling price buildings, namely, NB01, EB01, NWB01, and SWB01 received the lowest score of monitoring system amongst others due to their less number of the security guards and installed CCTVs.

Figure 8.11 The pictures demonstrated CCTVs camera of the Condominium
EB01 (Left), EB02 (Middle), and SB03 (Right)

- **Territoriality**

When comparing the score of territoriality amongst all levels, the low selling price buildings, namely, NB01, CB01, EB01, NWB01, and SWB01 earned the lowest points since they allowed non-residents to access their recreational facilities conveniently as well as some of them were semi-gated properties.

Figure 8.12 The pictures demonstrated the territoriality of the condominiums SWB01 (Left), EB02 (Middle), and SB03 (Right)

- **Milieu and Juxtaposition**

The surroundings of low selling price condominiums in this field survey also earned lower scores than other levels in same areas. Particularly, the building NB01, CB01 SB01, and SWB01 had the lowest score amongst others because of their remote distance from public transports, heterogeneity, and deterioration of the buildings' environment.

Figure 8.13 The pictures demonstrated the quality of the maintenance of condominiums EB01 (Left), CB02 (Middle), and SWB03 (Right)

The comparative analysis of the dataset by means of t-test statistic showed that the respondents who were living in the low selling price condominiums reported less household's income per month (61,163 THB or approximately €1,629/ month) than those residing in the middle and high selling price condos (116,959 THB or approximately €3,115/ month) at *p-value* = .003. At the average, the length of stay reported by the low selling price dwellers (60 months) was longer than the two other levels (40 months) at *p-value* = .000. When considering the dwelling behaviour, it appeared that the respondents of the low selling price condos showed their better relationship with neighbours (mean score 3.02 from 5) than those who lived in the middle and high selling price condos (mean score 2.68 from 5) significantly at *p-value* = .000. As well, their time spending at home (mean score 3.34 from 5) was also more than those who lived in the middle and high selling price condos (mean score 3.19 from 5) at *p-value* = .031.

8.2.2 The Aspect of Privacy Satisfaction

The results of ANOVA and Post hoc analysis indicated that the respondents who lived in the high selling price condominiums had the more average score of psychological privacy satisfaction than the respondents of middle selling price condos significantly at $F(2, 1203) = 4.572$, $p = .011$. Notably, the small-sized effect of the economic levels of condominium held 77% chance, which was less than 80%. Thus, this research cannot insist that this kind of impact will be found amongst the high-rise's population.

According to the PE assessment and the observation, all of the high-level condominiums were gated-property except EB03 and NWB03. When comparing the dataset, the t-test results revealed that the privacy supportive characteristic score of high-level condominiums (score 3.664 from 5) was significantly higher than the middle-level condominiums (score 3.332 from 5) at *p-value* = .000. Averagely, the high-level condos had 17 units per floor, which was significantly fewer than the middle-level condominiums (25 units/ floor), at *p-value* = .000. Besides, the compared means analysis also revealed that the respondents of high-level condos had a higher level of education as well as more frequency of social capital sharing

and social activities participation than the respondents of middle-level condos at *p-value* = .000 and .001 respectively.

Figure 8.14 The diagram of privacy satisfaction score compared by Level of Property

These results led to the possibility that the number of units per floor, which was an architectural advantage of high-level condominiums, integrated the educational level and the frequency of social capital sharing and social activities participation could slightly improve the psychological privacy satisfaction amongst their high-rise dwellers.

Figure 8.15 The pictures demonstrated the different privacy supportive conditions of the low-selling price condominium (Left) and the high-selling condominium (Right)

8.2.3 The Aspect of Sense of Community

Similar to the results of safety concern and privacy satisfaction, the influence of the level of property on the dwellers' sense of community came out significantly. The results of ANOVA calculation indicated that it affected the respondents' sense of membership and reinforcement at $F(2, 1203) = 3.742$, $p = .024$ and $F(2, 1203) = 4.755$, $p = .009$ respectively. The Post hoc comparisons applied with Scheffe criterion confirmed that the respondents of the low-level condominiums significantly reported their stronger sense of membership and reinforcement with their community than the dwellers of high-level condominiums with the statistical power of 69% and 80% respectively. Regarding the PE assessment, the score of the communal characteristic of the low-level condominiums (score 2.595 from 5) was slightly higher than the high-level condos (score 2.486 from 5).

Figure 8.16 The diagram of privacy satisfaction score compared by Level of Property

From the physical environmental observation, the low selling price condominiums mostly were semi-gated compounds that provided various facilities for their residents as well as non-residents could also easily access to their premises plus the locations of such recreational facilities were more exposed and accessible. Unlikely, most of the high-level condominiums provided fewer recreational facilities only for their residents and excluded such areas from the public sight as much as they can.

Figure 8. 17 The pictures demonstrated the different locations of the communal facilities of the low-selling price condominium (Left) and the high-selling condominium (Right)
Source http://img.tarad.com

According to the dataset, it appeared that the high-level residents significantly had a more household's income per month (148,552 THB or approximately €3,953/ month) than low-level residents (61,163 THB or approximately €1,627/ month) at *p-value* = .000. In connection with dwelling behaviour, it appeared that the low-level condominiums' respondents had been living in their buildings for a longer period (averagely 60 months) than the high-level condos' residents (averagely 37 months) significantly at *p-value* = .000. Besides, the respondents from the low-level condominiums had a higher average score of relationship with neighbours and spent their time at home more than the high-level condominium's residents significantly at *p-value* = .000. The comparative analysis of the respondents' personality also revealed that the respondents from the high-level properties were likely more introvert than the low-level residents significantly at *p-value* = .034.

8.3 Summary of Factors Affecting Safety Concern of High-rise Dwellers

After applying the various statistical methods, the results revealed that each environmental and personal factor had particular effects on the safety concern of the respondents. The table below shows the summary of all independent variables, which significantly affected the respondents' safety concern including its sub-variables: crime concern, behavioral disorder concern, and emergency concern.

Table 8.1 Summary of Statistical Effects of All Independent Variables on Dependent Variables Safety Concern including Crime Concern, Behavioural Disorder Concern, and Emergency Concern

Independent Variables	Safety Concern and Sub-variables			
	Safety Concern	Crime Concern	Behaviour Disorder Concern	Emergency Concern
IV01: Environmental Factors	**Urban and Community Variables**			
1. Density of Population [Q]	✓		✓	
2. Land use Policy [C]	✔	✔	✔	✓
3. Bangkok Municipal Zoning [C]	✔		✔	✔
IV01: Environmental Factors	**Architectural Variables**			
1. Height of Building [Q]	✓	✔		
2. Floor Level of Dwelling Unit [Q]				✔
3. Type of Property [C]	✓	✓		✔
4. Level of Property [C]	✔	✔	✔	✔
5. Type of Dwelling Unit [C]			✔	
6. Defensible Score Bldg. [Q]	✓	✔		✓
7. Privacy Supportive Score Bldg. [Q]	✔		✔	✔
IV02: Personal Factors	**Personal Attribute Variables**			
1. Gender [C]	✔	✔		✔
3. Stage of Life [C]	✔	✔	✔	✔
4. Nationality [C]	✓	✔		✓
5. Religion [C]	✔	✔	✔	✔
6. Marital Status [C]	✔	✔	✓	
8. Education [C]	✔	✓	✔	✓
9. Occupation [C]		✔		
IV02: Personal Factors	**Dwelling Behavioural Variables**			
4. Number of Unit Member [Q]				✓
5. Roommate [C]	✔	✔		
IV02: Personal Factors	**Psychological Background Variables**			
2. Mental Health Condition [Q]			✓	
3. Relationship with Neighbours [Q]			✔	
4. Experience of Threats [Q]	✔	✔	✔	✔
5. Privacy Need [Q]	✔	✔	✔	✔
6. Social Capital/ Participation [Q]	✓	✓		

✔ = Power of effect more than 0.8 (80% chance of detecting)

✓ = Power of effect less than 0.8 (80% chance of detecting)

[Q] = Quantitative Variable [C] = Categorical Variable

8.3.1 Urban and Community Factors Affecting Safety Concern of High-rise Dwellers

The above summary table identifies all factors influencing safety concern and its sub-variables: crime concern, behavioural disorder concern, and emergency concern. The statistical analysis indicated that there were three variables involving urban and community aspect that significantly affected the respondents' safety concern, namely, 1) district's population density, 2) land use policy, and 3) city zoning.

- Population density

Regarding the regression equation described in Chapter 6, the higher population density of the district, where the condominium located, tended to cause a greater behavioural concern amongst the dwellers. Regarding the PEP questionnaire, the density of population seemed to provoke the concern about a substance abuse, domestic violence, and the jumpers, amongst high-rise residents participating this study. However, it is worth noting that the above-mentioned effects of population density on safety issues earned extremely subtle predictability (R^2 = .005, p = .019) plus the statistical power of 70% chance of detecting, which was lower than the minimum criteria set in this research (80%). In consequence, it is remained unconfirmed to find this kind of effect in the entire population.

- Land use policy

The three types of land use policy applied in this study: 1) medium-density residential area, 2) high-density residential area, and 3) commercial area, were derived from the latest version of Bangkok comprehensive planning 2015 along. The results of one-way ANOVA identified that the respondents residing in the commercial area reported the least overall safety concern and behavioural disorder concern with the statistical power of 98% and 94% chances of detecting a small to medium-sized effect respectively. Meanwhile, the respondents from the high-density residential areas showed the greatest crime concern with the 99% chance of detecting this small to medium-sized effect. The observation and the PE assessment pointed that the condominiums located in the commercial areas were in the city centre where all amenities and public safety facilities are available, such as hospitals, police station/ precinct, 24/7 supermarket and pharmacy, and public transports as well as

surrounded by upper-class neighbourhoods. These advantages could reduce their concern of being a victim of crime and difficulty of getting assistance in case of emergency. Unlikely, the respondents from the high-density residential areas were living in more heterogeneous neighbours and farther from public transports and amenities.

- Zoning of Bangkok

As discussed earlier in the previous section, zoning of Bangkok considerably influenced the total safety concern of the high-rise dwellers including behavioural disorder concern and emergency concern. It appeared that the group of high-rise residents from the Western Bangkok had the greater concern about drug abuse, domestic violence, jumping off the building, and evacuation in an emergency situation more than the high-rise dwellers from Eastern Bangkok, according to the survey. The calculations of effect size indicated that the effects of Bangkok municipal zoning on safety concern, behavioural concern, and emergency concern were in the range of small to medium-sized with the 94%, 99%, and 83% chance of detecting consecutively.

8.3.2 Architectural Factors Affecting Safety Concern of High-rise Dwellers

The statistical analysis extracted seven architectural factors that significantly influenced the safety concern including crime, behavioural disorder, and sense of community. The seven factors are 1) height of the building, 2), floor level of the dwelling unit, 3) type of property, 4) level of property, 5) type of dwelling unit, 6) defensible score building, and 7) privacy supportive score building.

- Height of the building

Regarding the regression equations in Chapter 6, the height of building alone had a small-sized effect on the respondents' crime concern at R^2 = .007, p = .003. It could be interpreted that the higher residential building was, the less crime concern amongst its residents was predicted. Regarding the Cohen's f^2 effect size, there were 83% chance of detecting the effect of building height on crime concern.

According to the sampling group, most of the tall condominiums participating in this study were mid-level and high-level condominiums administered

by private companies that targeted upper-class clients. Their security systems were well-maintained plus 24-hour security guards. Besides, the locations of these tall buildings were close to the city centre where the land values were expensive, and the floor area ratio (FAR) promulgated by the City Planning Department (CPD) allowed these investors and landlords to construct their buildings higher than the peripheral area of Bangkok. These could be the reasons that caused less concern of crime amongst the respondents living in taller residential buildings in Bangkok.

- Floor level of the dwelling unit

As well, the effect of floor level of the dwelling unit on the respondents' emergency concern was detected. According to the PEP questionnaire, it appeared that living on the upper floor could slightly elevate the respondents' anxiety of an elevator's malfunctioning and a failed rescue operation in case of emergency. However, it is important noting that this outcome earned the slightly predictive power at R^2 = .004, p = .031 and the chance of detecting this kind of effect is lower than 80% which this research cannot affirm.

- Type of property

The two types of the property focused in this study comprise 1) gated-condominium, and 2) semi-gated condominiums. The results indicated that the residents of gated condominiums had greater safety concern including crime concern and emergency concern than the residents of semi-gated condos significantly at *p-value* = .025, *p-value* = .028, and *p-value* = .004 respectively. According to the PE assessment, the gated condominiums were the enclave areas with closed perimeters of walls and fences. They did not allow non-residents to access the properties freely or share any of their recreational facility. The exclusionary of property management and the visual landscape of fear created by walls (Low, 2001) were assumed to play an important role embedding discriminating feeling between insider and outsider, fear, and negative perspective to the nearby communities. However, it is important to define that despite the t-test p-value < 0.05, the Cohen's effect sizes (*d*) of the property's type on safety concern and crime concern were less than the minimum requirement of this study plus the low statistical power at 61% and 60% chance. Therefore, these two effects are still unconfirmed, whereas, the small-sized effect of

the community's type on emergency concern is confirmed at the power of 83% chance of detecting.

- Type of dwelling unit

The ANOVA calculation also detected the effect of type of dwelling unit on the behavioural concern of the dwellers. It was statistically significant that the residents living in the studio-type unit reported the stronger concern about behavioural disorder involving substance abuse, domestic violence, etc. in their building than others. According to the field survey, the dwellers living in studio type unit mostly lived alone or lived with another roommate. In the tightened proximity habitat like a condominium, residing with one or two members could cause a perception of unprotected when being too close to an anonymous neighbour. This vulnerability was then assumed as a hidden driving force of fear and the indefensible feeling amongst them. Somehow, the effect size of the dwelling unit type was considered as a small-sized effect with the low power 74% chance of detecting, which makes this kind of effect unconfirmed.

- Defensible characteristic score of building

As described earlier in Chapter 3, there were three architectural indicators conceived in this particular field survey, namely, 1) defensible characteristic score, 2) privacy supportive characteristic score, and 3) communal characteristic score of the buildings. These indicators were to assess the physical condition of the buildings. For the safety issue, the regression calculation indicated that the defensible characteristic and the privacy supportive characteristic score of the building significantly influenced respondents' safety concern, whereas the effect of the communal characteristic score of the building was not involved.

It is important noting that despite the significant *p-value* < 0.05, the predictability of the respondents' safety concern and emergency concern by the defensible score of condominiums are still unconfirmed because of their extremely small R^2 at .005 and .004 along with their trivial effect size and insufficient power. Unlikely, the small-sized effect of the condominium's defensible score on the respondents' crime concern (R^2 = .007, p = .003) is confirmed with the statistical power of 83% chance of detecting.

To interpret the meaning of regression equation mentioned above, firstly, the four elements of the defensible indicator: 1) access control, 2) surveillance, 3) territoriality, and 4) milieu and juxtaposition constructed on the defensible space theory proposed by Newman in 1972, were statistically proved to diminish the high-rise dwellers' concern of crime. Secondly, the defensible score of the condominiums contained a capacity to alleviate the residents' concern of emergency and failed evacuation during an emergency situation.

- Privacy supportive characteristic score of building

Besides the architectural elements related to the defensible space theory, it appeared that the privacy supportive features of high-rise housing proposed in this study were statistically proved to reduce the dwellers' behavioural disorder concern (R^2 = .008, p = .002) encompassing substance abuse, domestic violence, jumpers, and touch/ airborne infection inside the building. The three privacy supportive elements were 1) number of units per floor, typical floor plan, and 3) the number of unit's members. These items are reflecting the floor density, the density of dwelling unit, and the layout and circulation of the corridor which are the cause of the proximity to threats and the difficulty of evacuation during an emergency situation. The interpretation of these results is that the higher privacy supportive score earned by a condominium, the less concern of behavioural disorder amongst residents is predicted.

Noted that, although the effects of this indicator on the safety concern and emergency concern were significantly detected (R^2 = .007 and .006), the trivial effect size and insufficient power (less than 80%) have left them unconfirmed.

8.3.3 Personal Factors Affecting Safety Concern of High-rise Dwellers

The statistical analysis investigating the influence of personal attributes on the respondents' safety concern led to the significant findings that indicated the seven personal attributes affecting safety concern of the high-rise dwellers in particular ways. The seven personal attributes are 1) gender, 2) stage of life, 3) nationality, 4) religion, 5) marital status, 6) education, and 7) occupation.

- Gender

According to the findings reported in Chapter 6, the gender of respondents dominantly differentiated the mean of average safety concern including crime concern and emergency concern at *p-value* equal 0.002, 0.002, and 0.001 respectively. This finding congruently confirmed that female high-rise residents reported a greater concern about safety especially crime and emergency issues than male. From the previous global research, it is a common acceptance that the biological differences between female and male, such as physical conditions, hormones, etc., can influence the different degree of depression and anxiety between them. In particular, the rate of depression and anxiety was higher amongst women than men. (Gater, Tansella, et al., 1998) The results of this study as well statistically acquiesced such mentioned commonplace in the same direction. Regarding the Cohen's effect sizes (*d*), the effect sizes of gender on safety, crime, and emergency are confirmed as small-sized effects which achieved the statistical power of 87%, 91%, and 86% detecting chance consecutively.

- Stage of life

Despite the statistically insignificant effect of age, it appeared that in the different lifespan, the high-rise dwellers reported their concern about safety significantly differently. The Post hoc test revealed that the early adolescent respondents (13-18 years old) and the later adult respondents (61 years old or older) showed a lower average safety concern including crime, behavioural disorder, and emergency concern than other respondents in different stage of life. Notably, when considering an interactional effect of genders and lifespan amongst the early adolescent group, the results showed that the girls reported their concerns about crime, behavioural disorder, and emergency significantly greater than boys at *p-value* = .005. The Cohen's *f* calculation for the effect sizes of the lifespan on safety, crime, behavioural disorder, and emergency concerns considered these results as the small to medium-sized effects which owned the power of 89%, 88%, 78%, 84% detecting chance consecutively.

- Nationality

Regarding the analysis, it came out that the group of foreign high-rise residents in this study showed the lower concern about safety including crime

concern and emergency concern than Thai residents significantly at p-value equal 0.004, 0.005, and 0.009 respectively. After comparing the effect sizes of nationality on safety issues, it appeared that the nationality produced the small-sized effect on the average safety concern and emergency concern with the power of 75% and 71%, which lower than the minimum requirement of this study and could not be confirmed. Whereas, its effect size on crime concern is confirmed because of its medium-sized effect with the power of 86% detecting chance. This result is implying that the non-domestic background of the dwellers was quite substantive in reducing their crime concern.

- Religion

Meanwhile, the effect of religion on the safety concern was quite remarkable considering its magnitude and statistical power. The ANOVA statistic revealed that the religion defined by the respondents themselves affected the average safety concern including crime, behavioural disorder, and emergency concerns at $F(4, 1201) = 5.257$, $p = .000$, $F(4, 1201) = 4.866$, $p = .001$, $F(4, 1201) = 3.655$, $p = .006$, and $F(4, 1201) = 4.101$, $p = .003$ consecutively. The interpretation of Post hoc test indicated that the group of non-religious respondents reported their less concern of all safety issues than the groups of other religions. The magnitude (Cohen's *f*) and power comparison for the effects of religions on safety, crime, behavioural disorder, and emergency concern considered them as the small to medium-sized effects which achieved the statistical power of 97%, 96%, 88%, and 92% detecting chance.

- Marital status

The results of ANOVA indicated that the marital status of the residents affected average safety concern, crime concern, and behavioural disorder concern at *p-value* equal 0.004, 0.001, and 0.020 consecutively. The interpretation of Post hoc test suggested that the group of married respondents showed the greatest concern about crime and behavioural disorder than other groups, in particular, the widow and divorced group. According to the comparison of Cohen's effect size (*f*), the effect of marital status on safety concern was a small-sized effect with 85% power, whereas, its effect on crime concern was a small to medium-sized effect with 92% detecting

power. The unconfirmed effect of marital status on behavioural disorder was a trivial one with 71% chance of detecting.

- Education

The field survey's results also defined the significant effects of education on the respondents' average safety concern and its sub-variables: crime, behavioural disorder, and emergency concerns at *p-value* equal 0.004, 0.035, 0.007, and 0.009 consecutively. The Post hoc test explained the greater concern of all safety issues amongst the bachelor degree respondents than the lower bachelor degree respondents significantly. The effect sizes of educational level were considered the small-sized effects according to Cohen's calculation. Their statistical power were 85%, 64%, 81%, and 79% detecting chance respectively. Regarding these statistical power values, therefore, the effects of education on crime and emergency concern are remained unjustifiable.

- Occupation

The occupational factor is the last personal attribute that had significant impact on the respondents' crime concern. The results of Post hoc indicated that the respondents who worked in private companies reported the greater of concern about crime than the group of students significantly at *p-value* = .013. According to the dataset, the group of private employees was the majority of this sampling group, followed by the group of students. Most of the private employees were living alone or with their partners and considered themselves as the owner of the unit, whereas most of the students were living with parents or family's members and considered themselves as the guest of the dwelling unit. Presumably, the differences in socio-economic status, mindset, and tenure could be the reasons that drove the level of concern about safety amongst high-rise dwellers. The effect size of respondents' occupation on crime concern was considered a small-sized effect according to Cohen's magnitude, and earned the 86% detecting chance.

