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Coping with Physical Environment: The Case Studies of Low-Income Housing in Jakarta

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ABSTRACT

The history shows that human beings modify their environments by creating a human-built world to augment their natural setting. this study is centred on the contemporary problem of housing units that are designed with little regard for users and which, by neglecting some of their fundamental needs. This lead to a range of both positive and negative coping strategies in order to exist within such units. This research provides empirical evidence on the behaviour and daily activities of 18sqm unit's occupants of low-income housing in Jakarta, Indonesia in relation to their use of space within their physical architectural setting. The primary data for this study was collected through semi-structured interviews with residents from five different unit types within four low-income housing complexes built in central Jakarta by the national urban development corporation of Indonesia (perum perumnas). Mixed data analysis method, combining both qualitative and quantitative was employed for the research. The study revealed that the design strategies deployed for the selected housing complexes did not, to various and differing degrees, adequately meet the residents needs in terms of daily activities or spatial use. This resulted in rooms being utilized in inappropriate and ineffective ways in terms of their functions, leading to dissatisfaction amongst residents, especially in the smaller sized units studied. The effect of this for residents was the enforced adoption of various coping strategies and modes of spatial adjustment to compensate for both the physical and behavioural limitations of their living space and extended areas within each housing complex.

Key words: modest economy, accomodation, physical surroundings, spatial adjustment, perumnas

The history shows that human beings modify their environments by creating a human-built world to augment their natural setting (Boutourline 1970, Bell, Fisher *et al.*, 1978), this study is centred on the contemporary problem of housing units that are designed with little regard for users and which, by neglecting some of their fundamental needs (Heimsath 1977), lead to a range of both positive and negative coping strategies in order to exist within such units.

In the case of Jakarta City, the previous research has found that, more than 50% of existing housing and surroundings in Jakarta were classified as sub-standard, with those areas located in the urban centre requiring high-investment for facilities and infrastructure to bring them up to a minimum standard (Provincial Government of DKI Jakarta 1991, p. 11). This would suggest that the basic psychological and physical needs of housing and daily living have not yet been reached. Data concerning the poor provision of floor space further suggest that housing in Jakarta needs radically improved and as such, the minimum

standards for adequate housing needs to be redefined (Komarudin 1997: 299). Other than that, there were clear socio-psychological effects on occupants living in low-income housing in Jakarta (Subroto 1984).

This research provides empirical evidence on the behaviour and daily activities of 18sqm unit's occupants of low-income housing in Jakarta, Indonesia in relation to their use of space within their physical architectural setting.

Research Methods

Post Occupancy Evaluation which involved semi-structured interview, field observation and photography was conducted.

Semi-structured interviews were conducted with the occupant as a respondent. This interview was carried out in low-income housing complexes located in Central Jakarta, representing an area with the highest population density (23,132 people/km²) (BPS 1998). The interviews carried out were face-to-face interviews, using questionnaires and tape-recording.

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The proportionate stratified random sampling was employed determined for the research, was sought proportionate samples from 10% of the total units available. The number of samples to be taken are a total of 71 units or households which is particularly those living in particular type of 18 sq.m units.

There were 3 (three) major areas of information and assessment covering information as follows: (1) general and socio-demographic information to obtain this information, the interviewer interviewed 1 (one) adult family member who was considered to represent the household's general and socio-demographic information; (2) diary log of occupant's behavior pattern (daily basis) to obtain this information, the interviewer interviewed 1 (one) adult family member who was considered to represent the household's experiences for information on general activities and behaviour of the family members as a whole; and (3) occupant's perception of their existing residential setting. For this information, it is expected that it was necessary to interview a minimum of 1 (one) adult family member per unit as representative of the household's perceptions of their unit and housing complex.

Field observation & photography were also conducted in this study. The researcher in this observation section took photographs. This observation was non-participatory. Physical housing units and facilities to be observed were randomly selected and this visual information used to illustrate the existing housing units and complex.

Results and Discussion

Coping with Physical Environment:

The Case studies of Low-Income Housing in Jakarta

One of the major issues facing the city of Jakarta, Indonesia, as stated in the city's master plan for 2005, is the problem of housing. Specifically, this concerns providing homes that meet the demands of both physical well being and psychological needs of occupants. To date such expectations have not been fulfilled. Early research has shown that what housing has been provided tends to concentrate on the minimum space requirement for housing units in terms of economy of floor space, types and number of rooms. Initial research has also indicated that it is in response to these spatial disadvantages by occupants that they have sought various coping strategies to deal with their particular physical environment leading to an adaptive use of their architectural setting.

