

The Making of Flexible Design Process for Taiwanese Housing Developments

Dr. Kuo-Hsun Wen*, Prof. Kin-Tak Lam **

* *Division of Business and Management, United International College
Zhuhai, China, khwentwcat@gmail.com*

** *Department of Information Communication, Leader University
Tainan, Taiwan, lamkt@mail.leader.edu.tw*

Abstract: This paper proposes a human-centered design approach to provide a model of flexible design process for private housing development in Taiwan. By integrating the concepts of Open Building and Open Source Building theory, this paper suggests the scope for the ongoing customization of individual units within housing developments that intends to facilitate real-world, sustainable development for the Taiwanese housing market. Also, it argues that the current market-led design approach creates inherent problems for the Taiwanese housing sector. However, in Taiwan's housing and urban planning sectors are coupled with entrenched, unsustainable decision-making from housing developers and particularly the intractable communication gap between developers, architects and homebuyers. Architects often lack professional integrity and serve the interests of developers before those of home occupants and the wider community. Growing global awareness of sustainable development has recast housing as an intrinsic component of the urban environment and successful communities. In Taiwan, short-term profitability rather than long-term sustainability drives private housing. Through a series of exploration to current design process and based on the principle of design management, this paper will 1) analyze the flawed relationships between Taiwanese developers, architects, interior designers and homebuyers, explaining how these lead to inferior housing design and the waste of significant human, material and financial resources; and 2) then concludes a model of flexible design process integrated the concepts of human-centered design approach, Open Building and customization to townhouse development practices. As a result, such approach can significantly improve the flexibility of present design process in terms of better meeting end-user requirements, the demands of sustainability, whilst ensuring the continued commercial viability of housing developments.

Keywords: *human-centered design approach, flexible design process, sustainability, designer client relations*

1. Introduction

As is the case in many parts of the world, private housing in Taiwan is developer-led, the rapid realization of profit being the main driver in design and development. Marketing involves the public 'profiling' of a housing product and includes extensive media advertising, prominent billboards and establishment of a marketing office

and display suits. It is primarily concerned with the artificial stimulation of consumer desire and demand, where homebuyers choose between stylistically differentiated options provided entirely by market [1]. Homebuyers wanting a dwelling on their own piece of land create the private market for homes in cluster housing developments in urban areas. Since supply currently outstrips demand developers seek to maximize sales through aggressive marketing strategies that stress the latest styling and luxury enhancements like spa facilities or home movie theaters.

As a result, a very ordinary urban scene to be perceived in Taiwan is the sumptuous display house/unit next to construction sites as developers' common strategy to attract homebuyers by creating the image and atmospherics of so called "dream home". However such strategy often leads to a failure that ignores what a flexible design process can achieve for homebuyers [2]. Taiwanese display house usually designed with many luxurious options trying to create qualities of a dream home, giving a sense of what homebuyers would be like to live in after construction, regardless of the unsuitability and difficulties of the actual site as well as the expense. The reality of the finished housing unit, minus the luxurious interior décor and appliances of the display house, could be very different. Undoubtedly, Taiwanese housing developers put considerable energy into maximizing sales and profits for their developments through heavy marketing. Marketing stresses quality of life, security and new technology leading developments of reflecting life in a five-star hotel and luxurious facilities [3]. However, inexperienced homebuyers often ignore this. Consequently, such situation raises considerable issues to housing developers and in Taiwanese housing market which reflecting up-scaling trends of desirable living environment. (Figure 1, 2)



Figure. 1 Taiwanese display house – the front and facade [4]



Figure. 2 Taiwanese display house – interior [5]

Above figures present a common alignment of a display house next to construction site in Taiwan but ignore how alteration can be made to correct current process of housing developments in order to meet homebuyers' actual needs. In conjunction with the glowing awareness of sustainability, such consideration must focus on the application of using human-centered design approach as the prime concern to also improve designer client relationships in the process of housing development. Therefore, the examination has to be implemented on not only the current process, flawed relationship between designers and homebuyers but also the application of using new model building form as innovative approach to enhance the flexibility of design process and housing development.