8.3.4 Dwelling Behaviour Factors Affecting Safety Concern of High-rise Dwellers

From the statistical analysis, there were two dwelling behavioural factors, which statistically influenced the respondents' of safety concern in this survey, namely, 1) number of unit's members and 2) type of roommate.

- Number of unit's members

The simple linear regression analysis suggested that the more members of the dwelling unit, the greater concern of emergency were predicted (R^2 = .004, p = .027). The results became clear that the high-rise residents were feeling anxious about a hardship of evacuation amid an emergency situation due to the number of family members. Despite the p-value < 0.05, it is necessary to note that the magnitude of this effect was defined as a small-sized effect with the low detecting chance of 60%.

- Type of roommate

Analysing the type of roommate as one of the dwelling behavioural factors led to the finding that it also had influences on the average safety concern and crime concern at *p-value* equal 0.039 and 0.009 consecutively. Regarding the Post hoc test, the group of respondents who lived alone significantly had a less worrying about safety and crime than those who lived with their spouse, family's member, and non-family members. The Cohen's effect size (*f*) assessment indicated the influence of roommate type on the average safety concern and crime concern were small to medium size with the power of 80% and 92% chance of detecting consecutively.

8.3.5 Psychological Background Factors Affecting Safety Concern of High-rise Dwellers

The findings of statistical analysis indicated that there were five psychological factors that significantly impacted the respondents' safety concern and its sub-variables, namely, 1) mental health condition, 2) relationship with neighbours, 3) experience of threats, 4) privacy need, and 5) social capital and participation.

- Mental health condition

For the issue of mental health, the results suggested that the better score of mental health self-reported by respondents, the less concern of behavioural disorder was predicted (R^2 = .003, p = .042). This interpretation exemplified the connectedness between a mental immunity and a worrying about neighbours' behavioural disorder. It was reflecting a positive attitude towards neighbours came from the respondents who reported their better mental health after moving into high-rise buildings. However, it is necessary to state that despite the p-value < 0.05, the predictability of this results and the magnitude of this effect was extremely subtle with the statistical power lower than 50% of detecting chance, which means that this trivial effect still needs a further investigation.

- Relationship with neighbours

Besides the mental health, the relationship with neighbours was statistically confirmed that it was another cause affecting the respondents' behavioural disorder concern (R^2 = .007, p = .004). The results indicated that the better score of relationship with neighbours by which the respondents self-reported, the fewer concern about behavioural disorder was predicted. Comparing the magnitude and the power of these two factors indicated that the effect of relationship with neighbours was slightly stronger than the mental health factors with the power of 83% chance of detecting.

- Experience of threats

Amongst the psychological indicators initiated for this particular study, the experience of threats and the privacy need were statistically confirmed to have the domination on the respondents' safety concern and its sub-variables. The multiple linear regression equations predicted that the overall safety concern of the high-rise residents was escalating every increasing score of their experience of emergency (caused by human) plus the experience of behavioural disorder (R^2 = .013, p = .000). The statistical power was 95% chance of detecting this small-sized effect. Meanwhile, the growing of their crime concern was statistically forecasted by the growing experience of emergency (caused by nature) (R^2 = .008, p = .002) instead of the experience of crime as presumed earlier. The statistical power of this small-sized effect was 97% chance of detecting.

The results also suggested that the expanding of concern about behavioural disorder could be predicted by an increase of experience of behavioural disorder at R^2 = .01, p = .001. For the emergency issue, it was clear that the respondents' emergency concern arose every increasing score of their experience of emergency (caused by human) at R^2 = .012, p = .000. The statistical power of these small-sized effects on the behavioural disorder and emergency incidence concern was consecutively 94% and 97% chance of detecting. These outcomes were congruent with the assumption set at the beginning of the research. The only aspect of experience that did not have any statistical effect on the safety concern of this sampling group was the experience of crime.

- Privacy need

As for the privacy need, the predictive regression model indicated that the respondents' safety concern was affected by the experiences of crime and emergency caused by the human at R^2 = .013, p = .000. The power of this effect was 95% chance of detecting its small-sized effect. In the meantime, the crime and behavioural disorder concern were significantly boosted up by their reserved personality at R^2 = .017, p = .000 and R^2 = .016, p = .000 with more than 99% chance of detecting their small-sized effects.

According to the PEP questionnaire, the respondents who reported feeling uncomfortable when riding an elevator with others tended to have more crime and behavioural disorder concern significantly. Concurrently, the equation also indicated that the respondents' emergency concern significantly arose every increase of their reserved personality integrated with an isolated personality, which referred to the comfortable feeling when being alone, at R^2 = .017, p = .000 with 99% chance of detecting its small-sized effect.

- Social capital and participation

According to the results described in Chapter 6, the trend of the predictive model implied that the more frequently participating the civic duty, the more safety and crime concern was predicted. It is important noting that although the MLR calculation could detect the positive effect of the frequency of social capital and participation on the safety and crime concern at p-value less than 0.05, these effects

cannot be confirmed by this study due to their tiny R^2 (.003 and .006) and the insufficient effect size and statistical power.

When comparing the R^2 values and the magnitude and statistical power of effects caused by these factors, it appeared that the psychological background factors expressed more substantial impacts on the safety concern than the environmental factors. This issue was discussed amongst the behavioural and psychological researchers that the internal conditions, for example, sociocultural boundary and psychological factors were generally more prominent than the external conditions including the environmental motives, attitude, and values. (Spielberger, 2004)

8.4 Summary of Factors Affecting Privacy Satisfaction of High-rise Dwellers

The statistical analysis extracted the essential environmental and personal factors that significantly influenced the privacy satisfaction of the high-rise dwellers in Bangkok. The table below is the summary table of all independent variables, which significantly affected the respondents' privacy satisfaction and its sub-categories, which are satisfaction of 1) psychological privacy, 2) informational privacy, 3) physical privacy, and 4) social/ interactional privacy.

Table 8.2 Summary of Statistical Effects of All Independent Variables on Dependent Variables, Privacy Satisfaction including Psychological Privacy Satisfaction, Informational Privacy Satisfaction, Physical Privacy Satisfaction, and Social Interactional Privacy Satisfaction

Independent Variables	Privacy Satisfaction and Sub-variables				
	Privacy Satisfaction	Psychological Privacy Satisfaction	Informational Privacy Satisfaction	Physical Privacy Satisfaction	Social Privacy Satisfaction
IV01: Environmental Factors	**Urban and Community Variables**				
3. Bangkok Municipal Zoning [C]	✔		✔	✔	
IV01: Environmental Factors	**Architectural Variables**				
4. Level of Property [C]		✔			
5. Type of Dwelling Unit [C]			✔	✔	
7. Privacy Supportive Score Bldg. [Q]	✔	✔	✔	✔	
8. Communal Score Bldg. [Q]		✔			
IV02: Personal Factors	**Personal Attribute Variables**				
1. Gender [C]	✔	✔	✔		
3. Stage of Life [C]					✔
4. Nationality [C]					✔
5. Religion [C]				✔	✔
8. Education [C]	✔	✔	✔	✔	
9. Occupation [C]			✔		
10. Household Incomes/ month [Q]				✔	
IV02: Personal Factors	**Dwelling Behavioural Variables**				
1. Length of Dwelling [Q]			✔		
2. Tenure [C]	✔	✔	✔	✔	
4. Number of Unit Member [Q]	✔	✔	✔	✔	
5. Roommate [C]	✔	✔	✔	✔	
IV02: Personal Factors	**Psychological Background Variables**				
1. Health Condition [Q]	✔	✔	✔	✔	✔
2. Mental Health Condition [Q]	✔	✔	✔		✔
5. Privacy Need [Q]	✔		✔	✔	✔
6. Social Capital/ Participation [Q]	✔	✔	✔	✔	

✔ = Power of effect more than 0.8 (80% chance of detecting)
✔ = Power of effect less than 0.8 (80% chance of detecting)
[Q] = Quantitative Variable [C] = Categorical Variable

8.4.1 Urban and Community Factors Affecting Privacy Satisfaction of High-rise Dwellers

As discussed in Section 8.1.2, it was clear that the levels of privacy satisfaction of the respondents were diversified by the various urban contexts of Bangkok. The data analysis also defined that the urban and socio-economic differences might be the common factors driving the satisfaction of privacy amongst high-rise dwellers, such as population density, age, household's income per month of dwellers, and density of dwelling units per floor. As to the magnitude of effect size analysis, the urban zoning of Bangkok had small to medium-sized effects on the participants' privacy satisfaction including informational privacy satisfaction and

physical privacy satisfaction with the power of 75%, 79%, and 86% chance of detecting consecutively.

8.4.2 Architectural Factors Affecting Privacy Satisfaction of High-rise Dwellers

Amongst all architectural features adopted in this study, there were four factors that were determined to have statistical effects on the respondents' privacy satisfaction, namely, 1) level of property, 2) type of dwelling unit, 3) privacy supportive characteristic score of the building, and 4) communal characteristic score of the building.

- Level of Property

The effects of level of property especially on psychological privacy satisfaction were discussed earlier in Section 8.2.2. The conclusion defined that the architectural qualification -the fewer number of units per floor- integrated the personal attributes -the higher educational level and the more frequency of social capital sharing and social activities participation- could improve the psychological privacy satisfaction amongst high-rise dwellers. Nevertheless, the magnitude of this effect considered a small-sized effect with the power of detecting lower than 80% according to Cohen's standardised requirement, makes it remained unconfirmed.

- Type of dwelling unit

The influences of the type of dwelling unit were identified by the ANOVA statistic, which revealed that it involved the variance of the informational and the physical privacy satisfaction of the respondents at $F(4, 1201) = 2.575$, $p = .036$ with 73% power of detecting its small-sized effect, and $F(4, 1201) = 3.108$, $p = .013$ with 83% power of detecting its small to medium-sized effect consecutively. The Post hoc test indicated that the residents living in the studio had less satisfaction of these two issues than the one-bedroom and two-bedroom type residents significantly. It is noteworthy that the first effect of this indicator has not been confirmed due to its statistical power lower than 80%.

Spatially, the distinction between studio and one-bedroom unit is that a studio unit is a single multi-purpose room, whereas, a one-bedroom unit has extra separate room for sleeping area. Commonly, both types also contain bathroom(s)

and kitchen/ pantry area in the unit. As for the mechanism of privacy, it is a fundamental psychological need, which one can be satisfied by control his/ her information, communication, emotion, or physical exposure/ contact in various ways, depending on situations. The statistical proof of this study implied that the spatial features of one/two-bedroom dwelling unit, such as extra walls, and separate space, could assist the occupants controlling their psychological privacy and informational privacy better than the studio type. Regarding the PEP questionnaire, the one/ two-bedroom occupants were feeling more comfortable to have a private conversation, to do personal care i.e. shower, undress, or to be loose and relax in their living unit more than the studio's occupants significantly.

- Privacy supportive characteristic score of building

The privacy supportive characteristic score, which was another architectural indicator added for this particular research, had the significant influences on the respondents' average privacy satisfaction as well as its sub-variables. Referring to the predictive equation described in Chapter 6, the residents' total privacy satisfaction including psychological, and physical privacy satisfaction arose relatively with an increase of privacy supportive score by which condominium earned, at R^2 = .008, p = .002 with 88% power of detecting, R^2 = .009, p = .001 with 91% power of detecting, and R^2 = .01, p = .000 with 94% power of detecting respectively. These small-sized effects could be interpreted that living in the residential high-rise environment, where contained a fewer number of dwelling units per floor, typical floor plan with better visual flow, and fewer number of unit's members, could improve the occupants' satisfaction of privacy encompassing psychological, informational, and physical issues. Meanwhile, the effect of this indicator on the informational privacy satisfaction is still unconfirmed due to its extremely small R^2 of .005, p = .014 with 70% power of detecting chance.

- Communal characteristic score of building

Besides the privacy supportive characteristic of the building, the communal features score of the building was confirmed to associate with the satisfaction of psychological privacy as well. The interpretation of equation indicated that the psychological privacy satisfaction dropped relatively with the increase of the building's communal score significantly at R^2 of .007, p = .003 with 83% power of

detecting its small-sized effect. In other words, living in the condominiums that provided more various recreational facilities and more exposure of the layout plan could lessen the residents' psychological privacy satisfaction, for example, working on a concentration-required task, and emotional expression while they were in the dwelling unit.

8.4.3 Personal Factors Affecting Privacy Satisfaction of High-rise Dwellers

In accordance with the statistical results reported in Chapter 6, the personal attributes that significantly influenced the high-rise occupant's privacy satisfaction are 1) gender, 2) lifespan, 3) nationality, 4) religion, 5) education, 6) occupation, and 7) household's income per month.

- Gender

Analysis of the gender factor revealed that male respondents significantly reported less privacy satisfaction score including psychological and informational privacy less than female respondents at *p-value* equal 0.038, 0.001, and 0.018 respectively. The magnitude and power of these effects were 53%, 90%, and 64% consecutively.

The result confirmed that male respondents were facing some difficulties of primarily expressing their emotional conditions inside the dwelling unit. Moreover, the satisfaction of finishing concentration-required works and having a private conversation while living in their units amongst male residents was also less than female. Nevertheless, it is important noting that the effects of gender on the average privacy satisfaction and informational privacy satisfaction which earned less than 80% statistical power could not be confirmed by this analysis.

The data comparison additionally indicated that male respondents participating in this field survey tended to have an introvert personality more than female respondents significantly (p = .014). In more detail, male respondents self-reported more uncomfortable feeling when being surrounded by people in a party, and more distrustful feeling when a stranger tries to befriend with their family members or friends than female respondents. Moreover, amongst the middle

adulthood (35-60 year-old) respondents, it appeared that male respondents expressed their need of privacy more than female (*p* = .039).

- Stage of life

Concerning the lifespan of the respondents, the statistical outcome unveiled its involvement with the social/ interactional privacy satisfaction. The Post hoc test interpretation was that the groups of middle childhood (6-12 years old) and later adulthood (61 years old and older) had greater social privacy satisfaction than the other groups (*p-value* = .016). The result was implying that the groups of children and senior residents were feeling more enjoyable to hang around the common areas of the condominiums as well as more comfortable to invite their guest to visit their dwelling unit than the other age groups. Additionally, the effect size of lifespan on the privacy satisfaction was considered as a small-sized effect with 84% chance of detecting.

- Nationality

The nationality's effect on the respondents social/ interactional privacy satisfaction was detected at *p-value* = .001. According to the t-test results, the foreign residents were feeling more enjoyable using the common facilities of the condominiums plus they were feeling freer to invite their guest into their dwelling unit than Thai residents significantly. The effect size of nationality on the social interactional privacy satisfaction was considered as the small to medium-sized effect with 91% chance of detecting, according to Cohen's criterion. This data trend could imply that the non-domestic background or the international perspective of the residents perhaps was an essential determinant to improve their social/ interactional privacy satisfaction living in the high-rise compound.

- Religion

In connection with the religion of the respondents, the statistical results unveiled its influences on the physical and social/ interactional privacy satisfaction significantly. The Post hoc test indicated that the group of residents who considered themselves as non-religion showed their higher physical and social/ interactional privacy satisfaction than the group of Buddhism at *p-value* equal 0.009 and 0.024 consecutively. The effect size of religion on the physical privacy satisfaction was estimated as the small to medium-sized effect with 85% power of detecting,

whereas, the small-sized effect of religion on social privacy satisfaction is remained unconfirmed with 77% power of detecting.

- Education

Regarding the educational factor, the ANOVA's results defined that the group of higher-bachelor degree respondents reported the greatest satisfaction of privacy including psychological, informational, and physical privacy satisfaction amongst the others at the same *p-value* = .000. The dataset comparison was performed to specify the differences between the group of higher education and the other two groups. It revealed that the group of higher-bachelor degree respondents significantly had a greater need for privacy, or tended to have more introvert personality than the group of bachelor and lower-bachelor degree (p = .028). Additionally, the average age of the higher-bachelor group (39 years old) was more than the others (30 years old) (p = .000). Also, their length of dwelling was longer (average 53 months) than the others (average 45 months) (p = .011). These additional distinctions could be the co-factors that interacted with the educational level of the residents' privacy satisfaction.

Regarding the magnitude and power calculation, the result indicated that the educational level had the small to medium-sized effects on average privacy satisfaction including psychological and informational privacy satisfaction with more than 98% power of detecting. Meanwhile, its small-sized effect on physical privacy satisfaction earned lower than 80% chance of detecting and was unable to be confirmed by this study.

- Occupation

Furthermore, the influence of occupational factor was found on the respondents' informational privacy satisfaction. The results of Post hoc indicated that the respondents who did not disclose their occupation in the questionnaire (n = 20) was the group that showed the least satisfaction of informational privacy (*p-value* = .035). This group of respondents reported the feeling uncomfortable to have a private conversation in their unit, and to receive a classified document via the building's mailbox. However, the effect size of occupation was considered small-sized effect with lower than 80% chance of detecting according to Cohen's rule of thumb and could not be confirmed.

- Household income per month

The small effect of household's income on the physical privacy satisfaction of the respondents was statistically detected at p = .044, with an R^2 of .004. It appeared that the satisfaction of physical privacy decreased relatively with the increase of household's income per month. In this case, there was a possibility that the more household income per month was generated by the more unit members who were living in the same unit. Although the p-value of this result was less than .05, the power and size of this effect was less than 80%, which could not be confirmed by this analysis as well.

8.4.4 Dwelling Behaviour Factors Affecting Privacy Satisfaction of High-rise Dwellers

In relation to the dwelling behaviours, the statistical analysis indicated the four behavioural factors that influenced the respondents' privacy satisfaction, namely, 1) length of dwelling, 2) tenure, 3) number of unit member, and 4) type of roommate.

- Length of dwelling

The length of dwelling in high-rise building was statistically confirmed to have influence on the respondents' informational privacy satisfaction at p = .013, with an R^2 of .005. It appeared that the longer residents lived in the building, the more comfortable to have private conversation in their unit and receive a classified documents via the building's mailbox they felt. Predictably, their informational privacy satisfaction arose every each month of dwelling period. The result led to a presumption that a longer length of dwelling in one place could help the occupants to perceive and recognise their home environment including to learn how to control their informational privacy and feel more trustful to their living place. Notably, the magnitude and power of this effect was considered as a small-sized effect with the 70% power, which was unconfirmed by this study.

- Tenure

The tenure was a dwelling status that was statistically confirmed to dominate the residents' satisfaction of privacy. The effects of tenure on the average privacy satisfaction and its sub-variables, psychological, informational, and physical

privacy satisfaction were identified at the same *p-value* equal 0.000. Regarding the Post hoc test, it was clear and congruent that the group of owner respondents reported their greater satisfaction of privacy including psychological, informational, and physical privacy than the groups of tenant and guest significantly. This outcome implied that the ownership of dwelling unit could increase the dwellers' confidence and capability to take control and manipulate their own privacy, whereas the tenant and guest felt less powerful and comfortable to do so. Regarding the effect size estimation, the magnitude and power of effects of tenure on privacy satisfaction, psychological, informational, and physical privacy satisfaction were small to medium-sized effects with the power 99%, 97%, 99%, and 96% chance of detecting.

- Number of unit's members

In connection with the density of dwelling unit, the number of unit's members was one of the factors that influenced the privacy satisfaction of the dwellers. The simple linear regression identified its significant effects on the respondents' average privacy satisfaction along with psychological, informational, and physical privacy satisfaction at p = .004, with R^2 of .007, p = .003, with R^2 of .008, p = .014, with R^2 of .005, and p = .002, with R^2 of .008 respectively. Meanwhile, the magnitude and power of these effects were considered as small-sized effects with more than 80% chance of detecting except for the effect of unit's density on the informational privacy satisfaction of which earned 69% power of detecting and was considered as an unconfirmed effect by this study.

The consequences of the unit density on all aspects of privacy satisfaction were in the same direction. The more members of dwelling unit, the less privacy satisfactions were predicted. It was conspicuous that living in the high-rise building with more unit members could provoke the feeling uncomfortable amongst the occupants plus the difficulty of controlling and manipulating their privacy in the daily life.

- Type of roommate

In this study, the type of roommate was statistically confirmed as the factor influencing the respondents' total privacy satisfaction including psychological, informational, and physical privacy satisfaction at *p-value* equal 0.040, 0.014, 0.035, and 0.005 consecutively. The magnitude and power of these effects were considered

as the small to medium-sized effects with 80%, 89%, 82%, and 94% power of detecting consecutively. According to Post hoc test, the group of respondents living with non-family roommate reported their less privacy satisfaction involving psychological and informational privacy than those who were living alone or living with spouse/ boyfriend/ girlfriend, whereas, the score of physical privacy satisfaction amongst the living-alone respondents significantly higher than those who were living with family member and non-family member. It became clear that the relationship between high-rise residents and their roommates was one of the influencing factors to their privacy satisfaction. Secondary to an autonomous dwelling, living the family member and spouse could form the more comfortable occupancy than living with non-family roommate.

8.4.5 Psychological Background Factors Affecting Privacy Satisfaction of High-rise Dwellers

The statistical analysis pointed out four psychological factors that significantly impacted the respondents' privacy satisfaction and its sub-variables,, namely, 1) health condition, 2) mental health condition, 3) privacy need, and 4) social capital and participation.