The focus of this paper, as an outcome of fieldwork findings, concerns how occupants have

dealt with various physical domestic environments. This will discuss the coping strategies adopted by inhabitants living within 18m sq low-income housing units in Jakarta to their physical environment. These strategies, as defined by Bell, Fisher and Loomis, such involve both adaptation and adjustment where adaptation represents the way in which individuals change their behaviour to suit the physical demands of their home, and adjustment reflects the manner by which individuals reorganize the environment to satisfy their behaviour (Bell & Fisher 1978). It is these conditions that will be addressed as an outcome of fieldwork case studies that investigate in more depth the nature of coping strategies undertaken by occupants to render their domestic environment more meaningful to themselves.

The Importance of Human Dimension in Architecture

It is the reality that, for many centuries, human beings have modified their environments by creating a human-built world to augment their natural settings (Bell & Fisher 1978). The formal process of design which is concerned with the needs of human beings is therefore required to anticipate unexpected modification of their environment. The facts indicate that: (1) the dominant situation in modern life is that individuals live in a setting which was not built for them (Boutourline 1970); (2) in the current design process, which involves the three principal roles of the owner, the architect, and the regulatory government, behavioral data is not currently developed and quantified for the purposes of a building or planning project, nor is feedback a part of the process. The user of a building is not, with rare exceptions, a participant in the design process. The owner is often represented by an agent in the design meeting, but the agent almost always represents the administrative staff of a building, not the served occupants (Heimsath 1977); (3) architects who have attempted to create a well-built environment, have a tendency to rely more on their intuition and experience (Sears 1985); and (4) poor communication between users and the environmental planner and designer (i.e. architects, planners) and their tendency to turn towards expert knowledge instead of user needs has become another disadvantage perceived by the users of buildings (Sarwono 1992).

Environmental design has been established as the formal process of adjusting built-environment to meet human needs more effectively (Bell & Fisher 1978). The importance of the human dimension in architecture is becoming crucial to consider. It can be seen clearly from Izumi's diagram toward

psychological phenomena and building design. The diagram as seen below in the Figure 1, is useful in understanding the meshing of human and non-human components in architectural fabric. A fundamental premise behind the investigation into the field of environment and behaviour involves the assumption of a systematic interrelationship between architecture and patterns of human behaviour. Those buildings containing both people and objects need to be more humanized (Holahan 1978).

Residential buildings are one example to be considered in this light.

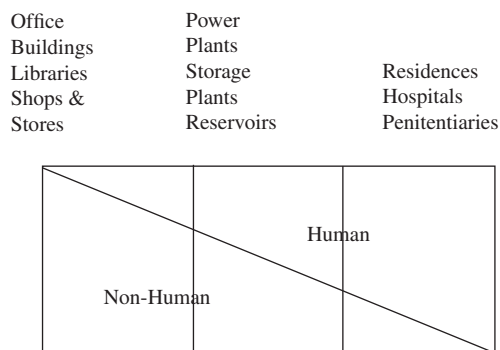


Figure 1.
The Field of Design (Izumi 1965)

A successful result of an environmental design is influenced by important factors. One of the factors which influence an environmental design result is a need to understand the criteria that has to be met in a well-built environment. The criteria is as follows: (1) to meet the needs of user behaviour implemented in functional and floor space requirements; (2) meets the standard of physiological condition; (3) meets the standard of perceptual condition; and (4) meets the standard of social condition (Sarwono 1992). In addition to the criteria meeting the needs of the user, it is also said by Zeisel that to incorporate the user requirements into the design process, distinctions should be made between user needs and user wants. User needs are the basic functions involved in any environment. For example, a family living in a physical setting should have provided the minimal space and amenities for meeting primary needs. However, users wants are more likely to be physical settings, which provides "beyond" of the requirements of basic living environment (Zeisel 1975).

Another perspective on how are we make our designed environments work better is written by Friedman, Zimring and Zube. They highlight that we must concern ourselves with all aspects of the

building design process: fine tuning the existing structures, improving new designs, improving minimum building standard and life safety codes, clarifying user needs and preferences, and improving public housing programs. They also clearly stated that we must retain and improve ideas that succeed and abandon those ideas that fail (Friedmann & Zimring 1978).