2. Designer client relations in Taiwan

According to Lawson, relationships in housing development revolve around the different combinations of four primary players, these being between client/developers, legislators/building regulators designers and user/homebuyers. These relations represent constraints that need to be confronted to improve outcomes for all involved in the development process but they also identify key intervention points where outcomes could be improved [6]. In Taiwanese cluster housing developments decision-making is currently skewed towards developers. The traditional image of the architect establishing a personal relationship with a client who is the future occupant of a home does not apply in this sector, where many architects provide little more than a drafting service that converts developer demands into plans. Developers control the ‘lead’ companies in the construction industry and their decisions and preferences dominate both the design and construction process [7]. Their control makes the architect’s task of understanding user needs and preferences inherently difficult [8].

Architects are seldom involved in project planning or recommending design options even though three separate parties — developers, architects and homebuyers — have a stake in the design process. Lawson argues that world wide, ‘The vast majority of design ... is commissioned by clients who are not themselves the users [9].’ For Michael Wilford, this creates inherent issues for design outcomes, since:

Behind every building of distinction is an equally distinctive client, not necessarily high profile, but one who takes the time and trouble to comprehend the ideas of the architect, is supportive and enthusiastic, who is bold, willing to take risks and above all can hold their nerve during the inevitable crises [10].

Wilford identifies the client as a creative partner in the design process but in Taiwan architects continually defer to developers while the future purchasers and likely eventual occupants of units in cluster housing developments never come into contact with architects [11]. Ziesel calls this the ‘gap’ between the ‘paying client’ and the ‘user client’, arguing that it can cause fundamental problems even when there is good communication between designers and those directly paying for their services [12]. User-centred design demands direct interaction between designers and end-users through the institution of communication and design processes in which meaning is created and shared [13]. Ideally, the design stage is where user clients express their needs and preferences to designers [14]. If this were to occur in the case of Taiwanese cluster housing developments it would allow designers to then liaise with developers and marketing professionals on homebuyers’ behalf.

3. An integrated model process for Taiwanese housing development and design

The future of housing development in Taiwan requires the introduction of user-centered design approach at specific stages of the development process in order to establish new housing forms that better accommodate homebuyers’ needs and expectations over the life of a dwelling. The scenario method introduced here is built on the premise that those who can directly control the details of the housing product, including developers, marketing professionals and designers, must interact with potential homebuyers. Scenarios of use can lead designers and developers to a deeper commitment to the actual needs of potential homebuyers, greatly enhancing the practical implementation and ‘workability’ of the user-centered design process (UCDP).

3.1 Stage 1: Planning and Development

A new housing development normally begins with Land Development and Evaluation, which has its own internal iterative cycle initiating further decisions to advance the development. At this stage, marketing is usually the major concern and driver of design decision making for developers. The outcome of this stage is normally to specify the development of a designated site for an identified market by a specific development team with a defined financial program. In general, Stage 1 is the main phase in which market studies and analyses are conducted, the target market identified, and the location, price range and total floor area of the development settled on.

The addition of an HCDP at this stage links marketing objectives to the process of obtaining a real understanding of homebuyers' needs. It includes the input of census data related to the Taiwanese housing market, the monitoring of feedback from previous housing developments, learning from other housing developers' experiences, QFD and the subsequent creation of hypothetical homebuyer scenarios. Apart from employing QFD to advent appropriate housing developments for developers and marketing professionals, the other method - post-occupancy evaluation (POE) can be regarded as the source of the most valuable information in planning new housing development, enabling rapid improvement. A POE typically focuses on assessment of client satisfaction and functional 'fit' with a specific space and typically, the criteria for judgment are the fulfillment of the functional program and the occupants' needs [15]. Therefore, developers can employ POE to ensure the homebuyers' needs are incorporated into the design process because the POE process is usually intended to make the built environment design process more scientific and research orientated [16]. More importantly, the design process should be cyclical in nature and incorporate feedback [17]. Therefore, it could be very beneficial to developers particularly in receiving feedback from homebuyers of previous housing developments. In conjunction with Norman's argument about activity-centered design discussed earlier, Zimmerman and Martin clearly state that 'A proper POE will provide real information on which to base decisions, and real information is key to informing and improving the next project [18].' Evidently, in Taiwan, many design decisions for housing developments that usually are made in stages of programming and design are mostly based on architects' and designers' assumptions of how the dwelling functions and how homebuyers use their spaces. Therefore in the planning and development stage, developers and marketing professionals can employ activities for considerations of human-centered design approach in parallel with traditional marketing strategies to better facilitate housing developments and better accommodate various homebuyers' needs.