- Health condition

In relation to the health condition, the outcome suggested that the better score of physical health by which respondents assessed themselves, the greater satisfaction of their average score of privacy including all of its aspects: psychological, informational, physical, and social/ interactional privacy was predicted at p = .001, with R^2 of .009, p = .003, with R^2 of .007, p = .027, with R^2 of .004, p = .019, with R^2 of .005, and p = .002, with R^2 of .008 consecutively. After considering the Cohen's f^2 coefficient, it is important noting that the above-mentioned effects were considered as small-sized effects with more than 80% chance of detecting except for the effects on informational and physical privacy satisfaction, which were unconfirmed due to the lower-conventional power of detecting (60% and 70% respectively). These simple linear regression effects could explain the linkage between physical health and capacity of privacy control in the dwelling unit in the way that one who assessed their health getting better after moving into the building would have more

positive attitude towards high-rise living and would not feel any difficult to maintain their own privacy while living in high-rise environment and vice versa.

- Mental health condition

Meanwhile, the influence of mental health on the residents' privacy satisfaction was as well revealed by the same linear regression method. The results indicated that the better mental health by which the respondents self-reported, the more satisfaction of privacy including psychological, informational, and social/ interactional privacy were predicted at p = .001, with R^2 of .009, p = .014, with R^2 of .010, p = .014, with R^2 of .005, and p = .002, with R^2 of .008. The size of these effects was considered as a small-sized category with earned 82% to 91% chance of detecting except for the effects on informational privacy satisfaction, which was unconfirmed due to its lower-conventional power of detecting at 70%. The only aspect of privacy that was not affected by the mental health was the physical privacy satisfaction. Likewise, the connection between mental health and the satisfaction of privacy could be interpreted in the same way as physical health condition of the residents.

- Privacy Need

The privacy need score of the respondents was one of the psychological indicators that significantly involved the satisfaction of privacy amongst high-rise dwellers. For the average privacy satisfaction, the MLR analysis defined that it was disturbed by the anonymous and reserved personality of the respondents. The more anonymous and reserved they became, the less total privacy satisfaction were predicted (p = .003, with R^2 of .009) with the power of 85% chance of detecting its small-sized effect. As well, the results indicated that the residents who reported their anonymity referring to an uncomfortable feeling to befriend with new people also reported their relative low satisfaction of informational and physical privacy (p = .010, with R^2 of .006 and p = .021, with R^2 of .004). However, it is necessary to define that the size and power of these two mentioned effects were lower than 80% chance of detecting (76% and 69%), which are unable to be confirmed by this study.

While the social/ interactional privacy satisfaction was influenced by the reserved and solitude personality of the respondents referring to an uncomfortable feeling to join any social event. Those who felt more distressed to participate social

activity as well reported their less satisfaction of social/ interactional privacy satisfaction while living in the high-rise building (p = .000, with R^2 of .021). When considering the magnitude and power of this predictive equation, it is noteworthy that both reserved and solitude personalities better explained the change of social/ interactional privacy satisfaction amongst the dwellers with the linear model than the other equations in the same category with the power of more than 99% chance to detect their small to medium-sized effect.

- Social capital and participation

The statistical findings also suggested an essential influence of social capital and social participation on the respondents' privacy satisfaction. The MLR equation suggested that the more frequency of sharing and donating, the greater average score of privacy satisfaction was reported (p = .037, with R^2 of .004). However, with the 60% power of detecting chance, this effect was remained unconfirmed.

The psychological privacy satisfaction of the resident increased when they reported more frequency of sharing and donating for the compound plus regularly paying common charge fee and voting or being a member building management committee. On the contrary, the psychological privacy satisfaction decreased when the residents reported more frequency of participating the social events or volunteering for community (p = .000, with R^2 of .016). This small-sized regression effect held the power of 97% of detecting chance. Meanwhile, an increase of informational privacy satisfaction was predicted when the residents reported more frequency of sharing and donating, however, its decrease was predicted when they reported more frequency of volunteering and participating social events with *p-value* = .001, R^2= .011, and 90% power of detecting small-sized effect. As well for the physical privacy satisfaction, its rising was predicted when the residents reported more frequency of sharing and donating for the public interest but its decline was predicted when they showed more frequency of volunteering and participating social events with *p-value* = .004, R^2 = .009, and 85% chance of detecting small-sized effect. Regarding the interpretation, it could be concluded that the dwellers' sharing and donating, and performing residential duty, both positively influenced their privacy satisfaction. On the other hand, the dwellers' volunteering and participating

social events negatively influenced their privacy satisfaction. Similar to the privacy need, the effects of social capital and participation on privacy could explained the variance of privacy satisfaction with the linear regression modeling better than the previous predictive models of the factors belonged to other categories.

When considering the R^2 values and the magnitude and statistical power of effects caused by all independent factors, the psychological background of the respondents was the more robust set of the independent variables that influenced privacy satisfaction than the other groups of variables.

8.5 Summary of Factors Affecting Sense of Community of High-rise Dwellers

In accordance with sense of community, the statistical outcomes defined the essential factors that significantly involved the diversity of sense of community of which consisted membership, influence, reinforcement, and emotional connection. The table below is the summary of all independent variables, which significantly affected the respondents' sense of community and its sub-categories: feelings of 1) membership, 2) influence, 3) reinforcement, 4) emotional connection.

Table 8.3 Summary of Statistical Effects of All Independent Variables on Dependent Variables, Sense of Community including Membership, Influence, Reinforcement, and Emotional Connection

Independent Variables	Sense of Community and Sub-variables				
	Sense of Community	Membership	Influence	Reinforcement	Emotional Connection
IV01: Environmental Factors	**Urban and Community Variables**				
1. Density of Population [Q]	✔	✔	✔	✔	✔
2. Land use Policy [C]	✔	✔	✔	✔	✔
3. Bangkok Municipal Zoning [C]	✔	✔	✔	✔	✔
IV01: Environmental Factors	**Architectural Variables**				
1. Height of Building [Q]					✔
3. Type of Property [C]	✔	✔		✔	✔
4. Level of Property [C]		✔		✔	
6. Defensible Score Bldg. [Q]	✔	✔		✔	
7. Privacy Supportive Score Bldg. [Q]				✔	
8. Communal Score Bldg. [Q]	✔				✔
IV02: Personal Factors	**Personal Attribute Variables**				
1. Gender [C]					✔
2. Age [Q]	✔	✔	✔	✔	✔
3. Stage of Life [C]	✔	✔	✔	✔	✔
4. Nationality [C]					✔
5. Religion [C]	✔			✔	✔
6. Marital Status [C]	✔	✔	✔	✔	
7. Parental Status [C]	✔	✔	✔	✔	
8. Education [C]	✔			✔	✔
9. Occupation [C]	✔			✔	✔
IV02: Personal Factors	**Dwelling Behavioural Variables**				
1. Length of Dwelling [Q]	✔	✔	✔	✔	✔
2. Tenure [C]	✔	✔	✔	✔	✔
3. Spending Time at Home [Q]	✔	✔	✔		✔
4. Number of Unit Member [Q]				✔	
5. Roommate [C]	✔			✔	
IV02: Personal Factors	**Psychological Background Variables**				
1. Health Condition [Q]	✔	✔	✔	✔	✔
2. Mental Health Condition [Q]	✔	✔	✔	✔	✔
3. Relationship with Neighbours [Q]	✔	✔	✔	✔	✔
5. Privacy Need [Q]	✔	✔	✔	✔	✔
6. Social Capital/ Participation [Q]	✔	✔	✔	✔	✔

✔ = Power of effect more than 0.8 (80% chance of detecting)
✔ = Power of effect less than 0.8 (80% chance of detecting)
[Q] = Quantitative Variable [C] = Categorical Variable

8.5.1 Urban and Community Factors Affecting Sense of Community of High-rise Dwellers

Regarding the results of statistical analysis, all factors of the urban and community category: 1) density of population, 2) land use policy, and 3) Bangkok municipal zoning, revealed their significant influences on the respondent's sense of community including its all sub-variables.

- Population density

In related to the simple linear regression results, the population density notably diminished the respondents' total sense of community and all of its sub-variables comprised the feeling of membership, reciprocal influence, community reinforcement, and emotional connection at p = .000 with R^2 of .043, p = .000 with R^2 of .028, p = .000 with R^2 of .024, and p = .000 with R^2 of .027 consecutively. The interpretation of the predictive equations was also coordinate in the same direction that the more density of population of the district at where the condominiums were located, the weaker sense of community including the feelings of membership, influence, reinforcement, and emotional connection of the residents were constantly predicted.

The above-mentioned results were consistent with several researches which have indicated that the disadvantageous urban life including size of the city, density, and heterogeneity of population could cause the overloads of people's cognitive functions, which leads to a withdrawal behaviour and taking less interest in the community. (Milgram, 1970) Remarkably, these small to medium-sized effects reached the maximum power of 100% chance of defecting. It was indicating that the effect of the population density alone effectively explained the high-rise residents' sense of community by the linear modeling function, based on this sampling group.

- Land use policy

The land use policy was another factor in the urban and community category that influenced the high-rise dwellers' average sense of community, feeling of membership, reciprocal influence, community reinforcement, and emotional connection at *p-value* equal 0.000, 0.002, 0.000, 0.000, and 0.001 respectively. The Post hoc test confirmed that the respondents who came from the medium-density residential neighbourhoods had the stronger sense of community (all aspects) than the respondents from the high-density residential areas. It could be considered that this result was endorsing the earlier conclusion that referred to the impediment of the density of population, both in the district and the community, on the residents' sense of community. As well, it could deter the strength of membership feeling amongst high-rise residents, reciprocal influence between neighbours, community reinforcement, and shared emotional connection between residents and their high-

rise community. Regarding the Cohen's effect size *f*, the small to medium-sized effects of land use policy on average sense of community, membership, influence, reinforcement, and shared emotional connection achieved the power of more than 98%, 90%, 95%, 97%, and 93% chance of detecting consecutively.

- City zoning

As mentioned in Section 8.1.3, it became clear that the sense of community of the respondents were deviated by the contexts of each urban zone of Bangkok. The dataset analysis also defined that together with the urban context, population density, age, length of stay, frequency of participating in social activities, density of dwelling units per floor, and the communal characteristic score of the building were considered as cofactors that driving the sense of community amongst high-rise dwellers from different zones as well. Regarding the effect size analysis, it appeared that the effect sizes of urban zoning of Bangkok on the participants' sense of community including membership, influence, reinforcement, emotional connection were in the range of small to medium-sized effect with the statistical power of 99% to 100% chance of detecting.

8.5.2 Architectural Factors Affecting Sense of Community of High-rise Dwellers

In related to the architectural features of high-rise building, the statistical analysis indicated six essential factors influencing the dwellers' sense of community as follows: 1) height of building, 2) type of property, 3) level of property, 4) defensible score of the building, 5) privacy supportive score of the building, 6) communal score of the building.

- Height of the building

The height of building was statistically confirmed to have a slight effect on the emotional connection amongst the respondents of this field survey. The results suggested that the respondents who were living in the taller building tended to have a greater emotional connection with their place significantly at $p = .047$, with R^2 of .003. However, with the power of less than 50%, this kind of effect could not be endorsed by this study. The trend of this effect indicated that the dwellers living in the taller building reported the higher feeling proud of their place. In related to the

field survey and the physical-environmental observation, most of the taller buildings participating in the study were the high-level condominiums with the well-maintained and well-designed environment. It could be assumed that the good image of the building could increase the positive feeling amongst their residents in some way.

- Type of property

The type of property was one of the categorical factors influencing the respondents' sense of community. The results suggested that the dwellers of the semi-gated compounds reported their stronger total sense of community including the feelings of membership, reinforcement, and emotional connection than the residents of gated compounds at *p-value* equal 0.001, 0.000, 0.011, and 0.001 respectively. As discussed earlier, there were arguments about the consequences of gated community broadly amongst urban scholars and professionals. The results of this research were statistically confirming the negative effect of the gated community on the high-rise residents in Bangkok. In the environment of gated condominiums, clearly, the residents showed their less feeling connected with their neighbours, less enjoyable to participate social event held by building, less feeling bound with their living compound than the semi-gated residents. When comparing the effect sizes of the gated/ non-gated environment on each independent variables, the results confirmed that the effects of this architectural determinant on the average sense of community, feeling of membership, and shared emotional connection achieved the acceptable power of 91%, 95%, and 91% chance of detecting. Meanwhile, its effect on the community reinforcement was still unconfirmed due to its lower than 80% chance of detecting (71%).

- Level of property

As discussed in the Section 8.2.3, the ANOVA calculation unveiled the variation of sense of community amongst the respondents living in the different levels of property. It also confirmed that the group of low selling price condominiums' residents significantly reported their greater sense of membership and community reinforcement than those who were living in high-level condominiums at *p-value* equal to 0.024 and 0.009 consecutively. The result of the dataset analysis led to the additional presumption that besides the physical

environment of condominiums, length of stay, household income/ month, the quality of relationship with neighbours, and the level of introvert personality could be the co-factors that drove the variation of sense of community amongst the residents. It is necessary noting that the effect sizes of the level of property on the feeling of membership and community reinforcement were considered as small-sized effects and remained unconfirmed because of their power of detecting (68% and 79%) lower than 80%.

- Defensible characteristic score of building

The defensible characteristics of the building was also statistically proved to have significant effects on the respondents' sense of community including feeling of membership and community reinforcement at p = .014, R^2 of .005 with the power of 70% detecting chance, p = .001, R^2 = .009 with the power of 91% detecting chance, and p = .006, R^2 = .006 with the power of 77% detecting chance consecutively. Regarding the results as mentioned above, this study could confirm only the effect of the defensible characteristic score of the building on the feeling of membership, whereas, the other models were trivial and disaffirmed.

Regarding the model interpretation, it appeared that the defensible features of the building had an adverse effect on the residents' feeling of membership. The SLR equation explained that the more score of defensible characteristics by which building earned, the less membership feeling of the residents was predicted. Regarding the PE assessment, the rigorous access control, providing surveillance throughout the compound, and clear boundary and gated territoriality that separated insiders from the outside environment could discourage the social interaction amongst the residents as well as between residents and non-residents. This situation might cause the decrease of membership feeling, reinforcement, and affect the sense of community amongst the residents as a consequence.

- Privacy supportive characteristic score of building

Meanwhile, the privacy supportive character of the building revealed its negative effect on the respondents' community reinforcement at p = .031, R^2 = .004 with the power of 60% detecting chance for small-sized effect which was considered unconfirmed by this study. Regardless of effect size, the trend of this effect

suggested that the respondents' feeling of reinforcement decreased relatively with an increase of the privacy supportive score by which the building earned. These characters referred to 1) the fewer number of units per floor, 2) the fewer number of occupants per unit, and 3) the typical floor plan of each condominium (the non-corridor/ atrium layout was given the highest score as the most beneficial to support privacy of the residents followed by single-loaded corridor, and double-loaded corridor respectively).

- Communal characteristics

From the statistical analysis, the communal characters of the building was proved to have the positive effects on the total sense of community and emotional connection amongst the respondents at p = .034 with R^2 of .004, and p = .005 with R^2 of .006 consecutively. However, it is important noting that the two effects earned extremely subtle predictability along with their statistical powers 60% and 77%, which were lower than 80% chance of detecting as required. In consequence, it was still unconfirmed to identify these effects in the entire population.

Regardless of effect size, the trend of models suggested that the higher score of communal characteristics earned by building, the stronger sense of community and emotional connection with the place amongst the residents were predicted. In more detail, providing more various facilities for the residents, sharing recreational facilities with the non-residents, and designing the layout plan of these facilities to be more exposed and accessible were the factors that could encourage the social interaction amongst people as well as improve their sense of community as a consequence.

8.5.3 Personal Factors Affecting Sense of Community of High-rise Dwellers

As shown in Table 8.3, the statistical analysis extracted nine personal attributes that affected the sense of community of the respondents as follows: 1) gender, 2) age, 3) lifespan, 4) nationality, 5) religion, 6) marital status, 7) parental status, 8) education, and 9) occupation.

- Gender

According to the t-test result, gender of the residents had a significant effect on their emotional connection with the living place. It suggested that the female respondents reported their stronger emotional connection than male *p-value* = .045. Based on the PEP questionnaire, the female dwellers reported their stronger displeasure in supposing that someone criticises or defames their buildings. However, with the power of 50% detecting chance, this effect could not be confirmed by this analysis.

In addition, it appeared that the female group of respondents in this field survey significantly had a pro-social behaviour more than male respondents. They significantly reported participating in social activities and engaging social capital more often than male respondents at p = .000, for example, donating for charity, sharing stuffs with neighbours, joining events organized by their buildings, and etc. When considering the effects of gender and lifespan together, it appeared that amongst the later adulthood (61 year-old and older) respondents, female reported their better relationship with neighbours (p = .022) and stronger sense of community reinforcement than male (p = .028).

- Age

Meanwhile, age of the respondents statistically affected their total sense of community and its all sub-variables: sense of membership, reciprocal influence, community reinforcement, and emotional connection with community at p = .000, with R^2 of .012, p = .000 with R^2 of .012, p = .002, with R^2 of .008, p = .013, with R^2 of .005, and p = .001, with R^2 of .009 consecutively. The linear regression models suggested that the average sense of community, membership, reciprocal influence, reinforcement, and emotional connection of the respondents arose relatively to the age of the respondents with the power of detecting 97%, 97%, 80%, 70%, and 91% consecutively. Regarding the Cohen's effect size (f^2), the effect of age on the respondents' community reinforcement was considered unconfirmed by this study due to the statistical power lower than 80%.

The results of all effects could be interpreted in the same way that the older residents were, the greater sense of community they had.

- Stage of life

Considering the lifespan of the respondents, the results came out in the same direction that the group of younger respondents especially later adolescence (19-24 years old) and early adolescence (13-18 years old) showed less sense of community than other groups significantly. Regarding the Cohen's coventional standard, the effect sizes of respondents' lifespan on average sense of community, membership, influence, reinforcement, and emotional connection were in the small to medium-sized range with the power of 98%, 94%, 82%, 97%, and 94% detecting chance respectively.

- Nationality

The nationality of the residents was another personal attribute that influenced the residents' emotional connection. The t-test suggested that the group of foreign dwellers obviously had a lower emotional connection to the community than the group of Thai dwellers significantly at *p-value* = .000. When comparing the effect sizes of nationality on sense of community issues, it appeared that the nationality produced a small to medium-sized effect on the emotional connection with the power of 96%. According to the dataset and observation, most of the foreign residents were expatriates and could not speak Thai language. This kind of communication barrier was presumed to expand the distance between occupants and neighbours then deter their feeling bound with community as a consequence.

- Religion

The statistical analysis revealed the effects of religion on the respondents' total sense of community including community reinforcement, and emotional connection at *p-value* equal 0.030, 0.039, and 0.007. The Post hoc test confirmed that the group of Buddhism respondents, which was the majority of respondents and entire Thai population, reported their greater sense of community, membership, community reinforcement, and emotional connection the group of non-religious respondents. Regarding the Cohen's *f*, the effect sizes of respondents' religion on their average sense of community and reinforcement were unable to be endorsed due to their statistical power of 75% and 72% which were lower than 80%, whereas, the small-sized effect of religion on the respondents' emotional connection was confirmed with the power of 86% detecting chance.

- Marital status

It is noteworthy that despite the p-value < 0.05, the effect size and power of the marital status on the average sense of community including feeling of membership, reciprocal influence, and community reinforcement were considered as the unconfirmed small-sized effects with the power less than 80% (77%, 69%, 64%, and 79%). The Post hoc test revealed that the group of married respondents self-reported their stronger sense of community including its sub-variables than the group of bachelors at *p-value* equal to 0.012, 0.024, 0.033, and 0.008 consecutively.

- Parental status

In the meantime, the parental status of the respondents was also found affecting their sense of community significantly. The results of t-test indicated that the group of residents having child/ children self-reported their stronger sense of community including feeling of membership, reciprocal influence, and community reinforcement than the group of respondents having no child at *p-value* equal to 0.001, 0.017, 0.003, and 0.000 consecutively. The effects' size of the parental status on sense of community, influence, and reinforcement were small to medium-sized effects with the power of 91%, 85%, and 97% detecting chance respectively, whereas, the effect of parental status on membership was a small-sized effect with 66% power of detecting which could not be confirmed by this study.

- Education

Although the effects of the educational level on the respondents' sense of community was detected at p-value < 0.05, the statistical power of these results were considered as small-sized effects with the power of detecting chance lower than 80% which could not be confirmed by this study. To review the direction of these influences, the result Post hoc test was considered. It indicated that the group of bachelor degree respondents had the lowest average sense of community than the other two groups at *p-value* = .031. Also, the group of bachelor degree respondents showed their less community reinforcement than the lower-bachelor respondents as well as their emotional connection was greater than the higher-bachelor respondents at *p-value* = .039 and *p-value* = .032 consecutively.

- Occupation

The occupation of the respondents also affected their sense of community. The statistical analysis confirmed that the group of retired and housewife respondents reported their stronger sense of community, community reinforcement, and emotional connection than the group of private company's employees at *p-value* equal 0.017, 0.034, and 0 .009 consecutively. It became clear that the groups of retired and housewife residents were spending more time at home more than other groups and earn more chances to socially interact with neighbours. The effect of occupational factor on the sense of community and emotional connection of the respondents were in the small to medium-sized range with the power of 84% and 88% detecting chance, whereas, its effect on reinforcement feeling was small size with the detecting chance of 77% and was unconfirmed.

8.5.4 Dwelling Behaviour Factors Affecting Sense of Community of High-rise Dwellers

In related to the behavioural issue of the respondents, the statistical analysis identified five essential factors as follows: 1) length of dwelling, 2) tenure, 3) spending time at home, 4) number of unit member, and 5) roommate.