The question that may be raised here is how are designers or architects to be made aware of user needs in order to develop design alternatives. In the book written by Bell, Fisher and Jeffrey and Loomis it was said that no single idea occurs more frequently in studies linking environmental design and behavioural science than the concept of user needs or benefits (Bell & Fisher 1978). One example of such a set of user benefit criteria has been proposed by Murtha (1976 in Bell & Fisher 1984). The term user benefit criteria emphasizes end goals: the maximization of gains or advantages that people will realize from the use of planned environments. Murtha's criteria are classified as four dimensions of user benefits: behaviour facilitation (functional conformance & spatial conformance), physiological maintenance (climate conformance & hazard regulation), perceptual maintenance (sensory initiation & sensory conformance) and social facilitation (social initiation & social isolation). User-oriented design criteria not only make such needs an important consideration but also emphasize the active role of users in the design process (Bell & Fisher 1984). In addition to this, it is highly desirable to have explicit behavioural criteria in mind before a new building or setting is constructed. Specification of behavioural criteria is then thought important for the effective communication between behavioural scientists and designers or architects (Bell & Fisher 1984).

In relation to the Izumi diagram on the meshing of human and non-human components in architectural fabric, the case studies of low-income housing in Jakarta should be considered to be design focused towards the human. The case studies will consider the importance of the human dimension in architecture and essential for build a well-designed environment. Design ideas geared towards human psychological requirements particularly in the case of low-income housing in Jakarta, will start to consider the needs of the users' behaviour, the users' perception, the users' preference towards the home that relates directly to themselves. The active role of the user in the design process is therefore taken into account. It is expected that the resulting alternative

design ideas will satisfy and support the explicit and implicit needs and values of the occupants through the improvement new designs, the improvement of minimum building standards, and clarification of user needs and preferences, etc.

Human Behaviour in relation to Physical and Social Environment

Each particular architectural setting has its associated characteristic patterns of behaviour. However, common sense is often a poor guide to appreciating the specific relationship between design and behaviour, and empirical assessment of the actual performance of any given architectural setting will often prove both surprising and instructive (Prohansky & Ittelson 1978).

A particular designed physical setting may be expected to evoke, or at the very least to serve as the locus of a range of expected behaviours whose variations could be studied as a function not of physical parameters but of those complex social and psychological determinants that are rooted in all human activities and relationships (Prohansky & Ittelson 1978).

A designed Physical setting is produced not only to meet specific needs, it is also expected to possess the capacity to satisfy the occupants in order to widen freedom of choice. A critical aspect of peoples' behaviour is that freedom of choice in relation to the physical environment. Whatever the primary purpose that brings an individual to any given physical setting, the setting must not only express a capacity to satisfy the primary need and other relevant subsidiary needs, but it must also allow for goal satisfactions that are only remotely related to the primary design aims. Any physical setting that provides many alternatives for the satisfaction of primary purpose and the satisfaction of related and unrelated subsidiary purposes obviously provides considerable freedom of choice (Prohansky & Ittelson 1978).

However, any designed physical setting will be successful if it is able to serve not only the individual, but also society. Society signifies a group of people who share a common habitat and who are dependent upon each other for their survival and well-being (Harris 1980). The classes differ from each other, not only in amount of power per capita, but also in broad areas of patterned thought and behaviour called "life-style" (Harris 1980). From most anthropologists point of view, it is said that every human society has to have cultural provisions for its

behaviour and thoughts, relating to making a living from the environment, having children, organizing the exchange of goods and labour, living in domestic groups and larger communities, and for the creative, expressive, sportive, aesthetic, moral, and intellectual aspects of human life (Harris 1980). And it is from anthropological perspective that culture of human means a socially acquired life-style of a group of people including pattern, repetitive ways of thinking, feeling and acting (Harris 1980). In the case of the architectural design of the Pruitt-Igoe Housing Project in St. Louis, Missouri, there is an atomizing effect on the informal social networks frequently found in lower and working-class neighbourhoods. Without the provision of semi-public space and facilities around which informal networks might develop, families living in Pruitt-Igoe retreated into the internal structures of their apartments without the social support, protection, and informal social control found in other low and working class neighbourhoods (Yancey 1976).

In the case of low-income housing in Jakarta, both physical and socio-psychological problems are to be found. Using a previous study, problems concerning physical housing conditions have been identified as having a minimum space for the unit, a minimum floor space provided for most of the rooms available in the unit and minimum types of room available (Komarudin 1997). The needs of the occupants to facilitate their behaviour seem to have been insufficiently considered. The case studies will be conducted is an attempt to resolve and further analyse these issues. It will focus upon behaviour patterns and the actual space needed to accommodate the needs of occupants with their activities in such a contemporary neighbourhood, characterized by a very heterogeneous unit based on the nature of the geography, the numbers and kinds of people, the socio-economic status of these people, their ages, cultural background, and housing form (Altman & Wandersman 1987). The behaviour pattern of occupants will be investigated to see how the spaces function in the units and housing complex.