3.2 Stage 2: Programming and Design Development

This stage is central to the entire housing development and is comprised of two parts: "Concept Development" and "Design Implementation". These phases are generally conducted sequentially by architects and designers, such as schematic design and design development to generating design concepts. In this stage, the HCDP platform suggests architects and designers to employ a user scenario strategy in opposition to the conventional response to developers and marketing professional's instructions. It overcomes the problem of not knowing who potential users are and not understanding their needs and preferences, resulting in more flexible outcomes that accommodate the unpredictable needs and preferences of future homebuyers.

3.3 Stage 3: Pre-sale

The “Pre-Sale” stage in Taiwanese housing developments normally overlaps the latter period of design development. It is a stage that responds to end user testing and user involvement phases that links to the period following architectural design for finalizing design and working drawings before commencing the construction stage. Salespersons are in the ‘front line’ at this stage with plentiful opportunities to talk to potential homebuyers and to further understand their needs and preferences. In Taiwan, specially constructed reception centers and display houses are usually prepared to attract intended homebuyers. Responses, opinions and ideas from potential buyers can be collected and fed back to designers to revise final plans and working drawings. Here, market feedback can be seen as a kind of outsourcing of market intelligence. The value of understanding information - shared among salespersons and potential homebuyers and channeled it into the design process as part of internal iterative cycle that produces better, more competitive and sustainable housing products cannot be emphasized enough.

3.4 Stage 4: Construction

This stage normally comprises a series of sequential constructional procedures for the housing development. Due to the rigidity of the construction process, the HCDP is limited to any homebuyers and their purchased housing unit. This stage is less flexible and demonstrates that design rigidities increase as the development process progresses.

3.5 Stage 5: Operation and Sale

The last stage is generally the sale phase of the completed housing development. In this phase, the HCDP is entirely confined by the high rigidity of conventional housing forms. Conventional development practices impose a very limited possibility to input a human-centered design approach at this stage. At this stage, to achieve homebuyers’ needs and preferences, demolition of the interior is usually required.

An overview of a human-centered design approach for housing development and design in Taiwan is integrated and shown as Figure 3. Three main phases are characterized and demonstrated as responding to this approach. In Phase 1, a human-centered design can be achieved according to the following categories such as identify homebuyers, understand and identify homebuyers’ needs, and then to accomplish homebuyers’ needs to respond possible methods (participatory design, user involvement) employed. In Phase 2, ‘User Testing’ and ‘User Involvement’ are employed as conductive methods to fulfill homebuyer’s needs and preferences. Phase 3 encompasses the construction process where human-centered design approach is not applicable.