- Length of dwelling

As reported in Section 6.3.4, Chapter 6, the length of stay was one of the dwelling behavioural factors that significantly affected the respondents' sense of community. The findings of SLR defined that the longer period of dwelling, the stronger sense of community including feeling of membership, reciprocal influence, community reinforcement, and emotional connection were predicted at p = .000 with R^2= .014, p = .000 with R^2= .012, p = .014 with R^2= .005, p = .001 with R^2= .009, and p = .000 with R^2= .014 consecutively. According to the Cohen's f^2, the magnitude of these effects were considered as small-sized effects with the power of 99%, 97%, 70%, 91%, and 99% detecting chance respectively. Based on the Cohen's f^2 and power, this study then could not confirmed the effect of the length of dwelling on the respondent's reciprocal influence.

Congruously, the findings of the field survey statistically supported the theoretical concept that the length of residency was one of the keys that could assist the residents to characterised themselves and their own community (Edwards, 2008) likewise in the residential high-rise environment.

- Tenure

As well, the ownership of the occupants was another dwelling factor that influenced their sense of community. The ANOVA and Post hoc test confirmed that the group of owner-occupants showed their stronger sense of community including feeling of membership, reciprocal influence, community reinforcement, and emotional connection than the groups of tenants and guest significantly at *p*-value equal 0.020, 0.005, 0.004, 0.040, and 0.039 consecutively. It is also important noting that these small-sized effects on the average sense of community and the feeling of membership were confirmed with the power of more than 85% chance of detecting, whereas, its effects on the influence, reinforcement, and emotional connection got the statistical power less than 80% chance of detecting. As discussed earlier, the tenure also influenced the privacy satisfaction of the respondents. Based on this issue, it is clear that the respondents who considered themselves as the owners of the dwelling unit seemed to have more commitment with the property than the group of tenants and guests since they decided to invest in the condominiums and intended to called them as “home”, whereas, the group of tenants and guest mostly had a temporary intention to stay. Amongst the high-rise residents, this might be a motivation that drove their enthusiasm of participating and to trying to reach out to neighbours in order to settle themselves in the community.

- Spending time at home

By means of the simple linear regression analysis, spending time at home of the high-rise occupants significantly dominated their sense of community significantly. The results confirmed that the residents’ total sense of community, feeling of membership, reciprocal influence, and emotional connection arose relatively with an ascent of their spending time at home at p = .001 with R^2= .010, p = .001 with R^2= .009, p = .001 with R^2= .007, and p = .003 with R^2= .009 respectively. These small-sized effects received the statistical power of 94%, 91%, 83%, and 91% chance of detecting respectively. Based on this result, it could be interpreted that

spending more at home could allow the occupants to observe, perceive, and identify their own community. The beneficial time spending at home could breed familiarity with their home environment as well as create more chance to socially interact with neighbours.

- Number of unit's members

Meanwhile, the number of unit's members also had a positive influence on the respondents' community reinforcement. The equation suggested that the more number of unit's members, the stronger feeling of reinforcement was predicted at p = .005, with R^2 of .007 and the power of 83% detecting chance for small-sized effect. From the PEP questionnaire, reinforcement or need fulfilment referred to a mental fulfillment and an obtaining helps from their neighbours. The results of the field survey led to the assumption that in the high-rise environment, living with more roommates could strengthen the positive attitude towards neighbours and community. Having more support from unit's members also influenced the willingness of the residents to participate the community's events and be more helpful to each other.

- Type of roommate

In related to the issue of dwelling unit's members, type of roommate also sustained the strength of sense of community amongst the residents as well. The ANOVA and Post hoc test statistically confirmed that the group of respondents who were living with family member self-reported their stronger sense of community and feeling of reinforcement than the other groups at *p-value* equal 0.017, and 0 .009 respectively. From the PEP questionnaire, it became clear that these respondents had more feeling that their neighbours were kind and helpful, and they felt happier to participate the community events. Regarding the Cohen's magnitude of effect size criterion, the effect size of type of roommate on the average of sense of community and reinforcement were considered as the small to medium-sized effects with the power of 81% and 92% chance of detecting.

8.5.5 Psychological Background Factors Affecting Sense of Community of High-rise Dwellers

In regard to the statistical analysis, the findings identified five psychological determinants that significantly involved the variation of the respondents' sense of community as follows: 1) health condition, 2) mental health condition, 3) relationship with neighbours, 4) privacy need, and 5) social capital and participation. Notably, the only psychological factor that had no statistical impact on sense of community was the respondents' experience of threats.

- Health condition

Referring to the health condition, the simple linear regression findings suggested that the better score of physical health by which respondents assessed themselves, the stronger sense of community encompassing feeling of membership, reciprocal influence, community reinforcement, and emotional connection were predicted at p = .000, with R^2 = .046, p = .000, with R^2 = .039, p = .000, with R^2 = .020, p = .000, with R^2 = .028, and p = .000, with R^2 = .047 respectively. All of these effects reached the maximum power of 100% chance of detecting the small to medium-sized effect. The result implied that the connectedness between physical health and all pillars under sense of community category existed. The respondents' self-report being healthier after moving into the building was reflecting their physical security and equality. Without physical inferiority, they would be more courageous to interact with neighbours, to participate, to grow their feeling of membership, to recognise their influence on community, to reinforce and to be reinforced by community, and to share emotional connection with neighbours as a consequence.

- Mental health condition

In sync with the physical health, the significant effects of mental health score went in the same direction. It proved out that the greater score of mental health by which the respondents self-reported, their stronger sense of community including feeling of membership, reciprocal influence, community reinforcement, and emotional connection were predicted at p = .000, with R^2 = .059, p = .000, with R^2 = .044, p = .000, with R^2 = .017, p = .000, with R^2 = .038, and p = .000, with R^2 = .077 respectively. Similar to the physical health, all of these mental effects reached the maximum power of 100% chance of detecting the small to medium-sized effect.

These regression effects were implying that the mentally healthier assessment after moving into the property was an echo of the emotional security and the positive attitude towards their home environment encompassing neighbours and community structure. As a consequence, the sense of community of these respondents was greater than those who reported their worse mental health after moving-in.

- Relationship with neighbours

The relationship with neighbours clearly revealed its positive effect on the respondents' sense of community as well. The findings suggested that the greater score of relationship with neighbours, the stronger sense of community, feeling of membership, reciprocal influence, community reinforcement, and emotional connection were predicted at p = .000, with R^2 = .081, p = .000, with R^2 = .073, p = .000, with R^2 = .051, p = .000, with R^2 = .072, and p = .000, with R^2 = .036 respectively. All of these effects achieved the maximum power of 100% chance of detecting the small to medium-sized effect. These results were compatible with the theoretical concept and previous psychological research of which the relationship with neighbours was defined as a relevant indicator generating positive outcomes for the residents and community. (Manzo and Perkins, 2006)

- Privacy need

The privacy need score was one of the psychological determinants related to the variation of the respondents' sense of community negatively. The multiple linear regression result defined that the total sense of community of the dwellers was significantly restrained by a stronger degree of their reserved, anonymous, and solitude personality combined together at p = .000, with R^2 = 0.087. As well, the respondents' feeling of membership, community reinforcement, and emotional connection also dropped relatively with an ascent of these three types of introvert personality at p = .000, with R^2 = 0.054, p = .000, with R^2 = 0.091, and p = .000, with R^2 = 0.051 respectively. Meanwhile, the feeling related to the reciprocal influence amongst high-rise dwellers was retained relatively with the intensity of their reserved and solitude personality score at p = .000, with R^2 = 0.057. The consonance of statistical outcomes substantiated the psychological mechanism of cultivating sense of community, which was based on the social interaction. It confirmed that the sense of community of the high-rise residents became weakened when people

tended to be more individualised and introvert person, and lack of willingness to invest or participate in their communal activities. Moreover, these effects also earned the maximum power of 100% chance of detecting the small to medium-sized effect.

- Social capital and participation

Comparing the magnitude and power of effect plus the R^2 of the predictive equations led to a notable outcome that the social capital and participation seemed to be the better linear explanatory factor for the high-rise dwellers' sense of community than other factors in the previous categories. The multiple linear regression equations defined that the total sense of community, which included all four sub-variables: feeling of membership, reciprocal influence, community reinforcement, and emotional connection of the respondents, ascended relatively with their frequency of sharing and volunteering behaviours at p = .000, with R^2 = .112, p = .000, with R^2 = .069, p = .000, with R^2 = .086, p = .000, with R^2 = .095, and p = .000, with R^2 = .069 respectively. Likewise, these effects also owned the maximum power of 100% chance of detecting the small to medium-sized effect amongst this sampling group. This result was accordant with the theoretical concept and previous research, which proposed the intertwining between social investment/ social capital and sense of community of people. Indistinguishable from the safety concern and privacy satisfaction, the respondents' sense of community was more predictable by the factors related to their psychological background.

8.6 Interdependence of Safety Concern, Privacy Satisfaction, and Sense of Community amongst High-rise Dwellers

To begin with, the Structural Equation Modeling (SEM) was administered to statistically verify the analytical pattern of the interdependence of three psychological-dependent variables of this research: 1) safety concern, 2) privacy satisfaction, and 3) sense of community. During the process of Confirmatory Factor Analysis (CFA), of which a part of SEM verification, there were four psychological question items that needed to be abandoned from the equation due to their low loading factors. The two of abandoned items were adapted from the theoretical indicators of social/ interactional privacy, according to the four types of privacy

proposed by Burgoon in 1982. The low loading factors of these two items implied that in the context of high-rise housing represented by this sampling group, the social or interactional privacy was unique and disassociated with the other types of privacy comprising psychological privacy, informational privacy, and physical privacy. Regarding the high-rise housing environment, these three types of privacy could be maintained inside the dwelling units.

Meanwhile, the social or interactional privacy was different because it was an intimate need to control the privacy for one particular group of people. In some situations, family members could be included in such intimacy group. On the other hand, if one wanted to have a conversation with friends from work, his/ her family member could be considered as an outsider from this social group. (Burgoon, Parrott, et al., 1989) To achieve this type of privacy, the common areas of high-rise housing were the useful facilities in assisting the residence to flexibly manipulate this need of intimacy. The mentioned behavioural conflict was also assumed as the reason why the social privacy earned the low loading factors than other types of privacy in this study.

The other two abandoned question items were the items involving the feeling of membership and shared emotional connection. It appeared that asking the respondents how much do they feel being members of their building as well as how much do they feel bound with the place and hope to live there as long as they can were not associated with other question items to determine dwellers' sense of community. The divergent answers of these two questions informed us that being member of the building evidently might be unnecessary to them. Whereas, hoping to live in the current buildings as long as they could, perhaps depended more on other motivations, such as future goals, reason of moving-in, etc.

Based on the final CFA, the SEM was further developed to extract the pattern of statistical interdependence between safety concern, privacy satisfaction, and sense of community. The structural model statistically confirmed the existence of the interrelations between these three psychological variables as stated in the model assumption and the conceptual model at the beginning of the study. As described in Chapter 7, the hypothesis of this research that defined the interrelationships between three psychological dependent variables was statistically

accepted. There were two structural models constructed during the analytical process to confirm the existence of these interrelationships.

1. The non-recursive model:

Although the initial model was a non-recursive system, which produced an infinite cycling of effects for reciprocal paths including negative R^2 (Hayduk, 2006, Arbuckle, 2011) this particular model achieved a Good Fitness Indices (GFI = .963, CFI = .976, AGFI = .950, Chi Sq./df = 2.910, RMSEA = .040, P-Close = 1.000, P-value ≤ .001). Regardless of the regression weights' estimation of the reciprocal paths in this model, the interrelationships appeared in the model were considerably existent amongst the respondents in this field survey. The reciprocal paths proposed in this model were more close to the psychological mechanism ideation presumed at the beginning of the research, and hence they were worth further study.

2. The final standardised estimated model:

This model was composed based on the pattern of simple recursive structure, which meant the model did not contain any reciprocal paths. The estimations of this model were globally acceptable and verified (GFI = .967, CFI = .980, AGFI = .955, Chi Sq./df = 2.646, RMSEA = .037, P-Close = 1.000, P-value ≤ .001). Regarding this results, an inconsistent mediation relationship was revealed. (MacKinnon, Fairchild, et al., 2007) It suggested that safety concern (exogenous variable) had a direct effect on privacy satisfaction (endogenous variable), whereas, the sense of community acted as the mediator variable in this model. Focusing on the direct effect of safety concern on privacy satisfaction indicated that the escalation of safety concern amongst high-rise dwellers in Bangkok could diminish their satisfaction of privacy significantly. Meanwhile, despite the fact that sense of community was degraded by the increase of safety concern, the high-rise dwellers with the greater sense of community were more satisfied with their privacy while living high-rise housing.

8.7 Proposed Principal Components of High-rise Housing Supporting the Psychological Well-being in the Context of Urban Bangkok

In order to explore and scrutinise the pattern of the environmental psychological structure as defined in the theoretical model of the research, the inclusive model described in Section 7.4 was composed. (See Figure 7.9) This structural equation model was further administered based on the final standardised estimated model proposed in the previous section. Additionally, more six independent variables were inputted: 1) defensible characteristic score of the building, 2) privacy supportive characteristic score of the building, 3) communal characteristic score of the building, 4) the respondents' experience of threats score, 5) the respondents' privacy need score, and 6) the respondents' social capital and participation score. These variables were representing the environmental indicators and the personal indicators particularly constituted for this research. As a results, this conclusive structural model achieved Goodness of Fit indices at GFI = .957, CFI = .967, AGFI = .945, Chi Sq./df = 2.575, RMSEA = .036, P-Close = 1.000, and P-value ≤ .001, which statistically confirmed the dwellers' psychological mechanism related to the high-rise housing environment in context of urban Bangkok. In accordance with the inclusive model, the external effects of environmental factors and personal-psychological factors proposed in this research were statistically affirmative as well as the internal effects between safety concern, privacy satisfaction, and sense of community.

To be aware of the limitations of recursive structural modelling, in parallel, the multiple linear regression analyses (MLR: Stepwise method) were also performed to help specify the final set of the predominant variables (quantitative variables only), which considerably enhanced the psychological wellbeing of high-rise dwellers in Bangkok, particularly involved psychological safety, privacy satisfaction, and sense of community. The conclusive diagram below is demonstrating all quantitative variables appeared to have significant effects on the dependent variables suggested by both SEM and MLR processes. (See Figure 8.18)

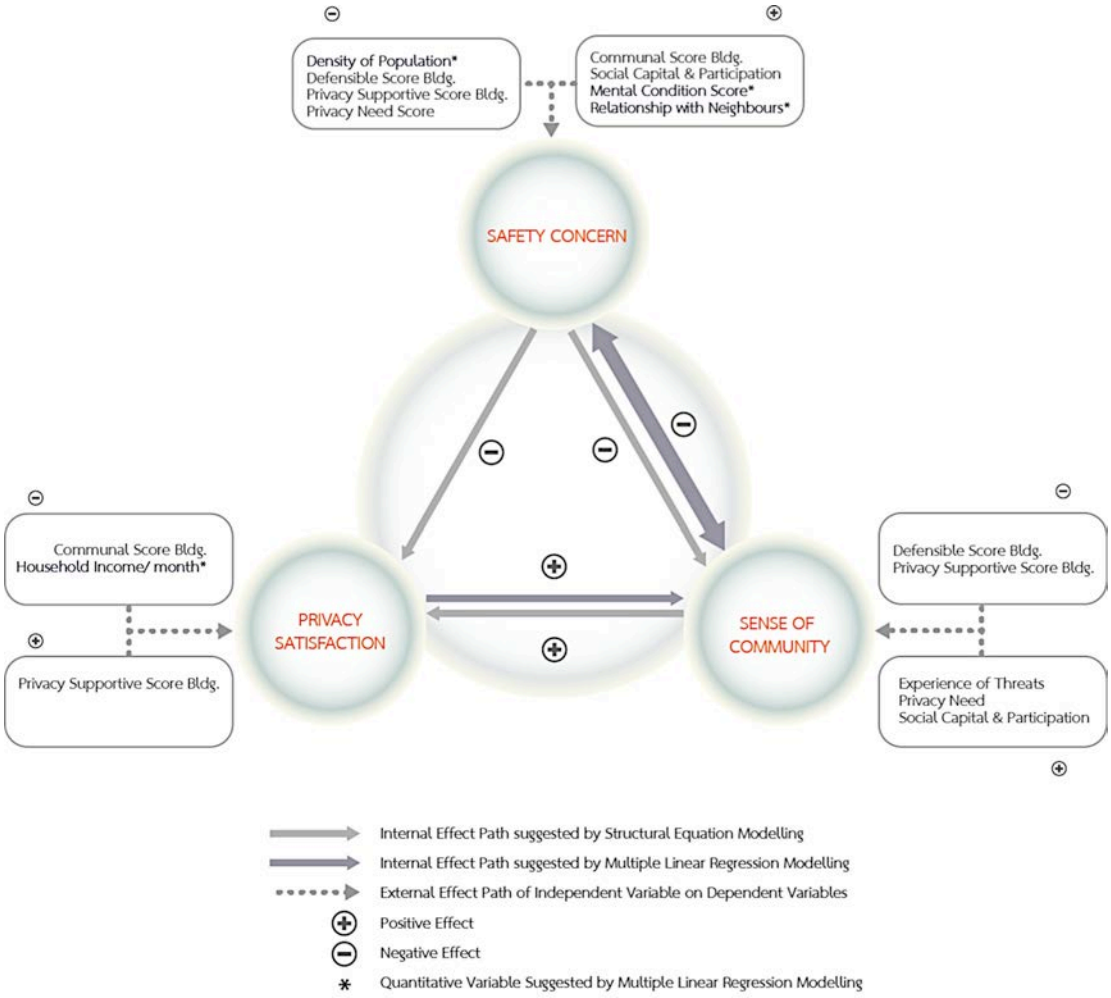


Figure 8.18 The conclusive diagram of environmental psychological constructs for high-rise dwellers in urban context of Bangkok

Based on the results of the SEM and MLR calculation, there were more reciprocal effect paths added into the constructs diagram, namely, 1) the positive effect path from the privacy satisfaction to the sense of community, and 2) the negative reciprocal effect paths from the sense of community to the safety concern. Moreover, the four more independent variables significantly proved their capacity to predict the psychological dependent variables as follows: 1) population density by district, 2) mental condition score, 3) relationship with neighbours score, and 4) household income per month. The conclusive diagram additionally suggested the effects that could compare to reciprocal relationships between the three psychological variables, which could not be found in the SEM. This finding made the

conclusion of the study more encompassing and close to the initial assumptions of the research.

8.7.1 Proposed principal components for psychological safety improvement

According to the conclusive model and multiple linear regression analysis, the quantitative variables defined to have major effects on safety concern are as follows:

- Environmental Factors
  1) Defensible characteristic score of the building
  2) Privacy supportive characteristic score of the building
- Personal Psychological Factors
  1) Experience of threats score of the dweller
  2) Privacy need score of the dweller
  3) Social capital and participation score of the dweller
  4) Average sense of community score

To predict the trend of safety concern amongst the population group of high-rise dwellers in Bangkok based on the concept of linear model, the predictive equations below could be implemented. The equation was confirmed at $F(6, 1104)= 7.835$, $p = .000$, with an R^2 of 0.04 as described below:

Safety Concern = 3.052 + (.035)(Exp. of threats) + (.031) (Privacy Need) + (-.149) (Privacy score Bldg.) + (.014) (Social Capital) + (-.124) (Avr. Sense of Comm.) + (-.094) (Defense score Bldg.)

8.7.2 Proposed principal components for privacy satisfaction improvement

Regarding the conclusive model and multiple linear regression analysis, the quantitative variables identified to have major effects on privacy satisfaction are as follows:

- Environmental Factors
  1) Privacy supportive characteristic score of the building

2) Communal characteristic score of the building

- Personal Psychological Factors
  1) Average sense of community score
  2) Average safety concern score
- Personal Attributes Factors
  1) Household income per month

To predict the trend of privacy satisfaction amongst the population group of high-rise dwellers in Bangkok based on the concept of linear model, the predictive equations below could be implemented. The equation was confirmed at at $F(4, 908)= 22.291$, $p = .000$, with an R^2 of 0.1 as described below:

Privacy Satisfaction = 2.786 + (.227) (Avr. Sense of Comm.) + (.140) (Privacy score Bldg.) + (-.055) (Communal score Bldg.) + (-1.359E-07) (House income/mth.)

8.7.3 Proposed principal components for sense of community improvement

The conclusive model and multiple linear regression analysis indicated the following quantitative variables, which were confirmed to have major effects on sense of community as follows:

- Urban and Community Factors
  1) Population density of the district
- Environmental Factors
  1) Defensible characteristic score of the building
  2) Privacy supportive characteristic score of the building
  3) Communal characteristic score of the building
- Personal Psychological Factors
  1) Mental health condition score of the dweller
  2) Relationship with neighbours score of the dweller
  3) Privacy need score of the dweller
  4) Social capital and participation score of the dweller
  5) Average sense of community score

6) Average privacy satisfaction

To predict the trend of sense of community amongst the population group of high-rise dwellers in Bangkok based on the concept of linear model, the predictive equations below could be implemented. The equation was confirmed at $F(10, 1191) = 49.505$, $p = .000$, with an R^2 of 0.3 as described below:

Sense of Community = 2.390 + (.023) (Social Capital) + (.253) (Avr. Privacy Stfn.) + (.09) (Relation Nghbr. Score) + (-3.324E-05) (Pop Dens.) + (-.033) (Privacy Need) + (.086) (Mental Condition) + (.039) (Communal score Bldg.) + (-.063) (Defense score Bldg.) + (-.043) (Avr. Safety Concern) + (-.062) (Privacy score Bldg.)

