

INTERIOR SPACE OPTIMISATION AND SHARED-LIVING INFRASTRUCTURE AS STRATEGIES FOR DOMESTIC SPACE REDUCTION IN HONG KONG

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Abstract: This paper serves as a status of our current research in the field of space optimisation and collective living design in the context of Hong Kong's urban housing fabric. The approach to this research has been to analyse the space-use efficiency of an exemplary housing project. Together with observations on emerging trends in co-operative living environments, this research is intended as guideline for the potential development of optimum building typologies in China Urban Housing.

Keywords: Space Optimisation, Housing Efficiency, Sustainability, Shared economy, Collective Living

1 Introduction

The continuous growth of the global population and the resulting increase in urban migration leads to an increasing constructed landscape. Residential buildings cover the main part of this building volume and are a chief cause of CO₂ emission, waste of resources and energy consumption. Despite the tremendously great improvements in fields of energy and building technology, the field of space optimisation has much scope to innovate in order to contribute to a sustainable built environment for the future.

The numbers of households are continuously increasing and the trend toward larger homes is even exaggerating the global need of more housing space. According the data from the National Association of Home Builders, homes in the United States more than doubled in size between 1950 and 2002 (from 90 m² to 210 m²). In China, houses tripled in size with per capita floor space increasing from 8.1 m² to 26.5 m² and from 6.7 m² to 22.8 m², in rural and urban China respectively, between 1978 and 2002¹. It is clear that despite innovations in sustainable building practices combined with an enhanced environmental awareness, space optimisation plays a minor role in the sustainable agenda.

We recognise the challenge of an ever increasing urban population, the increase in single person households along with an ageing demographic. Therefore, we propose that the potential for the optimisation of private households, combined with increased emphasis on collective infrastructure, energy resources and social spaces, can finally be sincerely explored as a solution for relieving the strain on building demand and therefore reducing energy consumption and CO₂ production. We also propose that embracing such design principles and challenging the form of current urban housing would foster a vibrant urban living experience and maximise the spatial capacity of communal spaces.

2 Housing Size in Hong Kong

For the purpose of this paper we address our attention to Hong Kong. The period of housing development in Hong Kong between the 1950's to the 1980's witnessed the construction of typologically and architecturally innovative structures.² Under specific political, social, climatic as well as spatial conditions, these building designs could be considered as a cross pollination of the modern European *Existenzminimum* design and traditional Chinese building typologies. A highly evolved and notably efficient transcultural hybrid, Hong Kong's urban housing models have been recognised and exported across the world.³ With the key issues of mass housing provision in Hong Kong always depending on the balancing of efficiency versus liveability⁴ we aim to address the conflict between the two, holistically.

Housing developments since the 50's in Hong Kong evolved out of sheer demand to provide, safe, fast and cost effective housing for the rapidly increasing population in the city. The result of ambitious building projects such as the Man Wai Lau were some of the most densely occupied settlements in the world. As one can expect, housing units were spatially restrictive with many unrelated families having to occupy the

same residential unit. The space efficiency was of such high priority that little or no consideration was given to the social and cultural amenities of such housing complexes

“Such tiny flats have generated social repercussions. As a result of crowded conditions at home, the city’s residents flee to streets and shopping malls that are enervated on Saturdays to the point of pedestrian gridlock. Although contributing to urban vitality, the Hong Kong press has noted that the family home as a place to sleep only, combined with parents holding more than one job each, results in a lack of family life and cohesion critical to traditional Chinese culture. Unlike the minimum, monofunctional dwelling, the multi-generational, mixed-use traditional shophouse supported that culture.”³

In our research we are addressing two contradicting challenges, the challenge of spatially optimising new residential units by reducing inefficient ‘individual space’, meanwhile actually increasing the quality of life for individuals in a collective environment.

3 Spatial Analysis of Living Space

Our Research assesses working patterns and lifestyles that are not conducive to the type of urban housing currently conceived in China. We maintain that the current spatial design of modern Hong Kong typologies do not adhere to emerging living and working practices, practices such as collective living and working. We recognise the shared economy as a growing trend in the economic development of urban centres. Space therefore could also be considered as potential shared commodity in the context of a culture of collaborative consumerism.

3.1 Assessment of Spatial Efficiency

After analysing the amount of active space use of a typical apartment layout in Hong Kong, one can draw conclusions on the ultimate effectiveness of the time and space use of a particular living unit. This should tell us a number of things about the routine rhythm of space use of a particular unit, but also provide us with quantitate information with which to calculate what areas of a residential unit could be considered for sharing in a collective environment.

In 2004, Dobbelsteen and Wilde invented indices for quantifying space use in living room. They differentiate between two dimensional (use of one layer of floor or ground space), three dimensional (picture of all two-dimensional layers related to a reference layer), and four dimensional space use (time). The latter needs to be observed over a period of time.⁵ Our research does not use their conception and indices but we follow conduct as well a two dimensional, a three dimensional and a four dimensional analysis; considering as well the time as the fourth dimension.