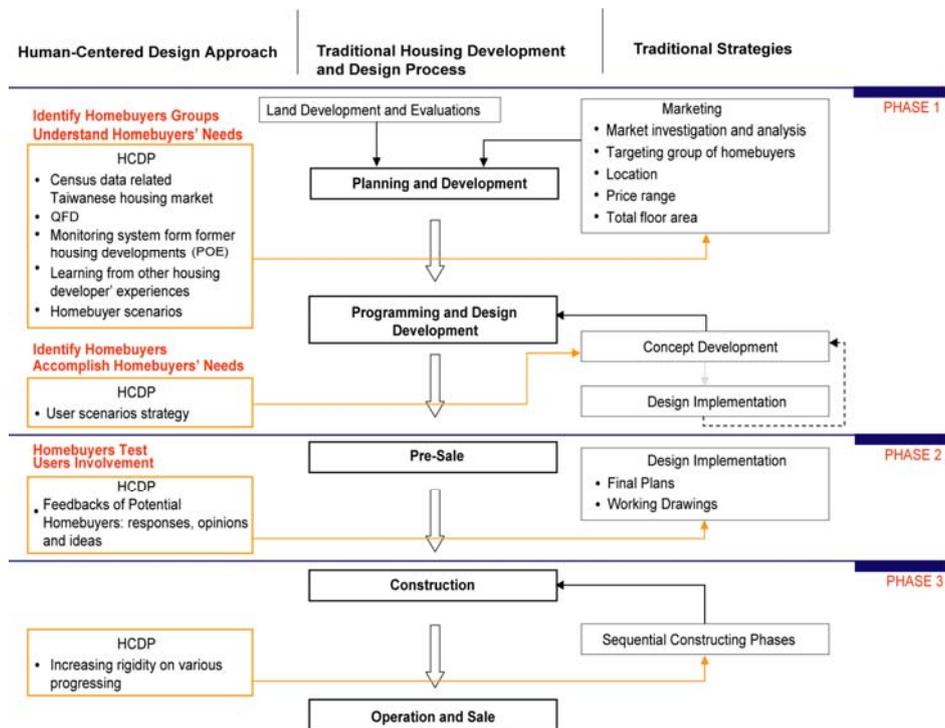


Figure. 3 Process of human-centered design approach for the housing development

Based on the role each of the five stages play in adapting user-centred design to housing design and development, this design research incorporates a further three levels into the process to more effectively accommodate homebuyers' needs. The first level includes 'Housing Development' and 'Programming and Design Development', where the UCDP is of most benefit to future homebuyers. This occurs through the more informed decisions made by developers, marketing professionals and designers. The second level includes the 'Pre-Sale' window where homebuyers can still benefit from UCDP through designer-initiated alterations. The third level contains the 'Construction' and 'Sale' stages where changes are currently limited by the rigidity of building construction and UCDP inputs cannot be catered for. Clearly, then, to optimise the implementation of a user-centred design practice in Taiwanese cluster housing projects it is necessary to introduce the user-centred design approach from the outset of the development. The Tainan case studies previously discussed illustrate the importance of this strategy.

4. Conclusion: Prototyping the base building for Taiwanese cluster housing development

As argued previously, the provision of UCDP at different stages of the housing development and design is also informed by Open Building and Open Source building principles combined with customisation strategies from manufacturing. Open Building was developed to give the greatest possible freedom of interior layout and construction. It also reflects the growing focus in the architectural profession and building industries on the life cycle of materials and components in the light of sustainability issues, changing established views of architecture [19]. Moreover, as previously outlined, the new design and construction strategies the research recommends for Taiwan use 'support' and 'in-fill' concepts from Open Building to facilitate easier remodelling of interior layouts according to needs. However, the Open Building system can not be directly transposed without addressing the issue Taiwanese building regulations, methods of construction and radical new approaches to supply chain management, which all need attention to maximise the possibility for 'free' interior layout options to be broadly

introduced to the cluster housing development sphere.

For instance, the traditional width of buildings in cluster developments may need to be increased to extend interior layout flexibility. Current building widths would make it difficult to provide modularised approaches such as floor grid systems. In turn, this restriction prevents the provision of alternative configurations of vertical connections such as plumbing and electricity. It is equally important to increase the storey height to improve the layout of plumbing installations, particularly to allow for additional horizontal connection to replace the conventional vertical connection of electricity, water and gas [20]. For example, a method for accommodating additional horizontal connections is to use a suspended floor system, creating an extended floor and ceiling cavity. The base building system advanced in this research includes a suspended, modular floor system with a lift-up components for upper floors. Currently, a concrete floor is mandatory for the first floor of Taiwanese cluster housing developments. When applied to Taiwanese cluster housing developments, the base building system is superior to other approaches due to the scope to adjust interior layouts during construction. Such adjustability includes altering spaces horizontally and vertically, and making internal structural changes to the elevation and extensions [21].