On the condition that the observed data needs to be measured by the PE assessment and the PEP questionnaire, the above-mentioned predictive equations could forecast the trend of these psychological variables by replacing the values of each indicator into the equations. Noteworthy, they could explain the variation of safety concern, privacy satisfaction, and sense of community, based on a linear model at 4% (R^2 = 0.04), 10% (R^2 = 0.1), and 30% (R^2 = 0.3) consecutively. In the field of social sciences, such as behavioural and psychological research, the capacity of explanation was regularly found lower than 50% due to the fact that humans were simply harder to predict than the experimental objects in pure sciences. "Regardless of the R^2, the significant coefficients still represented the mean change in response for one unit of change in the predictor while holding other predictors in the model constant". (Frost, 2013)

As described in Section 7.5.4, Chapter 7, the Cohen's magnitude and power of effect size also solidified the results of these MLR models. The last three MLR models received much larger effect size and stronger statistical power than the single effect analysis performed in Chapter 6. The MLR model for predicting the safety concern contained five predictors as mentioned earlier earned a small to medium-sized effect and the maximum power of 100% chance of detecting. As well, the MLR model for the privacy satisfaction, which consisted of four predictors, received a small to medium-sized effect and the maximum power of 100% chance of detecting.

Meanwhile, the MLR model for predicting the sense of community, which comprised ten predictors, achieved an extra large effect size f^2 = 0.416 which was more than 0.35 as defined by the Cohen's criteria with the maximum power of 100% chance of detecting. To conclude, it is explicit that these three multiple linear regression models extracted from this fields survey are extremely valuable for taking into account the further implementation.

CHAPTER 9
CONCLUSIONS AND RECOMMENDATIONS

Chapter Summary

The principal purposes of this chapter are to conclude and comprehend the findings of the research and to provide a generalisable application for multi-disciplinary stakeholders. In this last chapter, the conclusion of the results and the foreseen recommendations are addressed in the first section, whereas, the scholastic contribution and the value added of the research on housing development are placed in Section 9.2. As well, the holistic implementation is proposed in the policy recommendations described in Section 9.3. Eventually, the last two sections contribute to the limitations of the study and the suggestion for the future research involving the context of the urbanites and high-rise housing.

9.1 Conclusions and Recommendations

The basic axiom that defined an urban area as a human settlement is a clear illustration of a territory constituted by human and their built environment in which a high-rise housing is included. The standpoint of this research is established on the belief that the sustainable urban and housing development underpinned by profoundly understanding of human beings, the smallest unit of society, as well as their psychological and behavioural responses to the urban environment.

This study attempts to point out the importance of the true cognisance of the mental status of the heterogeneous residents related to the high-rise housing environment where the unique architectural characteristics and the physical limitations are combined. Nonetheless, its rapid growth has not seemed to slow down. As stated at the beginning of the research, it is decisively crucial to examine the psychological wellbeing of Thai high-rise housing inhabitants, especially in Bangkok Metropolitan area, where the condominiums have been sharing the largest

proportion of housing market for almost decades. On the basis of the relevant literature, theoretical concepts, and previous empirical research, the psychological fundamental for high-rise residents were constituted and defined as the research framework. The three psychological dependent variables spotlighted in this study are 1) safety concern, 2) privacy satisfaction, and 3) sense of community. As previously identified, the primary objectives of this study are 1) to explore these three psychological senses of home amongst the dwellers of high-rise buildings located in Bangkok Metropolitan area, 2) to analyse the significant influences of the two essential independent variables, which are personal factors and environmental factors, and 3) to assess the accuracy of the environmental psychological assessment implemented in this research and affirm the statistical interrelationships between these three psychological domains.

In order to achieve these research goals, this cross-sectional field survey was conducted based on the quantitative approach during the year 2015 to 2016 in Bangkok Metropolitan area, Thailand. The multi-stage sampling technique was applied for selecting 1,206 participants living in eighteen high-rises located in six different zones of Bangkok. The multi-stages comprised 1) a cluster sampling technique, 2) a purposive sampling technique, and 3) a random sampling technique. During the field survey, the two interdisciplinary instruments were applied: Physical-Environmental Assessment (PE) and Personal, and Environmental Psychological Questionnaire (PEP).

After conducting the field survey, the data analysis methods implemented in this research served their best to answer the two most important research questions, which are

1) “How are the three psychological fundamentals, namely 1) safety concern, 2) privacy satisfaction, and 3) sense of community amongst high-rise dwellers in Bangkok urban area significantly affected by the physical environmental factors composed of urban and architectural context, and the personal factors consisting of personal attributes, and personal psychological background?”
2) “How are the safety concern, privacy satisfaction, and sense of community associated with each other?”

The results of data analysis are concluded in four different topics as follows:

9.1.1 The Variation of Urban Psychology: A Holistic View through Bangkok High-rise Inhabitants

In accordance with the research framework, safety concern, privacy satisfaction, and sense of community are the three psychological domains, which were observed. The field survey outcome confirmed the distinct level of these psychological pillars amongst high-rise residents from the six different zones of Bangkok significantly.

As discussed in the previous chapters, the high-rise dwellers from the western side of Bangkok, known as Thonburee, where was a newly urbanised area, notably showed a greater concern about safety than the dwellers from the eastern side of the city particularly the issues of behavioural disorder and emergency embarkation. Unsurprisingly, this empirical result implied that these dwellers were perceiving, cognising, and reflecting their vulnerability to safety including the remoteness from life-saving infrastructures, mass transportation, and emergency assistance of their habitats.

Remarkably, the weakest sense of community amongst this sampling group was reported by the high-rise dwellers from the Central Bangkok area well known as the central business district of the country. As discussed earlier, this phenomenon integrated the demographic pattern pointed out that the competitive lifestyle and the densification and restless environment had abducted their vitality and positive attitude from them. The data analysis was also confirmed their least frequency of social participation, youngest average age, and shortest length of dwelling than other zones significantly. These were hinting the temporary intention of dwelling encompassing the unbounded sensation to their community.

The density of population had played an important role to explain the variation of urban psychology in this study. In congruence with the previous urban research and literature, the result of this survey confirmed the population density as one of the urban indicators influencing the high-rise residents' mental status. Statistically, the population densification was urging the level of concern about safety, whereas, deterring the positive sense of community of high-rise residents

participating in this study. Correspondingly, the medium-density residential neighbourhood motivates a greater sense of community amongst the residents than the high-density residential surroundings.

The results of Bangkok urban psychology exposed through the sampling group of the high-rise dwellers was an added value for the stakeholders of Bangkok housing industry. It is clear that amongst the extreme diversity of this metropolis, each neighbourhood has been sharing a common ground of mindset distinctively. Each community has their own unique requirement, worry, pleasance, as well as the connectedness to their living place, which is worth to examine. In order to construct the better high-rise housing projects in particular zones of Bangkok, the environmental psychological research-based approach is a stable bedrock to be built on.

9.1.2 The Recommended Predictors of Psychological Status for High-rise Dwellers: Physical-Environmental Factors

Besides the above-mentioned urban factors, the variation of psychological status of the high-rise dwellers was influenced by the architectural determinants. The statistical analysis revealed that the architectural features of high-level condominiums did not contribute to the residents' sense of community in the way that most of the people might imagine. To the contrary, some architectural features of these expensive towers, for example, gated characteristic, were excluding their residents from the outside environment and embedding fear and discriminating feeling between insider and outsider. The greater concern about crime and safety amongst the residents from gated-compound were statistically exposed.

It was also remarkable that the sense of community was more flourishing amongst the residents of low-level condominiums than others. While the privacy satisfactions of the residents from low, middle, and high-level condominiums were not statistically different. Thus, instead of judging the quality of condominiums by their economic level alone, this research proposes to focus more on their physical features and managerial approach which potentially improve the psychological well-being of the residents.

As mentioned in the previous chapter, the environmental physical indicators implemented in this particular survey were composed based on the

multidisciplinary theoretical concept integrated with the domestic context of condominiums in Bangkok and the agreement with the buildings' juristic committees. The following architectural determinants recommended for bettering the high-rise housing design and planning are as follows:

1. Defensible Characteristics

The defensible features that were measured by the PE assessment consist of 1) access control, 2) territoriality, 3) surveillance, and 4) milieu and juxtaposition. The sub-indicators of these topics can be seen in more detail in Chapter 5. The defensible characteristics of the condominiums statistically proved its potential of suppressing the concern about safety, crime, and emergency. On the other hand, it is also significant that these characteristics also have a capacity to reduce the sense of community encompassing the feeling of membership and community reinforcement amongst the residents. To employ these architectural components, a balancing and a clear directional housing policy are required.

2. Privacy Supportive Characteristics

The privacy supportive features contained in the PE survey are 1) number of units per floor, 2) typical floor plan, and 3) number of occupant(s) per unit. The detail of a scoring system was described in Chapter 5. Undoubtedly, the privacy supportive character was found dominating the increase of psychological, informational, and physical privacy satisfaction amongst the dwellers, yet its power of reducing the sense of community reinforcement of the dwellers was explicit. Moreover, the privacy features had the significant potential of diminishing the safety concern of the residents, in particular, the behavioural disorder and emergency issues. It is noticeable that both defensible and privacy supportive characteristics of the building is collaborating to exclude the residents from their neighbours and community. Thence, to apply the ideation of these elements, the developers need to be clear on their trajectory and their goal to which will be offered their clients and future residents.

3. Communal Characteristics

The communal features of the building were considered from two indicators, which are 1) variety of common and recreational areas and 2) exposure and ease of accessibility of such facilities. The details of a scoring system were

described in Chapter 5. This type of indicator statistically proved its capability to strengthen the residents' shared emotional connection with the community yet negatively impact their satisfaction of psychological privacy significantly. As well, it depends on the decisive theme including the managerial approach of the property developers to manipulate these architectural features.

9.1.3 The Recommended Predictors of Psychological Status for High-rise Dwellers: Personal Psychological Factors

Apart from the physical environmental factors, the personal attributes and psychological background of the residents are considered as the essential factors driving the internal psyche of high-rise residents.

As discussed in the previous chapters, the personal attributes, socio-economic status, and dwelling behaviours of high-rise residents had the particular impacts on all three psychological domains. (The interpretation of these categorical variables can be seen in Chapter 6 and Chapter 8) The findings of the multiple linear regression and SEM extracted the principal psychological factors, especially the numerical variables that appeared to have significant domination on safety concern, privacy satisfaction, and sense of community of Bangkok high-rise residents. Amongst those variables, the three psychological indicators applied in this study appeared to play a major role in predicting the feeling of the respondents. The three indicators are:

1. Experience of Threats

This indicator was formed based on the three types of modern tall building's threats: 1) crime, 2) behavioural disorder, and 3) emergency caused by human and nature, as described in the literature review section. It was hypothesised that human as a receptor had perceived and experienced the different volumes of facing such threats and this could drive the differences of concern about threats in each individual. After all, the statistical analysis approved the impact of the experience of threats directly on the safety concern per se in which crime, behavioural disorder, and emergency concerns of the respondents were included.

2. Privacy Need

The privacy need seems to be an indicator that had the multi-directional effects on all psychological domains. This indicator was built based on the

psychological concept of the six types of privacy: 1) isolation, 2) reserved, 3) anonymity, 4) solitude, 5) intimacy with friends, and intimacy with family. Nevertheless, the question items were adapted to fit into the research framework and not to be ponderous when they were converted into a scoring system for the statistical analysis later on. (See detail in Section 3.7, Chapter 3) The findings confirmed that the privacy need or the introversion of the high-rise residents motivated their concern of crime, behavioural disorder, and emergency. Meanwhile, it also diminished the satisfaction of informational, physical, and social/ interactional privacy amongst the dwellers as well as suppressed their sense of membership, reciprocal influence, community reinforcement, and shared emotional connection with their community.

3. Social Capital and Participation

This indicator was assembled from the urban theoretical concept involving people's social capital and their social participation behaviours integrated with the domestic context of condominiums in Bangkok. The sub-indicators are 1) sharing and donating 2) public volunteering, and 3) civic duty. Apparently, the sharing and volunteering score gave different effects to the dependent variables from the civic duty score. In more detail, the frequency of sharing and public volunteering of the residents could predict the increase of the sense of community including its all sub-variables. In the meantime, the higher score of civic duty was reflecting the higher concern about crime. As such, the more frequency of community volunteering was predicting the less psychological privacy satisfaction amongst them.

Additionally, the numerical factors included in the predictive equation were the self-reported mental condition of the residents and the quality of relationship with neighbours. It appeared that the resident who considered themselves that having the better mental health after moving into the property and defined that they were having a good relationship with neighbours had the stronger sense of community than others. The significant effects of other categorical variables can be seen in the discussion part of Chapter 8.

9.1.4 The Environmental Psychological Mechanism of High-rise Dwellers in Bangkok

The findings of this research led to the conclusion that the interdependence between the psychological fundamentals -safety concern, privacy satisfaction, and sense of community- statistically exists, and the pattern of their interrelationships is predictable. On the condition that the observed data needs to be measured by the PE assessment and the PEP questionnaire, the predictive equations revealed in the previous chapter can forecast the trend of these psychological variables by replacing the values of each indicator into the equations.

Furthermore, the outcomes of the Multiple Linear Regression and the Structural Equation Modelling allowed us to see the interrelationships between these three psychological fundamentals at the same time that they were responding to the external determinants (environmental factors), and the internal determinants (personal factors). The figure below demonstrates and explains the environmental psychological mechanism of high-rise dwellers in context of Bangkok based on the result derived from this study. (See Figure 9.1.)

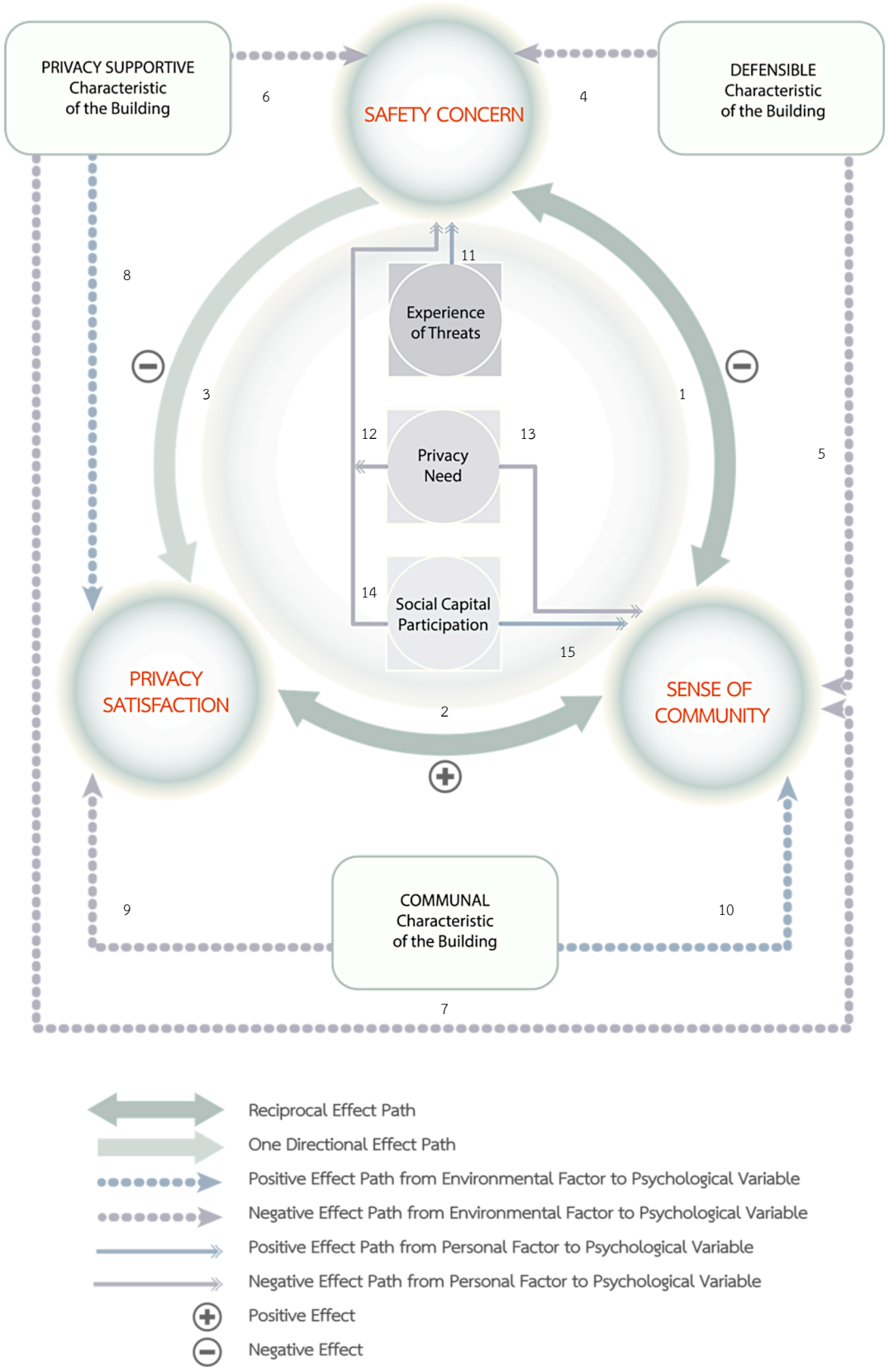


Figure 9.1 Diagram of the environmental psychological mechanism of high-rise dwellers in context of Bangkok metropolitan Area

The above diagram of the environmental psychological mechanism of high-rise dwellers was drawn based on the major statistical findings confirmed by the MLR and the SEM analysis. Referring to the number labelled on each path (as seen in Figure 9.1), the diagram interpretation is systematically described as follows:

Path 1 and Path 2 are representing the reciprocal effects between the psycho-dependent variables.

Path 1 (the two-directional arrow with a cathode (minus) symbol) demonstrates that the safety concern and the sense of community of high-rise residents had the adverse relationship with each other which meant the safety concern became another factor that impeded the strength of the sense of community, whereas, the sense of community owned the same capacity to deter the concern of safety.

Path 2 (the two-directional arrow with an anode (plus) symbol) shows the supportive relationship between the satisfaction of privacy and the sense of community of the high-rise residents. It can be explained that based on this dataset, the more satisfaction of privacy provided by the high-rise habitat, the stronger sense of community was confirmed, and vice versa.

Path 3 is the only route representing a unidirectional effect between the psycho-dependent variables. Regarding the path, the one-directional arrow with a cathode tag indicated that the safety concern of the high-rise dwellers owned a capacity to regress their satisfaction of privacy.

Paths, number 4 to 10 are representing the influences of the environmental factors on the psychological dependent variables.

Path 4 and ***Path 5*** (the dashed purple lines with one-directional arrows) are showing the negative influences of the defensible characteristics of high-rise buildings on the safety concern and the sense of community of the dwellers respectively.

Path 6 and ***Path 7*** (the dashed purple lines with one-directional arrows) are showing the negative influences of the privacy supportive characteristics of high-rise buildings on the safety concern and the sense of community of the dwellers consecutively. Meanwhile, Path 8 (the blue dashed line with the one-directional

arrow) describes the supportive influence of the privacy supportive characteristics of high-rise buildings on the privacy satisfaction of their residents.

Path 9 (the dashed purple line with the one-directional arrow) demonstrates that the communal components of the high-rise habitats have the capability to reduce the satisfaction of privacy amongst their residents. On the other hand, the positive effect of the communal characters on the residents' sense of community was confirmed and represented by Path 10 (the blue dashed line with the one-directional arrow).

Paths, number 11 to 15 are representing the influences of the personal factors on the psychological dependent variables.

Path 11 (the continuous blue line with the one-directional arrow) is showing that the personal experience of threats could provoke the concern of safety amongst the high-rise dwellers.

Path 12 (the continuous blue line with the one-directional arrow) indicates that the privacy need or the introvert personality of the individuals could increase more concern of safety amongst high-rise residents. In controversy, Path 13 (the continuous purple line with the one-directional arrow) demonstrates that the introversion of the individuals could weaken their sense of community.

Path 14 and ***Path 15*** (the continuous blue lines with one-directional arrows) are showing that the social capital and participation of high-rise residents is one of the factors that could stimulate the safety concern amongst high-rise dwellers, whereas, its positive influence was proved to strengthen their sense of community.

9.2 Contributions and Added Value of the research

The findings of this cross-sectional research have revealed the hidden mental status of high-rise inhabitants in the context of Bangkok metropolitan area as well as statistically proven the pattern of the psychological mechanism which is relevant to the environmental context of high-rise housing.