3.2 Analysis of a Typical Residential Unit in Hong Kong

The aim of our research is to improve housing efficiency through detecting unused spatial potential and reducing it to a minimum. This analysis involves looking at opportunities of reducing domestic private space that could otherwise be considered shared infrastructure between other private households in an urban context, particularly Hong Kong.

The floor plan we are looking at is located in Tseung Kwan O (New Territories, Hong Kong). The residential development of the MTR Corporation was formerly known as Dream city the LOHAS Park (LOHAS means lifestyle of health and sustainability). LOHAS Park would be recognised as an exemplary urban housing project in Hong Kong and for this purpose is a suitable subject for our research. For the research, two residents (a couple) were interviewed and their living habits were applied onto the space analysis.

3.2.1 Living Space Analysis

We firstly analysed the residential area in 2D. This is the way, most architects and planners understand the floorplan, even though it is very static and not yet a spatial research. Nevertheless, the top view of 2D space use delivers a very clear image of the floor plan and allows reading more into the design. Surprisingly, as figure 1 shows us that even in the 2D analysis, there are many redundant spaces, which means they may not necessarily be there. The figure is self-explanatory and should stimulate the thoughts about the resource space, but it has to be highlighted that we could detect 6.22 m² (of 39.14 m²) which are redundant spaces, which is very exactly twice the space of the bath room.

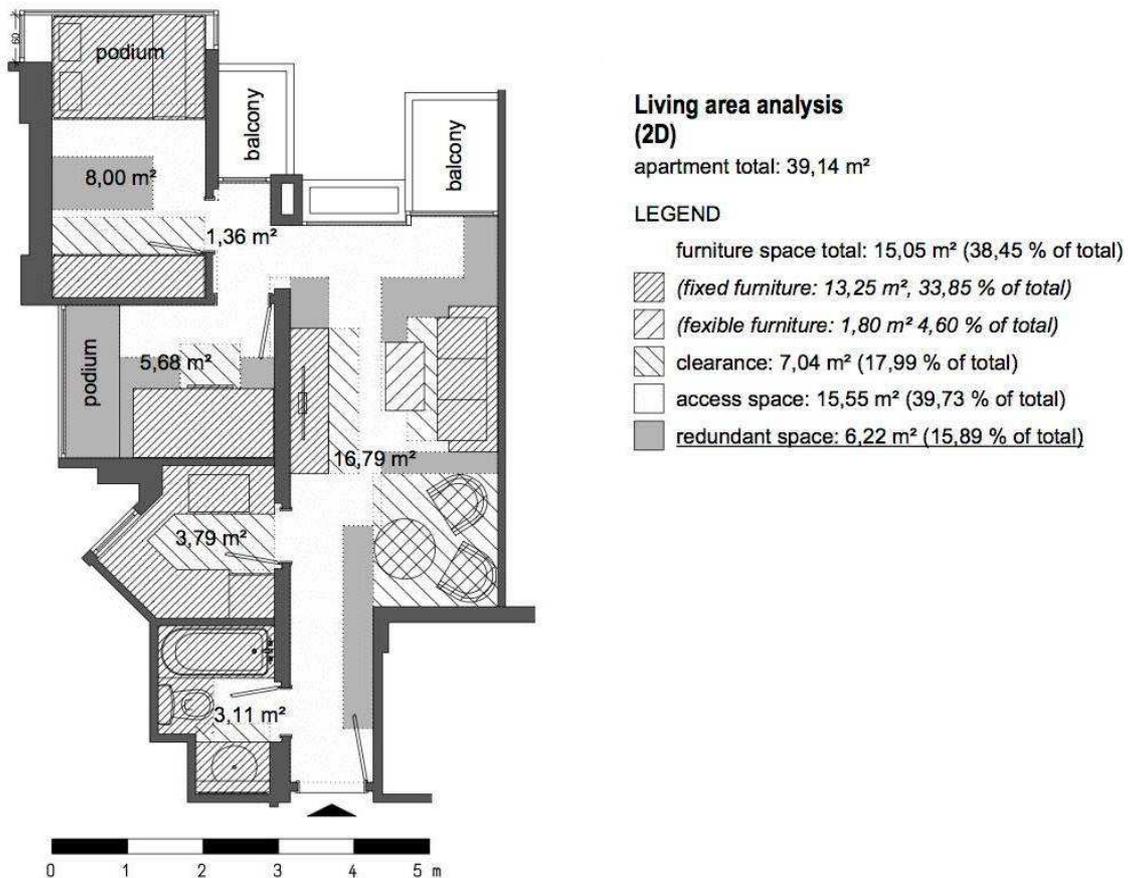


Figure 1 Living area analysis

Source from: Ernst Alexander Dengg (originator); floorplan designed according to an existing and furnished apartment, 2015.