Human Perception in relation to Physical and Social Environment

Perception is that part of our mental process by which, from our own particular point of view, we engage with the world around us in which we experiences and strive to gain satisfaction (Ittelson 1969). The function of perception itself is to bring us into contact with the world outside ourselves.

Furthermore, this contact is through our belief that the only things we can know about the world come to us through the medium of our senses (Ittelson 1969).

Human perception toward the environment is defined and characterised as follows: (1) human perception toward the environment is relatively based on the interaction occurring between each individual (with his/her personality, background and experiences) and the environment in which he/she lives (Sarwono 1992); (2) human perception towards the environment includes cognitive, affective, interpretive, and evaluative components, which are all operating at the same time (Ittelson 1978); (3) human perception towards the environment encompasses the meaning we derive from an environment. Does the environment make sense to us? Does it remind us of past experiences? Does it suggest ideas? Can we interpret the events in the environment in a meaningful way? (4) environmental perception includes the valuation, or determination of good and bad elements. Indeed the affective and evaluative components of environmental perception are the roots of forming attitudes toward the environment (Fisher 1984); and (5) environmental perception has at least three other characteristics, which are: firstly, the person perceiving an environment does not simply look from an angle at those things, which can be seen without turning ahead. The person brings individual goals and values into the perceptual experience, as well as group socio-cultural influences.

Previous studies on low-income housing in Jakarta have reported that low-income housing occupants have their own perceptions, not only toward their physical setting but also toward the social and psychological aspects. The socio-psychological disturbance of occupants, include feeling restricted when having guests visiting their home, noise, feeling uncomfortable, difficulty to concentrate, not being creative, not feeling free to do their own activity, making it difficult to work and study at home, not being able to talk freely, and restricting relationships with neighbours. Physiological and technical disturbances are also perceived by occupants such as the lack of space available creating poor air circulation in the room resulting in a feeling of stuffiness, a difficulty in making space arrangements, not feeling free to turn the radio on, difficulty in moving freely and following your own interests (Komarudin 1997).

In conclusion from the reviewing literature, previous study indicated that the occupants feel that housing currently available does not meet their needs and felt unsatisfied (Komarudin 1997). Expectations

toward housing of low-income housing occupants are also reported from previous research. Expectations are to have public transportation reaching their housing area; to have school facilities; to have good electricity facilities and drinking water; to have well-secured stairs to use; to have good connection between blocks; to have shops available within the complex; and to have a feasible place for entertaining guests at home. It is also reported that the occupants complained that the response to damage occurring in the building or facilities is poor; the water pipes are often clogged up; security facilities are not guaranteed; the building and its environment is not well-maintained; the fire protection systems are not well equipped; the population density in the complex is too high and the use of stairs causes noise; there is a lack of communal and community facilities provided in the complex. In addition to that, the occupants also complained that the rental price was too high and unaffordable (Komarudin 1997).

Based on the findings of the occupants' basic perception, the case studies that will be conducted will investigate further perceptions of the occupants. The study will eventually expect to discover what would be the designed environment that begins to address the perceptual and physical conditions of occupants.

Coping with Physical Environment

Even when we are dramatically affected by the physical setting within which we live, we typically remain unaware of, and insensitive to, such environmental influences (Prohansky & Ittelson 1978). A need to cope with the physical environment is initiated upon the perception of the environment by an individual, in interrelation to physical objects. If this perception cannot be accepted by the human, it then will be followed by stress and the effort to cope with the environment as seen in the Figure 2 (Bell & Fisher 1978).

Successful coping strategies involve adaptation and adjustment. Adaptation is the way in which we change our behaviour to fit environmental demands, while adjustment is the way in which we change the environment to fit our behaviour (Bell & Fisher 1978). Two examples of specific adaptation behaviours in residential settings are the orientation and the determination of compatible functions for specific areas. To the extent if a residential environment facilitates functional adaptation, we tend to be satisfied with it (Bell & Fisher 1978), whereas the adjustment method of coping is altering or designing

an environment to make it more compatible with human needs and behaviour (Bell & Fisher 1978).

Research studies of environmental coping in a low-income community of inner city residents say that while the residents are seen to be powerless to alter the physical qualities of their neighbourhood setting, they are able to redefine the function of available outdoor space to conform with existing social demands. Thus, spaces designed initially for non-social functional tasks can be reclaimed by community members to perform informally as casual social settings (Holahan 1978).