9.2.1 Contributions to Environmental Psychology

In contributing to the environmental psychology, particularly the housing environment, the literature investigation at the beginning of the study had brought up the three psychological pillars -safety concern, privacy satisfaction, and sense of community- into a spotlight and valued them as the psycho-fundamentals of hominess. Despite the simplicity and generality of these domains, the empirical research that focused on cross-examining and distilling the association and the autonomous functions of these underlying feelings had not yet been interpolated. Through the context of Bangkok Metropolis and the high-rise housing environment, the systematic investigation of this study affirmed the inconsistent mediation pattern between these three psychological domains. Speaking of which, the pessimistic angle of safety concern of the high-rise residents negatively impacted their satisfaction of privacy as well as weakened their sense of community. However, in synchronisation, the optimistic demeanour of sense of community acted as the mediator that alleviated the adverse effect of safety concern on privacy satisfaction. Besides the mentioned contribution, the comparison of statistical power had added another evidence that amongst these three psycho-domains, the sense of community was the most variable competently predicted by both external (environmental) factors and internal (personal psychological) factors defined in this study, followed by the privacy satisfaction and safety concern consecutively. Unlike sense of community, the findings of the statistical analysis were implying that the individual's feeling of safety including his/ her behaviour in response to the threats might be differently developed based on the deeper level of accumulated experiences as defined in the previous psychological theory (Maslow) which was beyond the framework of this research and needed the in-depth research methodology to explore its causality.

9.2.2 Contributions to Urban and Housing Management

In terms of urban and housing management, the results of this research had added another statistical endorsement to the previous urban psychological research of which the effects of density of population were underlined. In congruence with the works of urban psychologists, the interpretation of the MLR modelling indicated that the density of population statistically caused the decrease of the sense of community amongst high-rise residents. This result was linked to the

theoretical explanation that the urban factors comprising heterogeneity and high population density constitute the overloads which deform daily life on several levels including limiting people's connectedness to each other. (Milgram, 1970, Wirth, 1938) Besides the awareness of the density of population, this research had additionally specified the negative effects of the high density of dwelling unit and the high floor density. As the co-factors that shrank the high-rise residents' privacy satisfaction, these two indicators were worth for consideration regarding housing management. Furthermore, another salient indicator, which was congruent with the previous urban research, was the social capital and social participation behaviour. The capacity of this societal behaviour was statistically endorsed for its galvanisation on the increasing sense of community amongst high-rise residents. Whereas, the role of social capital, both in the economic form and cultural form, was widely considered as a political advantage for the community governance and a linkage to the success of democracy and the decline of political involvement (Putnam, 2000), departed from that manner, this study exploited and confirmed the social capital and participation as the key indicator for predicting the strength of residents' sense of community to which connected their mental wellbeing.

9.3 Policy Recommendations

In conjunction with the academic contributions of this research, the additional policy recommendations placed in this section are referred and discussed on the ground of the research findings integrated with the actual situation of high-rise housing in Bangkok.

The equalisation of health and mental health is one of the most significant global commitments defined by United Nations (UN). The linkages between sustainable housing and better mental health are declared in the 2030 agenda for sustainable development, Sustainable Development Goal (SDG) 11, "make cities and human settlements inclusive, safe, resilient and sustainable" (UN, 2016), and reaffirmed in the World Health Organization (WHO)'s strategies for health and sustainable development which indicate that "insufficient housing quality is associated with stress and mental health impacts" and "exacerbates mental health

disorders, including depression, anxiety, violence and other forms of social dysfunction." (WHO, 2017)

According to the 2017 Revision of World Population Prospects by UN, the world population will rise from 7.5 billion (2017) to 9.8 billion people by 2050, and 70% of them will live in the urban area. (WHO, 2012, UN, 2017) The high-rise habitat as a distinctive kind of human settlements especially in the metropolitan area will soon become an essential option that can alleviate the incoming accommodation shortage. Similar to the global trend, the population growth in Thailand is going on the same trajectory.

As a repercussion of UN's SDGs and WHO's housing and health equity statement, Thai Government as well endeavours to minimise the physical and mental health risks and inequity in Thai society and explicitly states such agenda in the 12th National Economic and Social Development Plan (2017-2021). In particular, the plan focuses on incubating a state of mind called "public mindedness" or "public consciousness" amongst citizens (NESDB, 2017), of which concept is related to the sense of community. Aside from the guidance for the healthy city and housing's physical environment suggested by WHO and UN, this research is additionally recommending the strategies of mental strengthening for high-rise housing dwellers to conjoin the global commitments, national policy, and the local people with the implementing solutions established on the actual participation of high-rise residents and the scientific ground. The mentioned rationale is illustrated in the below diagram. (See Figure 9.2)

Figure 9.2 The rationale and conceptual transferring diagram of the mental strengthening strategy

9.3.1 Mental Strengthening Strategies for Sustainable High-rise Housing

Objective:

The primary goal of the mental strengthening strategies for high-rise dwellers is to implement an interdisciplinary knowledge combining environmental psychology, urban and housing principles, and architectural theories for actualising the solutions of mental reinforcement in particular context of Bangkok Metropolis.

Key perspective:

The primacy of achieving the mental strengthening for the inhabitants of high-rises starts from an in-depth understanding of the high-rises' physical features.

- **Equity of housing standard**

Speaking of which, stakeholders are required to mind-set that, by comparing the number of households per area, high-rise housing complexes are equivalent to, or even surpassing some horizontal communities. Regarding the field survey, the number of households contained in eighteen participating condominiums was between 224 and 2,707 (averagely 900 units per compound), whereas, the numbers of households in small, medium, and large-sized communities defined by the National Housing Authority (NHA) are 1) less than 1,000, 2) between 1,000 and 3,000, and 3) more than 3,000 respectively. (Siripinyokij, M., Klinwichit, N., et al., 2015, NHA, 2015) Based on this perspective, the high-rise housing residents shall be administered and provided with necessary infrastructures, adequate living space, communal areas, access to health services, emergency response (i.e. police station, fire station), jobs, schools, affordable food outlets, etc. as the same standard applied to the low-rise community's members.

- **Sustainable administration and maintenance**

Apart from developing and leasing residential high-rise estates, a greater challenge of mental strengthening for high-rise dwellers appears to be the long-term maintenance and administration. It is undeniable that the physical environmental deterioration of the building including its equipment requires an attentive care, whereas, the mental healthiness of the residents demands extra insight and mindful sustenance.

The unique complexation of high-rise housing calls for the professional managers and comprehensive sustainable development plans which are accountable for thousands of residents living in the compound.

Unlike the horizontal community governed by the subdistrict administrative organisation and community chief, as described in Chapter 4, in the post-occupancy period of high-rise housing, the full authorisation of building management is legitimately transferred from developers to the condominium juristic persons comprising the external entity and the residents' representatives (two years performing period). At present, the certified license of the condominium's managers has not been legally enforced, and the problems of lacking good governance were often mentioned by the respondents. Such circumstance is reflecting that in terms of administration, the high-rise housing is still unsustainable.

- **Knowing and understanding inhabitants**

The demographics and statistical analysis of this study apparently reflect the heterogeneity of the high-rise residents in Bangkok urban area and reveal the particular factors that can impair or fulfil the psychological needs of the different groups of dwellers.

Despite the fact that the majority of high-rise dwellers in this field survey are Thai, most of them are non-local yet moved from other provinces or districts for working and studying in the city centre. Based on this matter of fact, the demographic oscillation can cause misleading administration schemes. Therefore, this research strongly recommends that the residential high-rise managers should conduct the annual internal census for the better understanding of the actual demographic proportion living their buildings.

Key indicators:

The three fundamental senses of home considered as the core mental indicators promoted in this strategic plan are:

- **Safety Concern:** a level of feeling worried about being harmed by three types of high-rise building's threat, which are 1) crime, 2) behavioural disorder, and 3) emergency including human-caused emergency and nature-caused emergency.

- **Satisfaction of Privacy:** a satisfaction of controlling over the access to self and the transaction between a person and other(s) in four dimensions, namely, 1) psychological privacy, 2) informational privacy, 3) physical privacy, and 4) social or interactional privacy while living in high-rises.
- **Sense of Community:** a mutual feeling between individuals and their community in four aspects, namely, 1) membership, 2) reciprocal influence, 3) integration and fulfilment of needs (reinforcement), 4) shared emotional connection.

The mental strengthening strategies for sustainable high-rise housing is divided into three major parts as follows:

Part 1: Urban and Land Use Policy Recommendations

Based on the statistical results of this study, the psychometric zoning map of Bangkok illustrated below is initiated in furtherance of geographical recommendations for developing residential high-rise projects beneficial to the goal of mental strengthening.

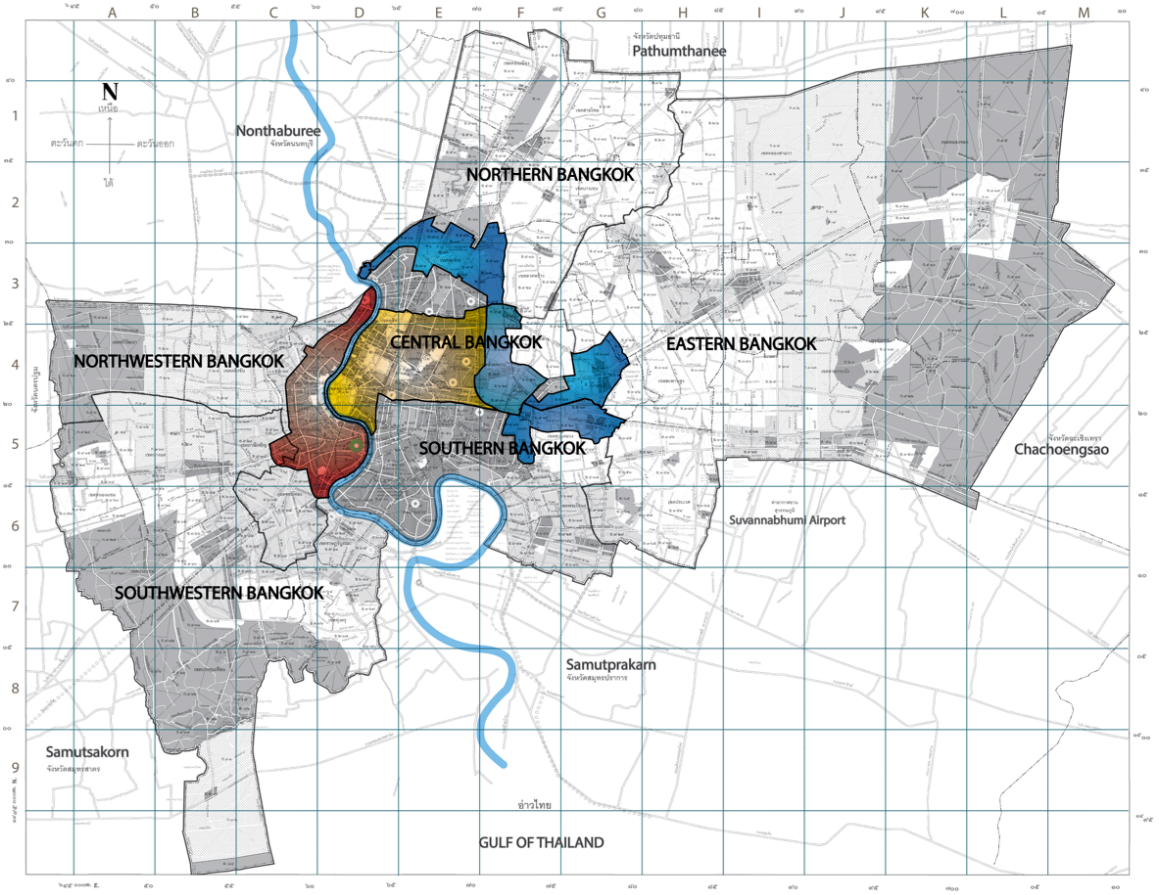


Figure 9.3 The psychometric zoning map of high-rise dwellers in Bangkok metropolitan area

Potential areas for high-rise residents' mental strengthening

Regarding the above psychometric map, the blue "S" shaped area (D2-3, E2-3, F2-5, and G4-5) is considered as the most competent location which is advantageous to the mental reinforcement for high-rise residents. The essential attribute of this area is the character of a medium-density residential neighbourhood located on the eastern side of Bangkok. Especially, the overlapped parts that lay upon the Northern Bangkok and Eastern Bangkok (E2-3, F2-4, and G-4) of which dwellers reported the strongest sense of community and lowest concern of safety. The transcendent qualifications of less population density, adherence of the area to the high-density residential neighbourhoods and the proximity to business district, can facilitate the better access to the primary infrastructure, job source, etc., whereas, the living cost is still affordable. Besides, the closeness to green agricultural zone and the connecting to both international airports: Suvarnabhumi Airport and Don-Muang Airport, are more convenient than other zones. Therefore, this research values the mentioned area as the location worthwhile for furthering the high-rise housing development in the interest of mental reinforcing promotion.

Vulnerable area for high-rise residents' mental strengthening

To the contrary, the urban zones which are considered vulnerable to the mental healthiness of the high-rise dwellers are also depicted on the psychometric map. The red "C" shaped area (C4-5 and D3-6) is representing the high-density residential neighbourhoods located in the western side of Bangkok of where the residents expressed the highest concern about safety. As discussed in Chapter 8, the results of the observation indicated the physical weaknesses of the area, for instance, disconnecting from the central business district due to the insufficient mass transportation for crossing the river, distance to healthcare and public-safety facilities, the proportion of derelict land, industrial arcade and brown field, and the presence of crimes and migrant labours, seasonal flooding, etc. Developing residential high-rises in this particular location requires a multidimensional property scheme to upgrade the whole area to become more pleasant and habitable.

Additionally, for the forthcoming development plan for the residential high-rise in Central Bangkok, yellow zone (E3-5, D3-4), it is recommended to be decelerated or revised due to the high density of population, heterogeneity, and

competitive lifestyle that incubate stress and individualism which can harm the sense of community and public mindfulness of the high-rise residents as a consequence.

Reconsidering urban planning regulations

In connection with the proposed psychometric zoning of Bangkok, to actualise the high-rise housing development in the medium-density residential zone, the existing bulk control regulations need to be reconsidered as follows.

- **Floor Area Ratio (FAR)**

As mentioned in Chapter 4, the FAR is one of the city bulk control indicators regulated by CPD. It refers to the ratio of a building's total floor area to the size of the piece of land. The latest revision of the FAR value applied for the medium-density residential area varies between 4 and 5, whereas, the value for high-density residential area varies between 6 and 8, and 5 and 10 for the commercial area.

To push forward the development of high-rise housing in the medium-density zone, the relaxation to increase the FAR in particular for the residential buildings is suggested. Oppositely, the FAR applied for the newly developed residential high-rises in the commercial area needs to be constrained.

- **Open Space Ratio (OSR)**

As mentioned in Chapter 4, the OSR refers to the ratio of an open-space land area to the total area of the entire developed land area. At present, the restricted OSR ratio applied for the medium-density residential area is diverse between 7.5% and 6%, the high-density residential area is various between 5% and 4%, and the commercial area is varied between 6% and 3%.

In connection with the FAR, the ratio of open space as well needs to be reconsidered. In this case, the OSR applied for the residential building in the medium-density residential area can be decreased, whereas, the OSR applied for the residential building in the commercial zone needs to be well constrained.

- **Biotope Area Factor (BAF)**

Besides FAR and OSR, this research also convinces an equal application of BAF (between 0.3 and 0.6(ETCP, 2017)) on the residential high-rise compounds in all zones of Bangkok since this indicator can help securing the green area and garden

which is synchronising with the ideal environment for promoting the mental healthiness amongst high-rise dwellers. Prospectively, a ratio of the green façade or surface area of green coverage of high-rise structure(Wood, Bahrami, et al., 2014), is expected to be advanced and implemented with the residential buildings in Bangkok urban area in the future for helping reduce the urban heat island affecting the people living in city centre.

Part 2: High-rise Dwellers' Mental Strengthening Recommendations

This section aims to recommend the pragmatic solutions divided into ten issues for reinforcing the feeling of safety, the satisfaction of privacy, and sense of community amongst high-rise dwellers envisioned from the results of this study and the current situation of high-rise housing in Bangkok. The following diagram shows the stratification of the proposed strategies and key principles for high-rise dwellers' mental health reinforcing. (See Figure 9.4)

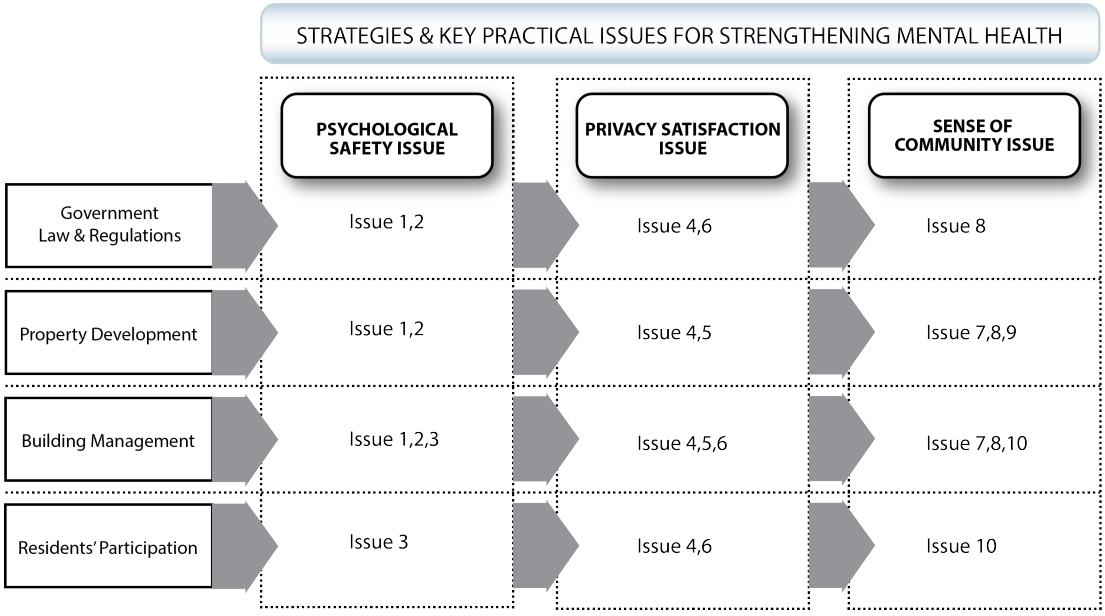


Figure 9.4 The stratification of proposed strategies and key principles for strengthening high-rise dwellers' mental health

Key Practical Issues for Strengthening Psychological Safety in Residential High-rises:

The paramount concept of the first three issues is to boost a perception of safety and security in the environment of high-rise housing by integrating the law

provision and the quality of environmental and managerial approach in parallel with the actual safety and security provided by the building.

Issue 1: Enforcing public safety and amenity linkages

With regard to the research results indicating the highest safety concern reported amongst the high-rise residents in the western side of Bangkok (Zone 5: Northwestern Bangkok and Zone 6: Southwestern Bangkok), the circumstances of the area: disconnecting to the central infrastructure, medical and public-safety facilities (i.e. hospital, clinic, police station, fire station), etc. are considered problematic. In this case, sustainably reducing such inequities and improving perceived safety and security require more efficient community regulations and housing standards on the same level as the low-rise communities to provide the accessibility to mass transportation, and to confine the maximum distance between high-rise community to the life-saving facilities. Also, the provisions of public safety and amenity linkages are required to enforce both public and private high-rise housing developing schemes equally.

Issue 2: Physical-environmental allocation

Building up a safe and secure environment for residential high-rises requires a prudential collaboration between spatial configurations and managerial solutions for making the residential space expressive its protective capacity and perceivable for the residents. Regarding the framework of this study, the four components of the defensible characteristic of the building: 1) access control, 2) surveillance, 3) territoriality, and 4) milieu and juxtaposition are recommended as the key features for enhancing the perception of security for high-rise dwellers due to their ability to reduce the concern of safety, in particular, the concern about crime.

- Access control: focuses on ensuring the residents that there are multiple levels of accessibility before reaching the intra-zone and dwelling unit instead of walling or fencing of which consequence entails the obstruction for emergency evacuation and cutting off the social interaction between insiders and outsiders.

- Surveillance: focuses on enhancing the competency of the residents to monitor threats from inside of their dwelling unit and to be surveilled by neighbours at all time when they are in common areas. Regarding space planning,

the isovist space syntax is an ideal for bettering visibility amongst dwelling units. However, the limitations of double-loaded corridor typically built for most condominiums in Bangkok requires other technical solutions to fulfil such needs, for instance, installing door peephole, security camera and intercommunication networks linked to the main control room and monitoring-screen in each dwelling unit.

- Territoriality: focuses on enhancing the residents' clear perception of existing boundaries that separate their entirely owned territory (dwelling unit) from shared facilities, and public space.

- Milieu and Juxtaposition: focus on the quality of persistent environmental maintenance, in particular, the common areas, for examples, green space, recreational facilities, building equipment, building illumination, etc. to create the perception that the residential high-rise is being taken care of.

Issue 3: Embedding experience and exercising protocol of life-threatening situations

As a result of the statistical analysis, it indicated that the greater concern about safety and security as well affected by the more experience of threats: crime, behavioural disorder, and emergency. On the other hand, supplementing the residents with cognisance and skills for surviving these threats is considered necessary, particularly in the constrained environment of high-rise housing. Incubating an insight of rescuing oneself from threats demand both cooperations from the residents and the integrated instructing programme designed by the building managers, for example, distributing a surviving guideline that contains protocol and information of how to survive an emergency, how to report crime and behavioural disorder, etc. In parallel, the annual or semi-annual exercises of an emergency evacuation, namely, fire drill, rehearsal in case of earthquake and flooding, etc. are also necessary.