In figure 2 we see the intensity of vertical space use. In reality nearly none of the existing furniture (except the cabinet in the bedroom) reaches room height. Here, we see that there is a huge potential of generating more space efficient solutions to storage and utilities.

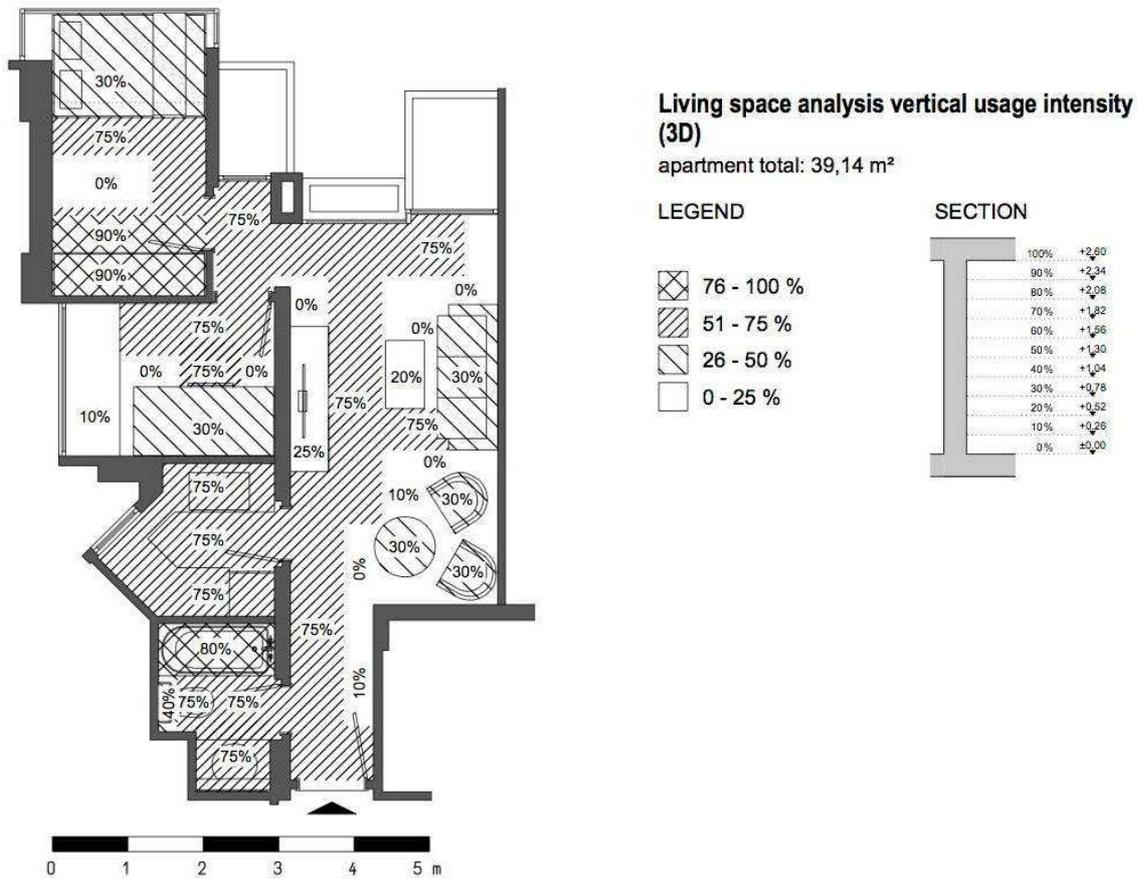


Figure 2 Living space analysis vertical usage intensity
(The section (vertical section) shows the obtainment of the percentage, which is related to the intensity of use of the room height)

Source from: Ernst Alexander Dengg (originator); floorplan designed according to an existing and furnished apartment, 2015.

For the analysis of time occupancy rate of living functions, figure 3 gives us deeper insights of the time expenditure of the residents in the apartment. Numbers are average value of both dwellers. As we can in the figure see, many of the living function were used very briefly. The kitchen for instance is used for 25 minutes per day per person in average.