The application of modularised building components and interior in-fill to the base building demands a building width with a fixed mathematic multiple relationship to building height. For example, in Figure 4, the width and depth of the modularised floor system is set as 60 cm. Therefore, the width of base building can be multiplied to 540 cm or 600 cm to preserve the interrelationships discussed above and enable modularity.

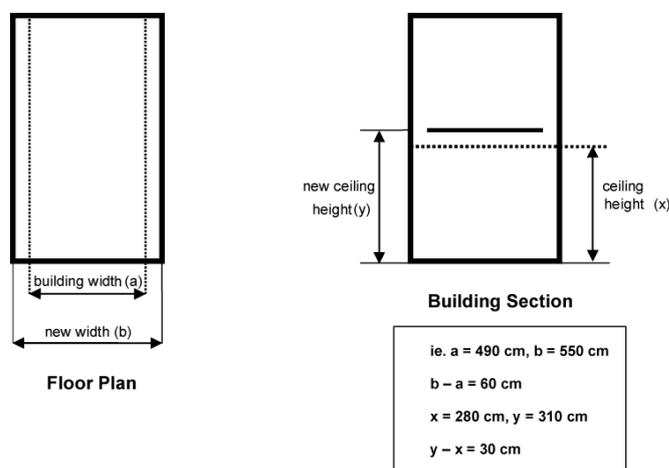


Figure. 4 An example of the width to height relationship of the base building system

In addition, revised building regulations are required to successfully apply an open building system. At present, every new home owner has to provide building authorities with copies of the floor plans submitted with the application for a construction permits, these plans being strictly checked against the completed house before a permit of building usage is issued. This makes it impossible to alter interior layouts during the construction stage of a housing development. Moreover, the stipulations of the building permit are a major obstacle to altering buildings in Taiwan, since floor plans are kept as a record to prevent alteration without the issuing of an

additional building permit. According to the system proposed in the research, the permanent base building elements would be the part of the building checked off against plans. Internal partitions would be regarded as transferable and exchangeable. The base building system is described in Figure 5. It is composed of external structural walls, floor voids, and a single service dock for connecting floors vertically and locating services like electricity, gas and plumbing, or for feeding them out through floor/ceiling cavities. The base building does not include any internal partitions or other internal in-fill elements such as doors. The incorporation of services for the building is divided into two stages, service roughing and full service. The stage of service roughing involves only the central distribution of plumbing and wiring. In the full service stage, services are extended throughout the home according to homebuyers' decisions about the final interior layout and the points where services are needed. To facilitate such flexibility in Taiwan, the permit of building usage issued by the building authority needs to accommodate both the base building stage recording only the completed building of exterior shell while documenting the final interior layout, if the latter is still thought necessary.

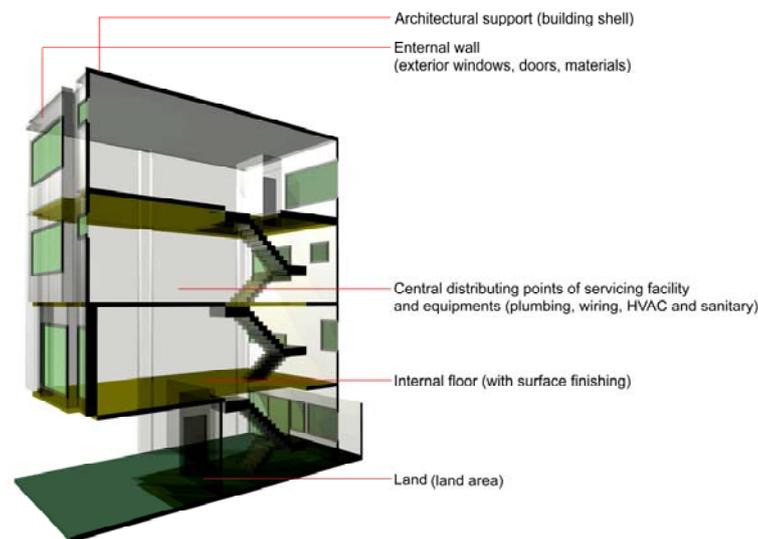


Figure. 5 An example of the base building system for one unit of a cluster housing development