Key Practical Issues for Strengthening Privacy Satisfaction in Residential High-rises

The concept of this practical issue is to create the residential high-rise environment that helps to facilitate the dwellers' privacy control in various situations by integrating the law provision and the quality of environmental and managerial approaches of the building.

Issue 4: Density control

Apart from the population density of the district discussed earlier, this study as well focuses on the effects of the residential density encompassing the number of units per floor and the number of unit's members. Statistical results indicated that high floor density is disadvantageous to the residents' psychological privacy and provokes their concern about a behavioural disorder, whereas, high unit density causes less satisfaction of psychological and physical privacy amongst the residents. To prevent an unpleasant atmosphere that might develop stress amongst high-rise dwellers, this research, therefore, suggests that these two types of density need to be restrained. In this case, enforcing the high-rise housing standards of NHA, for example, the minimum area per occupant, with newly developed residential high-rise projects both by the public and private enterprises, is considered worthwhile.

Issue 5: Responsive spatial planning for privacy adjustment

In connection with the issue of unit's density, the hindrance of individual's privacy control relates to the number of occupants in one enclosed space. Unlike the unit occupied by single dwellers, the multi-dimensional privacy control in the living unit, which contains more than two residents, tends to be more challenging and even more serious amongst non-family members. In this matter, besides the typical partitions available in the unit, providing shared multi-purpose space or facilities, for example, co-working space, library, common living and meeting room, is expected to help the residents to flexibly manipulate level of privacy -personal and group privacy- matching their requirements.

Issue 6: Promoting privacy respect and cohabitation agreement

Since the respectfulness of neighbours' privacy and the public interest are appraised as the principles of multi-family vertical housing, promoting and instructing societal rules and convention is as well necessary and need to be practised and encouraged amongst the high-rise residents vigorously. It is considered as an obligation for the building manager and committees to develop the standard rules of cohabitation and inform all residents by various channels to ensure that they all bear in mind.

Key Practical Issues for Strengthening Sense of Community in Residential High-rises

The fundamental concept of this issue is to incorporate the law provision and the quality of environmental and administrating approaches for creating the residential high-rise environment enhancing the social interaction between residents and reinforcing the sense of community, which is the strategic mental pillar beneficial to privacy satisfaction and feeling of safety.

Issue 7: Disillusioning segregated characters

The statistical analysis of the field survey confirmed that the sense of community of the residents living in the semi-gated high-rise compounds was stronger, whereas, their concern about emergency evacuation was less than those who were residing in the gated compounds. The adverse effects of the exclusive and disengaged milieu of high-rise housing in particular amongst high selling price condominiums on the mental healthiness of the residents are considered problematic.

Therefore, this practical strategy suggests that the property developers should avoid designing an absolute isolated atmosphere including using solid structural boundary. Instead, the concept of partially public-sharing space and applying the natural and transparent barriers are more promoted.

Issue 8: Enforcing recreational and common areas ratio

Since the associated influence of communal characters on the sense of community was confirmed, this practical matter then values the variety of recreational facility as one of the basic amenities that the high-rise residents deserve. According to the NHA's housing standard, the regulations compelling the minimum area ratio for retail and green space per community are available and enforced but only on the public housing projects. For reducing such inequity, it is recommended to develop further this recreational and common areas ratio, and apply to certify all newly developed residential high-rises both by the public sector and the private enterprises.

Issue 9: Applying the sociopetal[3] space allocation

In connection with Issue 8, besides the recreational and common area ratio, the accessibility and exposure of such facilities are considered as the relevant communal characters that positively affect the sense of community and social interaction amongst the inhabitants. It is also recommended for the high-rise housing developer to employ the concept of sociopetal space planning with these areas. This particular spatial characteristic is considered advantageous for enhancing visual flow as well as giving more experiences of communal living amongst the dwellers and additionally can increase the natural surveillance, which is a benefit for improving the feeling of safety.

Issue 10: Implementing community strengthening programme

In furtherance of magnifying social interaction opportunities including incubating the public mindfulness amongst the dwellers sustainably, the high-rise building committees are recommended to develop their distinctive community reinforcing programme that suits the particular micro-cultures and norms of each vertical community. The keynote purposes are to regularise the series of events (long-term and short-term) and provide various options for social capital and participation, which are attractive to the residents.

Part 3: Proposed Integrated-stakeholders Structure

The foreseen hindrance of accomplishing the mentioned key practical strategies are the gap and overlapping accountability amongst Government agencies, state enterprises, and private companies in controlling the quality of residential high-rise. The current situation is that there are several regulations and legal provisions issued by different entities, which are not proficient in residential high-rises administration, whereas, the professional organisations have no full authority to enforce housing standards and certify residential high-rises available in the market. The following four Government agencies are the main actors taking charge of high-rise housing development in Bangkok:

[3] Sociopetal is “a term used to describe the environment a group meets under such as seating arrangement and room temperature that is sued to promote interaction”, which is opposite to “sociofugal” (Nugent, P. M. S., 2013)

- **Department of Lands (DOL)**, Ministry of Interior: responsible for enforcing Condominium Act
- **Department of City Planning (CPD)**, Bangkok Municipality Administration, Ministry of Interior: responsible for administering Bangkok comprehensive plan, land use and bulk control
- **Department of Public Works and Town & Country Planning (DPT)**, Ministry of Interior: responsible for enforcing Building Control Act
- **National Housing Authority (NHA)**, Ministry of Social Development and Human Security: responsible for implementing housing Standards only for the public housing projects

Besides the mentioned Government agencies, a few non-governmental organisations are coordinating with high-rise housing estate investment, namely, Thai Condominium Associate (TCA) representing private condominium developers, and Real Estate Information Center (REIC) gathering and analysing business and investment information of housing real estate. Also, the Thai Building Manager Association (TMBA) represents the private facility management companies.

The below diagram illustrates the existing structure of high-rise housing stakeholders of Bangkok Metropolis. (See Figure 9.5)

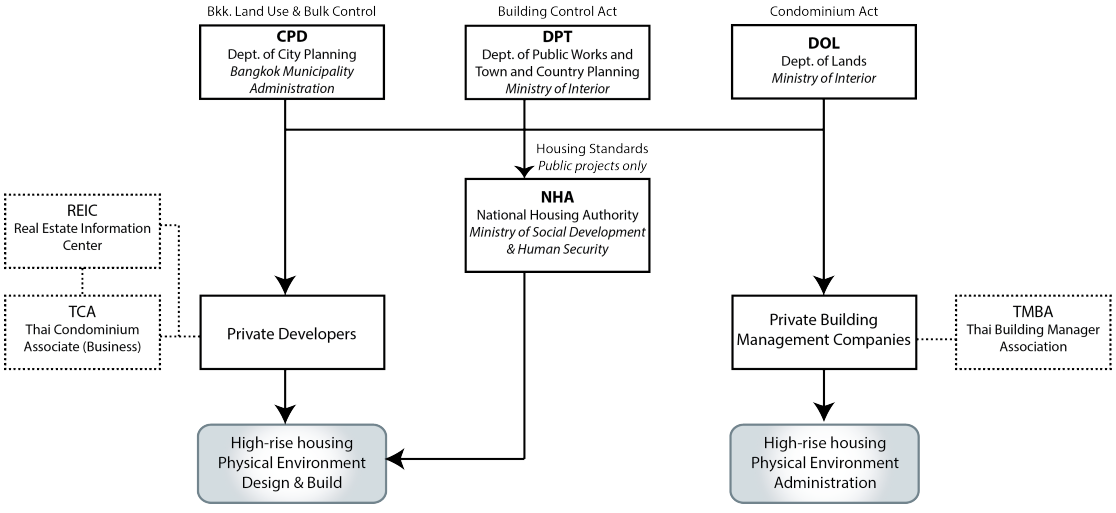


Figure 9.5 The existing structure of high-rise housing stakeholders of Bangkok Metropolis

Based on the environmental psychological standpoint of this study, the above diagram depicts the gaps and incomprehensiveness of the present

stakeholder's network of high-rise housing development in Bangkok. The structure reflects that the legal provisions and codes applied for high-rise housing are enacted separately by different agencies. At the urban scale, the CPD accounts for Bangkok comprehensive land use planning, of which contents affect the height of residential high-rises, and confine them within the high-density inner area of Bangkok that turns out to be a negative environment for the mental healthiness of the dwellers. Meanwhile, the DPT regulates the building codes of which contents control the fundamental features for emergency safety, i.e. fire protecting wall system and equipment, fire escape stairs, etc. yet omit the architectural features protecting dwellers from other threats, namely, crime incidence and behavioural disorder which should be available in the tall structures containing multi-family living units.

In the meantime, the DOL is directly responsible for legitimating the Condominium Act, which concentrates on the general legal aspect, for example, the ownership of living unit and co-ownership of land, the duty and period of employment of the condominiums' managers and committees, without any directive guidelines supporting the sustainable administration. Apparently, the NHA, which is a state enterprise that has developed housing standards including residential high-rise standard for years, does not have authority to control or superintend the most of the residential high-rises in Bangkok, which are administered by private companies.

It is quite clear that the present actors of high-rise housing industry in Bangkok are functioning separately for serving the two main purposes: 1) designing and building the condominiums before leasing, and 2) administrating the physical environment of the condominiums after leasing. Nonetheless, upgrading the high-rise dwellers' quality of life by engaging the mental strengthening and sustainable administration approach requires a more discerning and harmonious network of stakeholders. Therefore, this research is proposing an integrated structure of the stakeholders for high-rise housing development as illustrated in the below diagram. (See Figure 9.6)

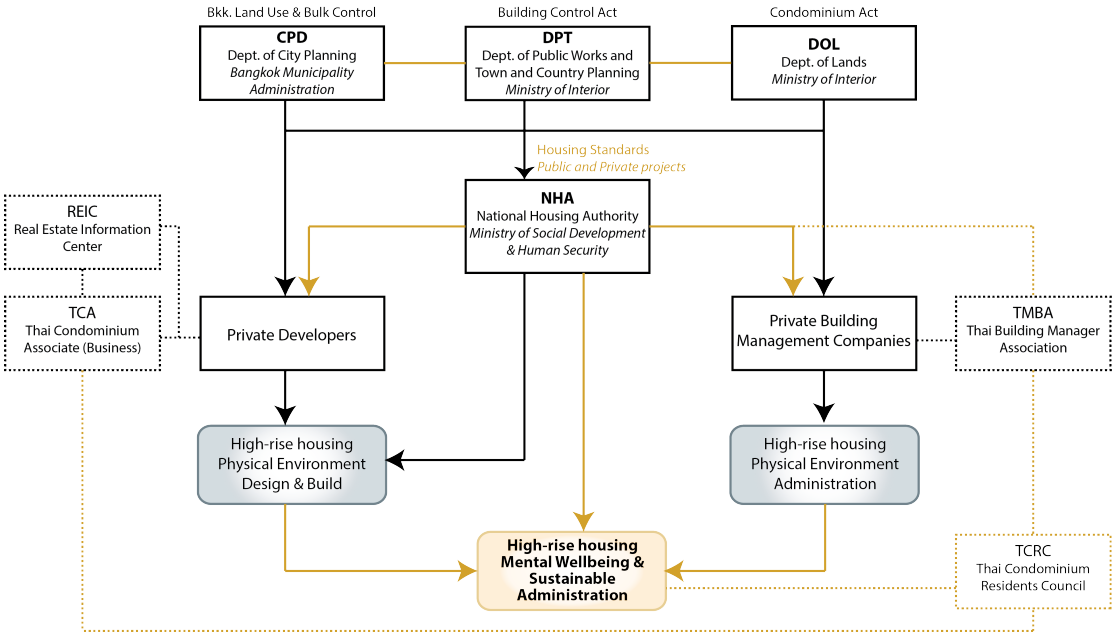


Figure 9.6 The proposed structure of high-rise housing stakeholders of Bangkok Metropolis

The above diagram is showing the ideal structure of stakeholders expected to support the mental wellbeing and sustainable administration for the residential high-rises in context of Bangkok metropolitan area. The essences of the upgraded structured represented by the yellow lines and objects are interpreted as follows:

- To begin with, in response to integrating the legal provisions and regulations specifically for mental reinforcing and sustainable administration of condominiums, the conventional Government agencies: the CPD, DPT, and DOL are required to collaborate with each other to reform the current acts or enact a new consolidated regulation to control the quality of physical environment and sustainable managerial protocol of the condominiums.

- It is considered beneficial to the high-rise residents if the NHA is authorised as the representative of Ministry of Social Development and Human Security to inspect and superintend the quality of condominiums operated by both public and private entities. Besides, accrediting the NHA to establish the high-rise housing sustainable administration guidelines, in which both physical and psychological well-being issues are clearly stated, as well as authorising NHA to certify the sustainable administration programme developed and proposed by each condominium's committees. In this regard, the same high-rise housing standards

engaged with the vision of mental wellbeing and sustainable administration will be enforced equally.

- As seen in the previous stakeholders' structure, the non-governmental organisations that participate in this particular industry have been founded on the business-oriented purposes and have not claimed for the benefits of residents. This issue is considered as a gap that requires the additional non-profit organisation to act as a true representative of high-rise residents. The model of such agency illustrated in this recommendation is called the Thai Condominium Residents Council (TCRC). This type of agency has been established in several cities in the United States and the United Kingdom for years, for example, Minneapolis Highrise Representative Council (MHRC), Cardiff Council, etc. acting as the units that advocate on behalf of the high-rise residents to appeal and negotiate their well-being issues and concerns. Likewise, the TCRC proposed in this stakeholders network is expected to advocate the similar issues. In furtherance, it is required to coordinate with other NGOs, namely, TCA and TMBA, to empower, perform checks and balances, and amplify the voice and actual needs of the high-rise residents to the public. Furthermore, for the benefit of sustainable administration, TCRC is expected to be an information centre, which provides other entities with the reliable data, statistics, reports of the semi-annual or annual survey, etc. related to the behavioural and mental status of the residents.

Part 4: Monitoring and Evaluation (M&E) integrated Research and Development (R&D)

For the goals of improving and achieving the key practical issues of mental strengthening for high-rise dwellers, the reliability of monitoring and evaluating (M&E) systems including the expertise and independence of the evaluators are necessary. Meanwhile, the research and development (R&D) are required to fulfil the purpose of sustainable high-rise housing development mostly depending on chronological data collecting. The mandatory qualifications of the M&E+R&D agency are as follows:

- **Independence of agency**: is to ensure that the results will be honest and unbiased.

- **Expertise of agency**: especially in the field of residential high-rise housing and capacity to conduct research both qualitative and quantitative approach.

- **Experience of agency**: the team is familiar with post-occupancy evaluation and able to interpret the research-oriented feasibility and practical recommendations to the stakeholders.

Concerning the mentioned qualifications of the M&E and R&D agency, the potential entity for these tasks is expected to be the academic commissioner or research institute.

Since the key psychological indicators -safety concern, privacy satisfaction, sense of community- have been developed and accomplished the validity and reliability tests by this study, the further implementation and advancement based on the Physical Environmental (PE) assessment and the Personal and Environmental Psychological (PEP) questionnaire are strongly recommended.

9.4 Limitations of Research

Although this multidisciplinary study could fulfill the primary research obejectives and the research questions and hypotheses, some constraints and conditions should be pointed out and given as an academic contribution.

The secondary data availability was the first limitation of this study. To investigate the factors related to crimes or fear of threats, the crime statistics was a crucial source. It appeared that the national crime statistics was too broad to be applied. Also, the municipality zoning of Bangkok was overlapping with the nine regions of the Metropolitan police department. Due to the ambiguity of the secondary data collection, in this case, the crime statistics had to be dropped out from the PE assessment. As a recommendation, the Government should devote more on the statistical data collecting system and improve the public accessibility to such information, which will be an extended contribution to the academic society and the national development.

The primary data authorisation was also another difficulty in conducting this field survey. According to Condominium Act, the juristic committee is the only

legal person who could authorise the researcher to distribute the questionnaires to the residents. It was quite a time-consuming to wait for several weeks or months for a formal allowance from each condominium. By the decision of the juristic person per se, many condominiums refused to participate this survey without the consent of their residents who might be interested in giving some feedbacks. Moreover, with regards to the occupants' privacy agreement, the access to the private residential zones, for example, dwelling unit, and residential corridor, etc. was limited. This limitation caused a dropping out of some physical-environmental indicators such as the soundproofing quality of the living unit, and the illumination quality provided by the building.

Finally, the capacity of the statistical analytical tools was another hardship for the data analysis. As discuss earlier in the previous chapters that the structural equation modellers available at this moment could not operate the non-recursive modelling accurately due to the endless cycle of estimations producing some statistically unacceptable coefficients. However, it did not mean that these kind of reciprocal effects do not exist in reality. In consequence, the integration of statistical tools was applied in parallel to investigate as close as it could to compare with the conceptual model reflecting the simultaneously psychological interrelationships.

Besides the issue mentioned above, the large sample size of this field survey (1,206 participants) statistically allowed several small-sized effects to be disclosed of which some retrieved extremely subtle predictive capacities and were considered as the trivial effects. Despite their statistical significance, these effects could not be endorsed by determining the Cohen's conventional criteria for the magnitude of effect applied in this research. The presence of these trivial effects needed further investigation to find more efficient explanatory and causality for bettering the understanding of these phenomena.

9.5 Future Research

Regardless of a limited time of research conducting, to build more confident results for the environmental psychology, the longitudinal research is

recommended to profoundly monitor the mental alteration amongst the residents affected by the urban ecological and architectural context of this vertical habitat.

The further exploitation of the Physical-Environmental Assessment (PE), and the Personal and Environmental Psychological Questionnaire (PEP) performed in this field survey is strongly recommended, due to the statistical confirmation of their reliabilities and the internal consistency. These field survey instruments are bottomless and wide-open for any contextual adaptation, indicator addition, and further development. Any academic advancement cultivated on the ground of this research would be appreciated. Moreover, as mentioned earlier, some subtle effects detected in this field survey require more research and input independent variables that might be unprecedented in this study to enhance the capacity of explanation and more efficient predictability of the psychological status of high-rise residents.

Across from the academic world to the professional reality, as well, these research tools can be applied for the benefits of the high-rise housing stakeholders. Especially, in Bangkok metropolitan area, the results of this housing field survey can be implemented in the research-based design and planning instantaneously. The contemporary context of this information is reflecting the present circumstances, problems, and offering the solutions for bettering the sustainable high-rise housing environment.

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APPENDIX

Questionnaire No. .....

Arch. D. in Multidisciplinary Design Research Program

School of Architecture, King Mongkut's Institute of Technology Ladkrabang

Environmental Psychological Assessment for High-rise Residents in Bangkok Metropolitan Area

Please take a moment to complete this questionnaire accurately and return to our staffs. Your information and suggestions are very valuable to our research. If you have any further question, please contact Siriwan Rujibhong via mobile-phone: 095-383-9121. We appreciate your help.

The information you provide will be kept confidential and will be used only for the academic purpose.

Part 1 Demographic Information

Please fill-out the following fields or tick ✓ in the answer box. (Please check one box per item)

1.1 Gender ☐ Male ☐ Female

1.2 Age _____ years old

1.3 Race _____ Nationality _____

1.4 Religion ☐ Buddhism ☐ Christianity ☐ Islam ☐ Non-religious ☐ If other, please specify _____

1.5 Education ☐ High school or lower ☐ Bachelor's degree ☐ Higher than Bachelor's degree

1.6 Marital Status ☐ Single ☐ Married ☐ Widowed/ Divorced/ Separated

1.7 Do you have children? How many? ☐ No ☐ Yes, I have _____child/children.

1.8 Occupation ☐ Student ☐ Private Company's Employee ☐ Government's Employee ☐ Own business/ Freelance ☐ Retired/ Housewife ☐ If other, please specify _____

1.9 Unit's member's income (including yours) _____ baht (per month)

Part 2 Residential and Behavioural Information Please fill-out the following fields or tick ✓ in the answer box. (Please check one box per item)

2.1 How long have you lived in this building? _____ year(s) _____ month(s)

2.2 Do you have any other residence in Bangkok? ☐ Yes ☐ No

2.3 Where is your hometown? _____

2.4 Before living here, in which type of residence did you mostly live?

☐ Detached Single House ☐ Semi-detached House ☐ Rowhouse ☐ Apartment/ Flat ☐ Condominium ☐ If other, please specify _____

2.5 What is your status in this dwelling unit?

☐ Owner ☐ Tenant ☐ Guest ☐ If other, please specify _____

2.6 What is the most important reason of living here (Please check only one box)

☐ Reasonable price ☐ Good environment/ neighbourhood ☐ Reliable developer ☐ Easy to reach by public transport ☐ Close to your workplace/ school ☐ If other, please specify _____

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2.7 How many persons are living in this unit? **(including yourself)** _____person(s)

2.8 Whom are you living with? (Checking more than one answer is possible)

☐ Alone ☐ Father/Mother ☐ Spouse/ Girlfriend/ Boyfriend ☐ Child/ Children

☐ Friend/ Roommate ☐ Brother/ Sister ☐ Relative(s) ☐ If other, please specify _____

2.9 How is your relation with neighbours?

☐ We know each other very well ☐ I can recognise some of them ☐ I do not know anyone.