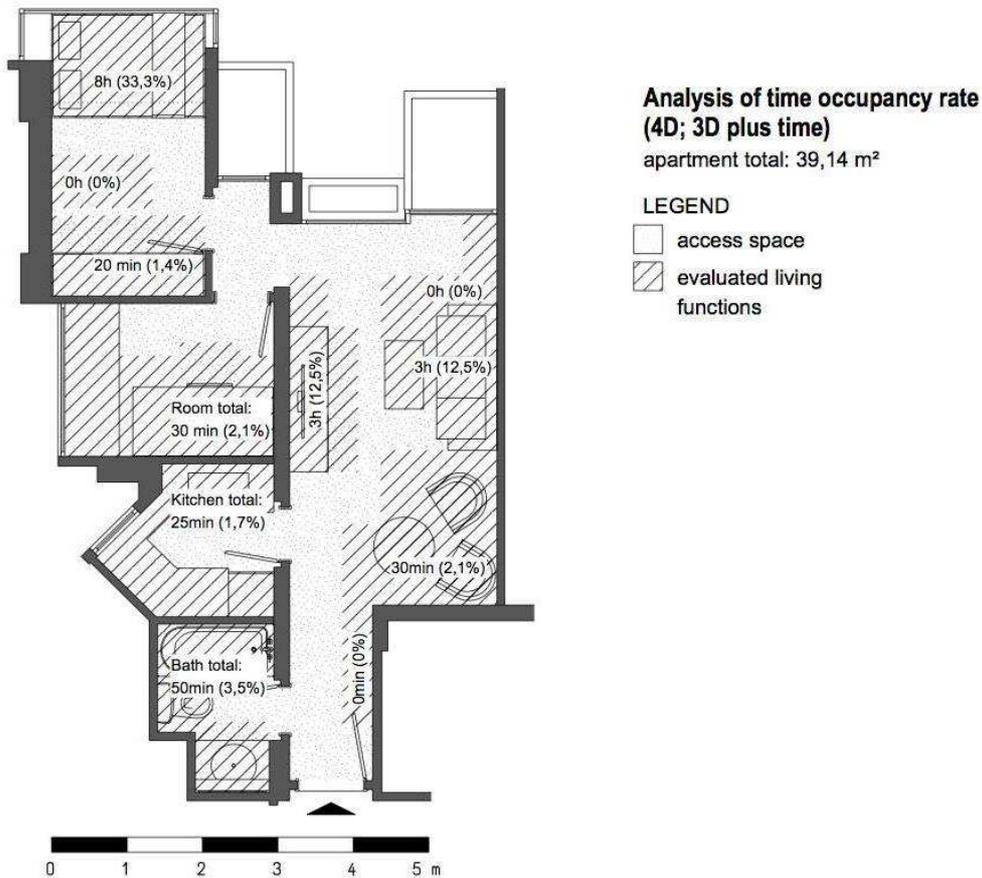


Figure 3 Analysis of time occupancy rate

Source from: Ernst Alexander Dengg (originator); floorplan designed according to an existing and furnished apartment, 2015.

3.2.2 Observation

Upon completion of our initial analysis, we observe that our findings can provide an insight into the spatial time use efficiency. This research should not be misunderstood that we are stating that certain usable space should be removed or reduced from the existing floorplan, but the its effectiveness should be reflected upon in terms of gross floor area made available to private households.

There is scope for improvement in achieving a truly optimised residential unit by reconsidering the volume space that is allocated towards private residential

It is obvious that the dedicated kitchen space is not sufficiently optimising the use of private residential space due to the amount of time it is being privately utilised.

4 The Potential for Implementing Individual and Collective Spaces in Urban Housing Design in China

“Shared living” and “Co-Living” are terms that illustrate a resurgence in co-operative living environments where resources and spaces are shared amongst other inhabitants in the housing accommodation. Generally, it can be assumed that residents inhabit dwelling units consisting of private sleeping area while sanitary and social resources are shared. We aim to resolve issues of reduced gross floor area of private residential units with the improved quality of life of increased collective infrastructure and space. Shared space should not be perceived as an invasion of privacy but quite the contrary, with the clear boundaries of “collective and individual spaces”⁶ one individual space should be perceived as a clear solitary retreat. Meanwhile the collective spaces within itself should offer opportunities for the individual to engage in collective and individual routines, which would require a sensitive application of design.

5 Conclusion

The application of principles adopted from co living or shared living environments, along with the tools used to determine the ultimate efficiency of individual living spaces should relieve the pressure on the demand for urban housing resources and construction in spite of the projected increase in the urban population in China in the next 30 years. We intend to investigate the opportunities and potential for this research to inform new forms of urban housing that can address the challenges of emerging demographic, economic and cultural issues in China's urban regions. Future research will adopt methodology from the field of VR technology in order to determine spatial perception of optimised and collective living scenarios. This research would provide the foundation for understanding how to manipulate housing design in an innovative, inclusive and effective manner.

优化室内空间及建设共享生活基础设施，作为缩小香港处所空间的策略

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摘要: 本文为本研究机构当前在空间优化及基于香港房屋结构肌理的集体生活设计研究成果。本文采用分析一个样例房屋的空间使用效率作为研究方法。结合对于合作生活环境这一新趋势的观察，本研究旨在提出一个最适宜的中国住房类型设计指导。

关键词: 空间优化，房屋效率，可持续发展，共享经济，集体生活

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