To support the base building system and make customised housing products feasible in Taiwan will require a well-established and linked supply networks in associated building industries, especially across the oblique relationships between customers and suppliers in the external supply chain beyond the immediate process of delivering components to builders and subcontractors to construct a building. This approach can be understood as an extended network, whereby the housing and building industries facilitate the scope for customisation by coordinating their products. To implement the Open Source Building system discussed in this research, the building industry must in reality achieve the quality and responsiveness of a 'one-off' architect designed house with great efficiencies, something that is currently beyond the capacity of traditional speculative housing developments in Taiwan. The integration of the principles of a user-centred design into the Open Building system to provide a more customised housing product is shown in Figure 6. It documents the points where the important strategies of 'Identifying User Groups and 'Identifying Users' Needs' must occur in the early stage of building development process, and where 'Participatory Design', 'User Involvement' and 'Collaborative Design' intercede in the subsequent stages. The idea of the 'Extended Design Stages' (see figure 6) advanced by the design research potentially allows homebuyers access to an alternative form of housing development, which

avoids rigid characteristics that can be very difficult and expensive to alter at a later date if needs and preferences change. For example, at the stages of full service, the base building allows homebuyers to engage in participatory and collaborative design at various points in the design and development process and to freely implement design alterations at a later time with minimal cost and disruption. At the interior fit-out stage in particular, the flexibility of base building system allows for the implementation of what could be called ‘continuous’ interior design to arrive at genuinely user-driven interior layouts.

Following this argument a new, flexible, tripartite process for homebuyer involvement in housing development emerges for Taiwan, the stages of which I have titled ‘Options from Developers and Architects’, ‘Interior Design and Designer’ and ‘Self-Management’. Each option provides homebuyers with a different set of circumstances of increasing scope to fulfil their needs. Moreover, as the flexibility of housing developments in Taiwan expands even more alternatives would most likely be offered by developers. ‘Options from Developers and Architects’ retain the customary approach of standard alternative designs being offered to homebuyers if they prefer traditional models. The alternative of ‘Self-Management’ allows homebuyers to fully determine interior layouts prior to occupation and over the life of a home. It is predicted that implementing a continuous interior design process to arrive at tailored interior design will achieve greater satisfaction for homebuyers, reflecting Friedman’s idea of designing for adaptability as a ‘growing process’ [22].