It also has to be acknowledged that environmental coping is dynamic. One of the concepts of dynamic aspect of environmental coping is identified by Holahan. Three features of environmental coping reflect its essentially dynamic nature: (1) it is an active human process; (2) it reflects a high level of personal resourcefulness; and (3) it is characterized by individual differences (Holahan 1978).

In the case of low-income housing in Jakarta, previous research indicated that occupants of low-income housing have a tendency to cope with their given environmental setting for many reasons. It was found that the occupants of low-income housing tend to spend most of their time outside their home/unit, letting the unit door remain open at all times, locating the chairs/sofas under the stairs, looking after their children in the corridor or stair areas and letting their children spend most of the time playing outside the unit or in the housing complex (Sarwono 1992). The disadvantages they perceive, will thus make them disappointed with a resulting stress on their lives and that will influence their behaviour (Komarudin 1997). The attempts of several occupants to cope with their physical setting are an indication of one-way to accept what is available or to overcome problems for themselves (as mostly conducted by the low income housing occupants so far), others overcome

the problems together with their community, or try to report to the building maintenance officer (Komarudin 1997). The case studies of low-income housing that will be conducted will investigate more clearly the would-be behaviour of coping with the environment (adaptation/adjustment), made by the occupants in order to make their living environment more meaningful for themselves.

Housing in Jakarta - Indonesia

To meet such housing demands for different levels of income groups, the strategies and methods of implementation to be considered are to execute housing improvement/urban renewal programs and new housing development. The housing demands were indicated where there is a gap of the housing needs and the housing stocks. The Figure 3 and Table 1 below explain the gaps on each parts of the city of Jakarta. New housing development, the city council of Jakarta determines the system called mass housing development, which is one option taken that may respond to the housing demands.

PERUMNAS (national urban development corporation), a state housing enterprise established in 1974, has built 24,000 units annually in urban areas of Indonesia (ADB 1984). Between 1979 and 1999 (throughout the third to sixth development plans of republic Indonesia), PERUMNAS built 21,097 housing units (both vertically & horizontally built) for low-income groups living in Jakarta (JAKARTA 1998).

Several of the housing development objectives in the city of Jakarta are essential to meet the housing demands of all households according to affordability and group aspirations, comfort and adequate housing environments that have proper infrastructure access as a sub-system of the city of Jakarta as a whole.

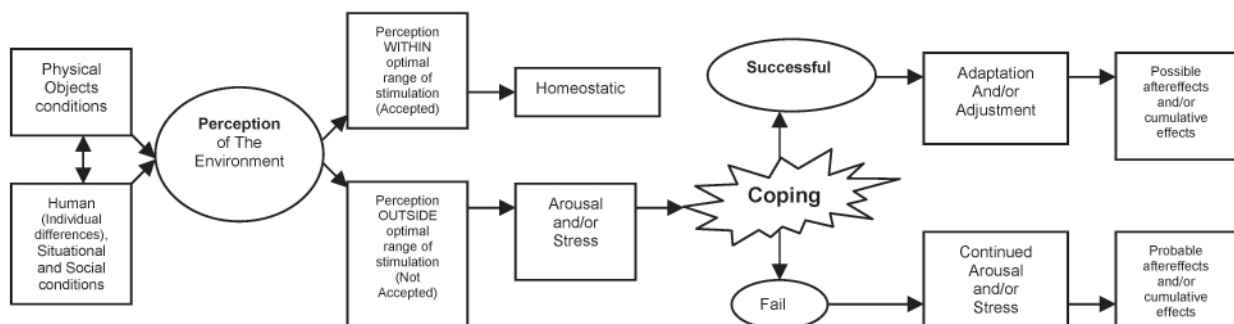
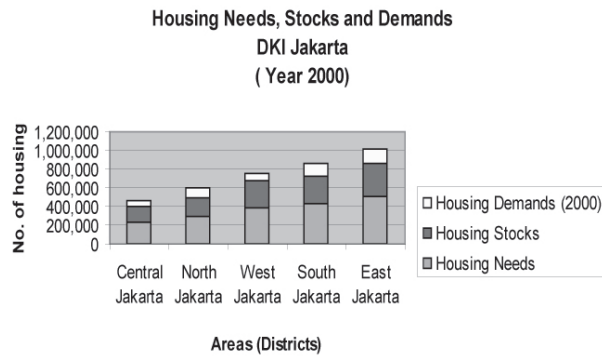


Figure 2.
Conceptual Model of Environmental Adaptation
Source: (Bell, Fisher & Loomis 1978)

**Figure 3.**

Housing Needs, Stocks and demands in Jakarta
in the year of 2000

Source: Jakarta City Council (2001)

Jakarta City Council plans to execute housing programs by developing zones for DKI Jakarta in 2005. The sites in the west, east and central development zones of Jakarta City, covering about 13,000 Ha, have appropriate planning for housing developments. Infrastructure is already in existence in these zones as indicated in the Table 2.