2.10 Which period of the day that do you spend time in this building?

Monday–Friday ☐ Out all day & night ☐ Stay only day-time ☐ Stay only night-time ☐ Stay all day & night

Saturday–Sunday ☐ Out all day & night ☐ Stay only day-time ☐ Stay only night-time ☐ Stay all day & night

2.11 On which floor are you living? _____ floor

2.12 Which one is your unit type?

☐ Studio ☐ One bedroom

☐ Two bedrooms ☐ More than two bedrooms

☐ If other, please specify _____

Part 3 Health, Privacy need, Experience of threats, Community participation

Please tick ✓ in the answer box. (Please check one box per item)

3.1 Health condition What is your health condition **after moving-in** this building?		Worse ☹👎	Same 😐	Better ☺👍
3.1.1	**Physical Health** after moving-in this building?	☐	☐	☐
3.1.2	**Mental Health** after moving-in this building?	☐	☐	☐

3.2 Privacy need If you are facing the following situations, how would you feel?		Uncomfortable ☹👎	Feel nothing 😐	Feel Good ☺👍
3.2.1	When you are at a party, you feel…	☐	☐	☐
3.2.2	When you must ride an elevator with other passengers, you feel…	☐	☐	☐
3.2.3	When a stranger tries to befriend you, you feel…	☐	☐	☐
3.2.4	When you must hang out by yourself or have dinner alone, you feel…	☐	☐	☐
3.2.5	When a stranger tries to befriend your family member or friend, you feel…	☐	☐	☐

3.3 Experience of threats Have you ever experienced the following situations? If yes, can you recognize the detail of incidence?		Never	Yes, I have	Yes and I can recognize the detail
3.3.1	**Crime** i.e. being a victim of property crime, sexual crime	☐	☐	☐
3.3.2	**Behavioural Disorder** i.e. witness a violence in family, drug abusing, suicide	☐	☐	☐
3.3.3	**Emergency (Nature-caused)** i.e. being a victim of flood, earthquake	☐	☐	☐
3.3.4	**Emergency (Human-caused)** i.e. terrorist attacking, stuck in an elevator	☐	☐	☐

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3.4 Community Participation How often do you participate in the following activities?			Never	Sometime	Always
Sharing	3.4.1	Donating money/goods for the benefit of building	☐	☐	☐
	3.4.2	Sharing your stuffs with neighbours	☐	☐	☐
Volunteering	3.4.3	Joining an event or activity held by the building	☐	☐	☐
	3.4.4	Participating the building's meeting or help them organise an event	☐	☐	☐
	3.4.5	Volunteering a public beneficial group i.e. a building surveillance team	☐	☐	☐
Civic Duty	3.4.6	Paying a common charge fee for the building	☐	☐	☐
	3.4.7	Voting in a political election	☐	☐	☐
	3.4.8	Being a juristic committee/ building management team	☐	☐	☐

Part 4 Safety Concern, Privacy Satisfaction, and Sense of Community

4.1 Safety Concern

Please rate your level of safety concern (on a scale of 5 to 1) with the following aspects and tick ✓ in the answer box.
(Please check only one box per item)

Score from *5 = Strongly Concerned* to *1 = Slightly Concerned*

		You are worried about/ that . . .	Level of safety concern Strongly >>>>>>>>>>> Slightly				
 Crime	4.1.1	A crime might happen in a parking space of this building	⑤	④	③	②	①
	4.1.2	A lack of CCTV (Closed circuit television) camera	⑤	④	③	②	①
	4.1.3	A stranger in the building. He/she might be a criminal	⑤	④	③	②	①
 Behavior Disorder	4.1.4	Someone might fall or jump off this building	⑤	④	③	②	①
	4.1.5	Drug-abusing, violent, or drunken people living in this building	⑤	④	③	②	①
	4.1.6	Unhygienic condition of sharing swimming pool, gym room, etc.	⑤	④	③	②	①
 Emergency	4.1.7	An elevator's malfunctioning in this building	⑤	④	③	②	①
	4.1.8	A failed rescue operation in case of emergency	⑤	④	③	②	①

4.2 Privacy Satisfaction

Please rate your level of satisfaction of keeping your privacy (on a scale of 5 to 1) in the following aspects and tick ✓ in the answer box. (Please check only one box per item)

Score from *5 = Completely Satisfied* to *1 = Slightly Satisfied*

		You feel free/ private enough to . . .	Level of satisfaction Completely >>>>>>>>>>> Slightly				
 Psychological	4.2.1	To express your emotional conditions in your unit	⑤	④	③	②	①
	4.2.2	To work on a concentration-required work in your unit	⑤	④	③	②	①
 Informational	4.2.3	To talk or having a private conversation in your unit	⑤	④	③	②	①
	4.2.4	To receive a classified document via the building's mailbox	⑤	④	③	②	①

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		You feel free/ private enough to . . .	Level of satisfaction Completely >>>>>>>>>>> Slightly				
 Physical	4.2.5	To do your personal activities i.e. shower, undressing	⑤	④	③	②	①
	4.2.6	To be loose or relax in your unit. No one can get in without your permission	⑤	④	③	②	①
 Social interaction	4.2.7	To relax/ sit leisurely with your family/friend in the building's common area	⑤	④	③	②	①
	4.2.8	To invite your friend/ guest to your dwelling unit	⑤	④	③	②	①

4.3 Sense of Community

Please rate your level of feeling involving sense of community (on a scale of 5 to 1) in the following aspects and tick ✓ in the answer box. (Please check only one box per item)

Score from *5 = Strongly Feel* to *1 = Slightly Feel*

		You feel that . . .	Level of Feeling Strongly >>>>>>>>>>> Slightly				
 Membership	4.3.1	You are a member of this building, and being treated well here	⑤	④	③	②	①
	4.3.2	Your neighbours can recognise you, and you can recognise them	⑤	④	③	②	①
 Influence	4.3.3	Your request or complaint are always listened here	⑤	④	③	②	①
	4.3.4	Your neighbours' opinions are useful. Listening to them is a benefit	⑤	④	③	②	①
 Reinforcement	4.3.5	You are happy to participate the events organised by the building's staffs	⑤	④	③	②	①
	4.3.6	Your neighbours are kind and helpful	⑤	④	③	②	①
 Emotional connect	4.3.7	You will be angry if someone criticise or defame this building	⑤	④	③	②	①
	4.3.8	You feel bound with this place and hope to live here as long as you can	⑤	④	③	②	①

Part 5 Building Assessment and Suggestion for Improving a Well-being of High-rise Residents

Please evaluate the physical conditions of your building (Please tick ✓ in the one answer box per item)		Good Enough	Improvement Needed
5.1	Density of dwellers in this building	☐	☐
5.2	Access Control	☐	☐
5.3	Number of CCTV	☐	☐
5.4	Clear boundary between public and private areas	☐	☐
5.5	Design and image of the building	☐	☐
5.6	Adequate illumination inside the building	☐	☐
5.7	Adequate illumination outside the building	☐	☐
5.8	Recreation facilities i.e. swimming pool, gym room, library	☐	☐
5.9	Common areas/ facilities i.e. lobby, laundry room	☐	☐
5.10	Garden and plants	☐	☐
5.11	Parking space	☐	☐
5.12	Elevator and fire escape stair	☐	☐
5.13	Building management	☐	☐
5.14	Garbage collecting system and management	☐	☐

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Please choose **the most 3 important items** for each aspect as follows (Please tick ✓ in 3 answer boxes per item)

5.2.1 Which are **the most 3 important factors** for increasing SAFETY & SECURITY of high-rise residential buildings

- ☐ 1. Providing information of safety and regularly hold fire drill
- ☐ 2. Natural surveillance by the residents themselves
- ☐ 3. Building design without blind-spot
- ☐ 4. Adequate illumination inside and outside the building
- ☐ 5. Installing an emergency lighting at the risk area
- ☐ 6. Monitoring system allowing observation from each unit

Further suggestion _____

_____

5.2.2 Which are **the most 3 important factors** for increasing PRIVACY of high-rise residential buildings

- ☐ 1. Controlling number of residents in each unit/ floor
- ☐ 2. Always reminding residents of their neighbour's privacy
- ☐ 3. Making clear boundary between public and private zone
- ☐ 4. Quality of soundproofing/ acoustic wall structure
- ☐ 5. Controlling an abuse of common areas
- ☐ 6. A mediator/caretaker dealing with conflict of privacy

Further suggestion _____

_____

5.2.3 Which are **the most 3 important factors** for increasing SENSE OF COMMUNITY of high-rise residential buildings

- ☐ 1. Often organising recreational/sport activities for residents
- ☐ 2. Providing a multi-purposed/ living area for residents
- ☐ 3. Promoting a representative of residents as the building's committee/ juristic person
- ☐ 4. Informing residents of annual report/ budget review regularly
- ☐ 5. Survey of living problem/ requirements of residents regularly
- ☐ 6. Opening more communicative channels i.e. application on mobile phone, Facebook

Further suggestion _____

_____

------ End of Survey ------

THANK YOU FOR YOUR PARTICIPATION

Summary of Index of Item-Objective Congruence (I.O.C.) Scored by Five Experts

PART 1 Demographic Information

Item	Question	Experts' Scoring					
		R	P	N	LPN	T	Total
1.1	Gender	1.00	1.00	1.00	1.00	1.00	**1.00**
1.2	Age	1.00	1.00	1.00	1.00	1.00	**1.00**
1.3	Nationality	1.00	1.00	1.00	1.00	1.00	**1.00**
1.4	Education	0.00	1.00	1.00	1.00	1.00	**0.80**
1.5	Marital Status	1.00	1.00	1.00	1.00	1.00	**1.00**
1.6	Parental Status	1.00	1.00	1.00	1.00	1.00	**1.00**
1.7	Occupation	1.00	1.00	1.00	1.00	1.00	**1.00**
1.8	Unit’s member’s income (including yours) (Baht per month)	1.00	1.00	1.00	1.00	0.00	**0.80**

PART 1 Residential and Behavioural Information

Item	Question	Experts' Scoring					
		R	P	N	LPN	T	Total
1.9	How long have you lived in this building?	1.00	1.00	1.00	1.00	1.00	**1.00**
1.10	What is your status in this dwelling unit?	1.00	1.00	1.00	1.00	1.00	**1.00**
1.11	How many persons are living in this unit? (including yourself)	1.00	1.00	1.00	1.00	1.00	**1.00**
1.11.1	Whom are you living with?	1.00	1.00	1.00	1.00	1.00	**1.00**
1.11.2	How is the relationship inside your living unit?	0.00	1.00	1.00	1.00	1.00	**0.80**
1.12	Can you recognize your neighbours? How many of them that you can remember name?	1.00	1.00	1.00	*-1.00*	1.00	**0.60**
1.13	Did you grow up in this high-rise community?	1.00	1.00	1.00	1.00	1.00	**1.00**
1.13.1	** If no, where is your hometown?	1.00	1.00	1.00	1.00	1.00	**1.00**
1.13.2	** If no, before living here, in which type of residence did you mostly live?	1.00	1.00	1.00	1.00	1.00	**1.00**
1.14	On which floor are you living?	1.00	1.00	1.00	1.00	1.00	**1.00**
1.15	Which one is your unit type?	1.00	1.00	1.00	1.00	1.00	**1.00**

Summary of Index of Item-Objective Congruence (I.O.C.) Scored by Five Experts

PART 2 Health/Mental Health and Personality

Item	Question				Experts' Scoring					
2.1 Health condition		Worse	Same	Better	R	P	N	LPN	T	Total
What is your health condition after moving-in this building?		☹👎	😐	☺👍						
2.1.1	**Physical Health after moving-in this building?**	☐	☐	☐	1.00	1.00	1.00	1.00	1.00	**1.00**
2.1.2	**Mental Health after moving-in this building?**	☐	☐	☐	1.00	1.00	1.00	1.00	1.00	**1.00**

Item	Question				Experts' Scoring					
2.2 Privacy need		Uncomfotable	Same	Good	R	P	N	LPN	T	Total
If you are facing the following situations, how would you feel?		☹👎	😐	☺👍						
2.2.1	When you are at a party, you feel...	☐	☐	☐	1.00	1.00	1.00	1.00	1.00	**1.00**
2.2.2	When sharing common facities i.e. swimming pool, you feel...	☐	☐	☐	1.00	1.00	1.00	1.00	1.00	**1.00**
2.2.3	When neighbours ask your personal information, you feel...	☐	☐	☐	1.00	1.00	1.00	1.00	1.00	**1.00**
2.2.4	When people talk loudly in elevator or touch your body	☐	☐	☐	1.00	1.00	1.00	1.00	1.00	**1.00**
2.2.4	When neighbours talk to your family members, you feel...	☐	☐	☐	1.00	1.00	1.00	1.00	1.00	**1.00**

Summary of Index of Item-Objective Congruence (I.O.C.) Scored by Five Experts

PART 2 Health/Mental Health and Personality

Item	Question				Experts' Scoring					
	2.3 Experience of threats Have you ever experienced the following situations? If yes, can you recognize the detail of incidence?	Never	Yes	Yes and I can recognize detail	R	P	N	LPN	T	Total
2.3.1	**Crime i.e. being a victim of property crime, sexual crime**	☐	☐	☐	1.00	1.00	1.00	1.00	1.00	**1.00**
2.3.2	**Behavioural Disorder i.e. witness a violence in family, drug abusing, suicide**	☐	☐	☐	1.00	1.00	1.00	1.00	1.00	**1.00**
2.3.3	**Emergency (Nature-caused) i.e. being a victim of flood, earthquake**	☐	☐	☐	1.00	1.00	1.00	1.00	1.00	**1.00**
2.3.4	**Emergency (Human-caused) i.e. terrorist attacking, stuck in an elevator**	☐	☐	☐	1.00	1.00	1.00	1.00	1.00	**1.00**

Summary of Index of Item-Objective Congruence (I.O.C.) Scored by Five Experts

PART 2 Health/Mental Health and Personality

Item		Question				Experts' Scoring					
2.4 Community Participation How often do you participate in the following activities?			Never	Sometimes	Always	R	P	N	LPN	T	Total
Sharing	2.4.1	Paying a common charge fee for the building	☐	☐	☐	0.00	0.00	1.00	1.00	1.00	**0.60**
	2.4.2	Donating money/goods for the benefit of building	☐	☐	☐	1.00	1.00	1.00	1.00	1.00	**1.00**
	2.4.3	Sharing your stuffs with neighbours	☐	☐	☐	1.00	1.00	1.00	1.00	1.00	**1.00**
Volunteering	2.4.4	Joining an event or activity held by the building	☐	☐	☐	1.00	1.00	1.00	1.00	1.00	**1.00**
	2.4.5	Organising community's event	☐	☐	☐	1.00	1.00	1.00	1.00	1.00	**1.00**
	2.4.6	Participating the building’s meeting	☐	☐	☐	1.00	1.00	1.00	1.00	1.00	**1.00**
	2.4.7	Being a juristic committee/ building management team	☐	☐	☐	1.00	1.00	1.00	1.00	1.00	**1.00**
	2.4.8	Volunteering a public beneficial group i.e. a building surveillance team	☐	☐	☐	1.00	1.00	1.00	1.00	1.00	**1.00**
Civic Duty	2.4.9	Voting in a political election	☐	☐	☐	1.00	1.00	1.00	1.00	1.00	**1.00**
	2.4.10	Joinging protest, rally, or campaign	☐	☐	☐	1.00	1.00	1.00	1.00	1.00	**1.00**

Summary of Index of Item-Objective Congruence (I.O.C.) Scored by Five Experts

PART 3 Safety concern, Priacy satisfaction, and Sense of Community

Item		Question	Experts' Scoring										
3.1 Safety Concern Please rate your level of safety concern (on a scale of 5 to 1) with the following aspects and tick P in the answer box. (Please check only one box per item) Score from 5 = Strongly Concerned to 1 = Slightly Concerned								R	P	N	LPN	T	Total
		You are worried about/ that . . .	Level of safety concern Strongly >>>>>>>> Slightly										
 Crime	3.1.1	A crime might happen in a parking space of this building	⑤	④	③	②	①	1.00	1.00	1.00	1.00	1.00	1.00
	3.1.2	A lack of CCTV (Closed circuit television) camera	⑤	④	③	②	①	1.00	1.00	1.00	1.00	1.00	1.00
	3.1.3	A stranger in the building. He/she might be a criminal	⑤	④	③	②	①	1.00	1.00	1.00	1.00	1.00	1.00
 Behavior disorder	3.1.4	Someone might fall or jump off this building	⑤	④	③	②	①	1.00	1.00	1.00	1.00	1.00	1.00
	3.1.5	Drug-abusing, violent, or drunken people living in this building	⑤	④	③	②	①	1.00	1.00	1.00	1.00	1.00	1.00
	3.1.6	Unhygienic condition of sharing swimming pool, gym room, etc.	⑤	④	③	②	①	1.00	1.00	1.00	1.00	1.00	1.00
 Emergency	3.1.7	An elevator's malfunctioning in this building	⑤	④	③	②	①	1.00	1.00	1.00	1.00	1.00	1.00
	3.1.8	A failed rescue operation in case of emergency	⑤	④	③	②	①	1.00	1.00	1.00	1.00	1.00	1.00

Summary of Index of Item-Objective Congruence (I.O.C.) Scored by Five Experts

PART 3 Safety concern, Priacy satisfaction, and Sense of Community

Item		Question	Experts' Scoring										
3.2 Privacy Satisfaction Please rate your level of satisfaction of keeping your privacy (on a scale of 5 to 1) in the following aspects and tick P in the answer box. (Please check only one box per item) Score from 5 = Completely Satisfied to 1 = Slightly Satisfied								R	P	N	LPN	T	Total
		You feel free/ private enough to . . .	Level of satisfaction Completely >>>> Slightly										
 Psychological	3.2.1	To express your emotional conditions in your unit	⑤	④	③	②	①	1.00	1.00	1.00	1.00	1.00	1.00
	3.2.2	To work on a concentration-required work in your unit	⑤	④	③	②	①	1.00	1.00	1.00	1.00	1.00	1.00
 Informational	3.2.3	To talk or having a private conversation in your unit	⑤	④	③	②	①	1.00	1.00	1.00	0.00	1.00	0.80
	3.2.4	Keep classified or financial documents inside your livng unit	⑤	④	③	②	①	1.00	1.00	1.00	0.00	1.00	0.80
 Physical	3.2.5	To do your personal activities i.e. shower, undressing	⑤	④	③	②	①	1.00	1.00	1.00	1.00	1.00	1.00
	3.2.6	To be loose or relax in your unit. No one can get in without your permission	⑤	④	③	②	①	1.00	1.00	1.00	1.00	1.00	1.00
 Social interaction	3.2.7	To relax/ sit leisurely with your family/friend inside your living unit	⑤	④	③	②	①	1.00	1.00	1.00	1.00	1.00	1.00
	3.2.8	To invite your friend/ guest to your dwelling unit at anytime	⑤	④	③	②	①	1.00	1.00	1.00	1.00	1.00	1.00

Summary of Index of Item-Objective Congruence (I.O.C.) Scored by Five Experts

PART 3 Safety concern, Priacy satisfaction, and Sense of Community

Item		Question	Experts' Scoring										
3.3 Sense of Community Please rate your level of feeling involving sense of community (on a scale of 5 to 1) in the following aspects and tick P in the answer box. (Please check only one box per item) Score from 5 = Strongly Feel to 1 = Slightly Feel								R	P	N	LPN	T	Total
		You feel that . . .	Level of Feeling Strongly >>>>>>> Slightly										
 Membership	3.3.1	You are a member of this building, and being treated well here	⑤	④	③	②	①	1.00	0.00	1.00	1.00	1.00	0.80
	3.3.2	Your neighbours can recognise you	⑤	④	③	②	①	1.00	0.00	1.00	1.00	1.00	0.80
 Influence	3.3.3	Your request or complaint are always listened here	⑤	④	③	②	①	1.00	1.00	1.00	1.00	1.00	1.00
	3.3.4	Residents of this building sharing the same common, norm, and culture	⑤	④	③	②	①	1.00	*-1.00*	1.00	1.00	1.00	0.60
 Reinforcement	3.3.5	You are happy to participate the recreational events organised by the building	⑤	④	③	②	①	1.00	0.00	1.00	1.00	1.00	0.80
	3.3.6	Your neighbours are kind and helpful and you are ready to help them	⑤	④	③	②	①	1.00	1.00	1.00	1.00	1.00	1.00
 Emotional connect	3.3.7	You are proud of this place. You will be angry if someone criticise or defame this building	⑤	④	③	②	①	1.00	1.00	1.00	1.00	1.00	1.00
	3.3.8	You feel bound with this place and hope to live here as long as you can	⑤	④	③	②	①	1.00	1.00	1.00	1.00	1.00	1.00

Summary table of the calculated Eigenvalue coefficients derived from the full-scale survey Part 4.1, 4.2, and 4.3

Summary table of the calculated Eigenvalue coefficients derived from the full-scale survey Part 4.1, 4.2, and 4.3

Section	Psychological Question Items	Eigenvalue of Component 1	Eigenvalue of Component 2	% of Variance
Part 4.1	Safety Concern	4.819	.783	60.236%
Part 4.2	Privacy Satisfaction	4.645	1.037	58.056%
Part 4.3	Sense of Community	4.445	.831	55.568%

The statistics defined in the table showing that the eigenvalue for the first factor is quite larger than the eigenvalue for the next factor (4.819 versus .783, 4.645 versus 1.037, and 4.445 versus .831 consecutively). Additionally, the first factor accounts for 60.2%, 58.06%, and 55.57% of the total variance. This outcome suggested that the scale items of these three parts were unidimensional.