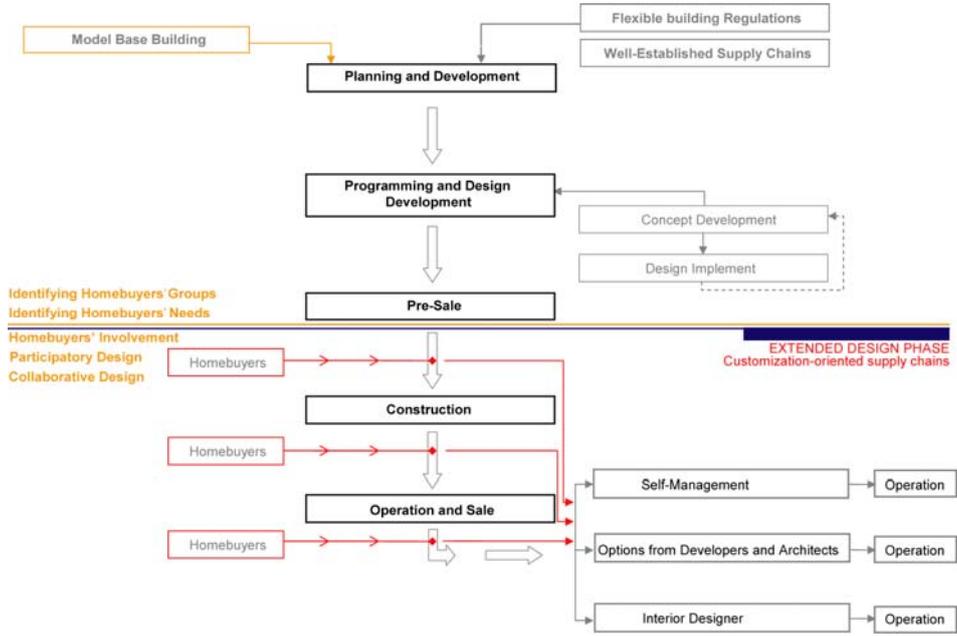


Figure. 6 Integrated flexible process for Taiwanese housing developments

In order to ensure success in the application of flexible, user-centred interior design in Taiwan, the research recommends dividing the development process into two parts (also see figure 6). The early stage allows the development team to target design’s more precisely to the needs and preferences of potential homebuyers. The introduction of the base building system to the process informs the second part of the development process, transforming it into an extended design stage that allows homebuyers to be directly involved in the design process. As such, the making of flexible design process and housing development could allow Taiwanese homebuyers to achieve real needs and preferences of their future homes.

5. References and Citations

- [1] Kumar, V and Whitney, P. (2003) Faster, cheaper, deeper user research, *Design Management Journal*, vol. 14, no. 2, pp 51-52.
- [2] Wen, Kuo-Hsun (2007) *The Next Home: An Investigation to housing development in Taiwan and thinking to promote social sustainability of housing stocks*, Tainan, Han-Chia Publisher, p 10.
- [3] Wen, Kuo-Hsun and Sun, Tzouh-Herng (2005) Dream Homes; An Investigation of the Culture of Taiwanese Housing Developments, with a View to Using Interior Design to Promote the Social Sustainability of Housing Stocks, *in proceeding of 2005idc*, Taiwan, Digital Volume.
- [4] Ibid.
- [5] Ibid.
- [6] Lawson, B. (1980) *How Designers Think*, London, The Architecture Press, p 66.
- [7] Hsieh, H.-Y. (2005) The 1990s Taiwan residential construction boom: a supply side interpretation, *Construction Management and Economics*, vol. 23, p 268.
- [8] Tzeng, C.-T. and Haung, P. (2002) The Professional Liability of Architects, *Journal of Architecture*, no. 39, p 24.
- [9] Ibid.
- [10] Lawson, B. (1980) *How Designers Think*, London, The Architecture Press, p 108.
- [11] Tzeng, C.-T. and Haung, P. (2002) The Professional Liability of Architects, *Journal of Architecture*, no. 39, p 24.
- [12] Zeisel, J. (1981) *Inquiry by Design*, Cambridge, Cambridge University Press, p 35.
- [13] Cherry, C. (1978) *On Human Communication*, Cambridge, MA., The MIT Press, pp 6-9.
- [14] Bowen, P. A. and Edwards, P. J. (1996) Interpersonal Communication in Cost Planning during the Building Design Phase, *Construction Management and Economics*, vol. 14, p 397.
- [15] Zimmerman, Alex and Martin, Mark (2001) Post-occupancy evaluation: benefits and barriers, *Building Research and Information*, vol. 29, no. 2, pp 168-174.
- [16] Ibid.
- [17] Zeisel, J. (1981) *Inquiry by Design: Tools for Environment-Behaviour Research*, Cambridge, Cambridge University Press.
- [18] Zimmerman, Alex and Martin, Mark (2001) Post-occupancy evaluation: benefits and barriers, *Building Research and Information*, vol. 29, no. 2, pp 168-174.
- [19] Jia, B. (2005) A Theory of Architectural Practice: Open Building Interpreted by Baumshiager and Eberle, in *proceeding of The 2005 World Sustainable Building Conference*, Tokyo.
- [20] Kadowaki, K. and Fukao, S. (2005) Factors in the Plumbed Installations Positioning of Multi-Unit Residential Buildings, *in proceeding of The 2005 World Sustainable Building Conference*, Tokyo.
- [21] Hsieh, Y. H. (2005) *A Variable Research on Ageless House depending upon the Physical and Mental Status of the Aged*, Master Thesis, Graduate School of Architecture, Chung Yuan University, Taiwan, pp 3 -22.
- [22] Friedman, A. (2002) *The Adaptable House: Designing Homes for Change*, New York, McGraw-Hill, p 11.