Spatial Housing Standard

The types of housing units provided in Jakarta for low-income earners are produced within the range of 12 m²–72 m² per unit (built both horizontally and vertically). However, vertically-built, units are only available within the range of 14 m²–51 m² per unit (Komarudin 1997).

Legislation issued by minister of public work No. 60/PRT/1994 (Now: ministry of housing and region infrastructure development) with regard to the technical requirements for housing, requires the minimum floor space of housing unit to be 18 m² with minimum frontage width not less than 3 meters. In addition to this, housing units with the minimum health condition standard has to meet a minimum space of 12 m²/person (18 m² for two persons, 27 m² for three persons) (Komarudin 1997).

The statistical data for housing in Jakarta obtained from the Housing and Region Infrastructure Department indicates that by the year 1998, the percentage of households with a space of less than 10 m² per person is 32.31% (Development 2002).

Table 1.

Housing Needs, Stocks and demands in Jakarta in the year of 2000 and Prediction for 2010

No	Areas	Housing Needs	Housing Stocks	Housing demands (2000)	Housing demands (2005)	Housing demands (2010)
1	Central Jakarta	227,827	166,214	61,613	65,691	70,039
2	North Jakarta	298,970	195,108	103,862	110,736	118,065
3	West Jakarta	380,201	303,978	76,223	81,268	86,647
4	South Jakarta	428,177	297,031	131,146	139,826	149,080
5	East Jakarta	508,763	354,451	154,321	164,525	175,414
	DKI Jakarta	1,843,938	1,316,782	527,156	562,046	599,246

Source: Jakarta City Council (2001)

Table 2.

Housing Needs, Stocks and demands in Jakarta in the year of 2000 and Prediction for 2010
Housing Development Plan by Zone for DKI Jakarta 2005 is provided as seen belows:

Housing Development System/ Zones Development	Total Hhs Increase 1980-2005	Infill	Development in New Area			RENEWAL		
			Guided Land Dev.	PERUMNAS	Real-estate	Individual/Private Org.	Government	Individual
North Dev. Zone	196,000	133,000	---	30,000	8,000	20,000	5,000	---
North West dev. Zone	110,000	---	28,000	12,000	8,000	62,000	---	---
North East Dev. Zone	117,000	---	---	18,000	3,000	96,000	---	---
Tanjung Priok Dev. Zone	103,000	29,000	---	---	1,000	60,000	6,500	6,500
Central Dev. Zone	248,000	145,000	---	3,000	5,000	78,000	3,500	13,500
West Dev. Zone	365,000	---	73,000	40,000	70,000	182,000	---	---
East Dev. Zone	320,000	34,000	38,000	30,000	27,000	191,000	---	---
South Dev. Zone	150,000	---	---	15,000	18,000	117,000	---	---
Total	1,609,000	341,000	139,000	148,000	140,000	806,000	15,000	20,000
	(100%)	(21,2%)	(8,6%)	(9,2%)	(8,7%)	(50,1%)	(0,9%)	(1,2%)

Source: Report of Team Housing Sector, Master

Spatial housing data suggests therefore that housing in Jakarta still needs to be improved in relation to this floor space plan.

Research conducted in Kemayoran housing complex phase I as one of housing complexes located in Central Jakarta. This Housing complex, which was built in 1990, constructed on the 7.10 ha development land area. Numbers of blocks are built within this area accounting for 21 blocks comprising of 1,472 units. Those consist of different types of units indicated as type 18, 21 and 36 sqm units, which 704 units of those are indicated as type 18 sqm units.



Figure 4.

Five Storey buildings of Low-Cost Housing block

Housing Conditions

Typical 5 (five) storey buildings were designed with a typical design for ground floor used for the social facilities and the first to fourth floor used for the units (see Figure 4). The 18sqm unit design consists of bedroom and balcony. Bathroom and kitchen are also provided and used communally with another household. Those communal rooms are located at the end of the corridor and available typically each floor to serve the occupants. The Floor Plan and Lay Out of this 18sqm units block as shown in the Figure 5.

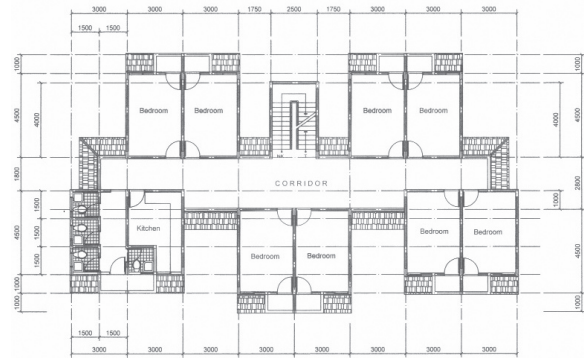


Figure 5.

Floor plan of 18sqm units building

Socio-Demography Condition

The average age of respondents found about 37 (thirty seven) years and those living in the unit are 4.18 people in average per household. The average monthly income/hh is Rp.1,420,289.86 or (A\$ 280). Majority respondent's religion found as Moslem people indicated up to 83.1% and majority respondent's ethnic found from Central Java accounted up to 38%. Most of respondent's occupation is housewives (53.4%) with senior high school level of education (54.9%).

Occupant's Perception of Rooms within Unit

Semantic scale was used to indicate occupant's perceptions. The scale of 1 to 5 was adopted which the value of 1 to 5 means increasing from negative to positive responses. The means of 3.00 above obtained is categorized for a positive response and below those are categorized for a negative responses.

Perception criteria were identified covering specific information required to understand occupants' level of perception toward the quality of rooms questionned within unit. There were 16 (sixteen) criteria questioned and 1 (one) question asking the occupants' perceptions' level for the each type of room as reported in the Table 3 below.

Types of Activities of Occupants and Functional Space Adjustment

The rooms within units were used more than its original functions except for bathroom and kitchen. The bedroom is not used only for sleeping. The occupants do other activities in the bedroom area such the activities as having meals, studying, working, chatting, sitting, relaxing (get together with

Table 3.
Perceptions Assessment for the Types of Room within the Units

Perception Criteria	Types of rooms				
	Living room*)	Bedroom	Bathroom (communal)	Kitchen (communal)	Balcony
The number of room	1.87	2.32	3.39	-	-
The availability of floor space	2.00	2.45	3.11	2.39	2.01
Extension of room	1.08	1.08	-	1.08	-
Flexibility of the room to function	2.51	2.68	-	2.38	2.23
The shape of room for usage	2.72	3.28	3.94	3.31	2.74
The natural lighting of room	4.53	4.46	-	4.15	-
The glare from window	4.43	4.45	-	4.79	-
Heating condition of room	3.04	3.03	3.85	3.65	-
Stiffness of room air	3.68	3.89	-	3.90	-
The room's air circulation system	4.34	4.46	4.16	4.37	-
The room level of humidity	4.74	4.63	3.86	4.34	-
Visual Privacy of room	-	3.77	-	-	-
Conversational Privacy of room	-	3.94	-	-	-
Having comfortable place to be alone	-	1.18	-	-	-
Having place to store any own possessions	-	3.24	-	-	-
Having a lock for the room	-	4.79	-	-	-

*) The layout rooms originally available within unit only bedroom and balcony; the living room is created based on needs (functional/physical space adjustment made originally from bedroom).

the family), playing (playing space for the children), baby bathing, ironing, praying, preparing food to sell, watching TV and listening to the radio. The activities taken place in the other room within the unit such as balcony are also interested. Other than its function for chatting, sitting, relaxing the balconies are also used for cooking space and storage even drying space.

Even more than that, the used of communal space like corridor is more than its function. The corridors are used for the occupants to have chatting, sitting, and relaxing. Beyond its common function as mentioned the corridor is also used for the place to eat, the space for children to play, the space for drying clothes, the space to do ironing activities even more for studying.

Physical Space Adjustment

From the activities described it is clearly indicated that occupants do some functional space adjustment. To accommodate their needs and do their activities the physical space adjustment required and made by occupant including their effort to provide a various types of furniture in the main room (bedroom). Having mat or carpet to sit on the floor for doing various types of activities is one of examples how the occupants do some physical space adjustment. Dinning table, sofa, study desk, ironing table were also available in the room like bedroom, which is not supposed to be. It is also provided in the balcony the rack for cooking tools and the cooking stove which also not supposed to be

there. Putting sofas, dinning table, ironing table and aquarium are common things to be allocated in the corridor area (see figure 6 & figure 7). The corridor even used for drying space with wire/string available anywhere. The corridor conditions seem to be more personal used instead of communal space.



Figure 6.

Corridor used overused for more personal space



Figure 7.

Corridor used overused for more personal space

Other than altering the function of the rooms the occupants also do some expansion. Those are living on the top floor expanding the area of bedroom by creating the new space in the ceiling area for additional sleeping space or storage as seen in figure 8 & figure 9.



Figure 8.

Expansion space toward the ceiling area



Figure 9.

Access made for reaching the roof expansion space

In addition to that, the use of partition in the unit is also taken place as indicated in Table 4 below. It clearly shows for about 36.6% of the units visited using Partition to split the space.

Table 4.
The Use of Partition in the Unit

No	Types of Partitions	Percentage
1	Full-partition (plywood)	2.8
2	Semi full-partition (plywood)	8.5
3	High-furniture used (>1.80m)	12.7
4	Short-furniture used (<1.80m)	2.8
5	Curtain	9.9
6	No Partition used in the unit	43.7
7	No response	19.7
Total		100.00

Types of Adaptation Behaviour made by the occupants

The occupants not only have to do some space adjustment for them to live. They also have to adapt themselves with the physical setting given to them. Adaptation behaviour to the physical setting with its all limitation and restriction given to them today was not always easy to make. Their efforts to adapt with the environment are not always perceived improving their life. Some adaptation behaviour they need to manage making them worsen than the previous living condition they ever had.

The types of occupant's adaptation behaviour which perceived improving their life as identified bellows: (1) having more sport as the sport court available; (2) having much better socialization (good neighborhood, no drug used within the neighborhood); (3) living more comfortably for the used of communal bathroom only for 2 households; (4) staying home most of time as spacious room available to use internally; (5) having shower without draw water from the well; (6) busy with more order for cakes to sell within the neighborhood; (7) having more playing/socialization as the social facilities available; (8) having chance to raise the fish for hobbies; (9) cooking without oil stove (currently with gas); (10) sleeping at earlier time (quite and convenience place to live); (11) leaving time from home a bit latter as workplace location is closer; (12) living with feeling free and protected from flood; (13) living with good attitude have to perform (neighborhood watch from cultural value); and (14) having more privacy living with core family (more relax to do activities).

The types of occupant's adaptation behaviour which make them perceive worsening their life which means worsen than the previous living condition they ever had, as identified bellows: (1) have to bring bath tools to the communal bathroom; (2) have to share the bathroom with another households; (3) have to take turn for shower; (4) have to provide and bring cooking devices/materials to cook to the communal kitchen; (5) have to share the cooking space and devices with another households; (6) have to take turn for cooking; (7) never have socialization as bad neighborhood society; (8) have to share the bedroom with the others family members; (9) have to leave gardening activity; (10) stay outside more often (get bored unit's space perceived too small); (11) less attending religious activities (less religious society around); (12) have to get up earlier to go to work where currently is far; (13) less privacy as the distance between units perceived too close; (14) having more socialization and friends

with bad habits (including alcoholic drinks and drugs); (15) have to having meals (breakfast, lunch and dinner) in the corridor area; and (16) have to feed the kids in the open space as limited space at home perceived too small.

Conclusion

The housing provision need to be enhanced to meet housing demands. Low-income housing occupants have their own perceptions, not only toward their physical setting but also toward the social and psychological aspects. The negative perceptions of the occupants toward their housing units will be followed by their effort to cope with their physical environment.

Perceptions of low-income housing occupants living in 18sqm units, concerning in a few points identified as the number of room, the availability of floor space, extension of room, flexibility of the room to function and the shapes of room to function. In addition to that, satisfactory level for the rooms is also found. Satisfactory level of occupants is positive for the bedroom, bathroom and kitchen. However, occupants' perceptions toward the rooms within unit negatively received for the living room and balcony.

The occupants made coping with the physical environment. The occupants' perception toward the environment are outside their optimal range of stimulation which referring to conceptual model of environment adaptation it then clearly brought those to cope with the physical setting where they live. The coping conducted for both adjustment and adaptation. Functional and physical space adjustments are made by the occupants including the used of bedroom more than for sleeping purpose, the use of bedroom for multi purposes, the use of balcony for other purposes other than its functions and the function of the corridor, which is more personal rather than communal space. Adaptation behaviours are also made by the occupants, which make the occupants' lifestyle have changed for the betterment on one hand and worsen on the other hands.

The findings thus clearly demonstrate that space and behaviour are interrelated in low-income housing, and that occupants of low-income housing have to cope with their physical setting in various ways.

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