

# **Rooftop garden development in Iskandar, Malaysia: growth and perception**

M. R. Maryanti, Z. Z. Ainur, P. W. Tan, M. Y. Norhidayah,  
H. Khadijah, M. N. Razali & A. L. Maslinda  
*Department of Real Estate, Faculty of Geoinformation and Real Estate,  
Universiti Teknologi Malaysia, Malaysia*

## **Abstract**

The rooftop garden is a part of sustainable development aspirations that modifies the modern landscape and has growing potential in property markets worldwide. However, it is considered new in Malaysia. Although this development is growing especially in the urban areas such as Klang Valley, the contribution of this concept is only seen as an addition to the open space provision for property development with limited land area. Considering this situation, this study attempts to examine the current growth of this concept particularly in Iskandar Malaysia. Twenty property developers have been selected and interviewed and the results have been analyzed qualitatively. Among the property developers, 11 of them have included the rooftop garden concept in 14 of their service apartment projects. Based on the interview, this preference was driven by their awareness of the benefits of the rooftop garden to the environment and occupants. Meanwhile, the non-preference of the other nine developers on this concept was due to the development costs that may indirectly affect property price. The outcome of this study concludes that the development of the rooftop garden concept is growing steadily in Malaysia. However, high cost in its development and maintenance has become one of the major barriers of its implementation and expansion in Malaysia.

*Keywords: rooftop garden, growth, perception, developer.*

## **1 Introduction**

In recent decades, the question of 'how to live sustainably' has become central to every development agenda. This deliberation opens up for more innovations to



be made especially in property planning and development, the vital sector that plans and develops spaces for human civilization. One of the innovative green features introduced is the rooftop garden concept. This concept is defined as a landscape built on the roof of multi-storey buildings in-addition to the provision of open space for multi-storey residential building with limited development area [1].

This landscape has been recognized as a tool to combat environmental issues in urban area. It has been widely implemented in Europe as well as several Asian countries especially Singapore, Hong Kong and Japan. In fact, rooftop greening has gained the support of Singapore government since 2001 when the Prime Minister affirmed the government's commitment to take the lead in implementing sky deck greenery in their public housing estates and public buildings (see the speech text by the Prime Minister in Singapore Government Press Release, dated 26th June 2001). This is due to the fact that the landscape has various benefits in terms of social, environment as well as economic [2–4].

In Malaysia, this landscape is basically used to solve issues concerning the provision of public open space for the limited development area [5]. Due to the high land value in several areas that are experiencing rapid development, the provision of open space for the community fails to meet the guidelines set by the planners. Therefore, this landscape is used as an alternative to fulfil the community needs to be provided by the developer appropriately. For example, some residential buildings in Sentul East area have applied this landscape on the apartments or condominiums building as an additional space for the occupant to enjoy because of its limited development area and the high land value. While in Damansara, the development of this landscape has not only been implemented on residential building, but also on few of commercial building such as 1Utama shopping complex.

The discussion on rooftop gardens in the current literature is enormous. It prominently covers the use of a rooftop garden to mitigate environmental issues such as urban heat island [6–8], to reduce rainwater runoff [9, 10], to maintain the thermal comfort of the building [11], to minimize electricity consumption [7, 12] and as habitat to several species of birds, insects and endangered species of orchid [13–16]. Besides the technical-environmental aspects, there are also social research that was conducted extensively regarding rooftop gardens as open space [2, 17] and urban food production [18, 19].

However still, the rooftop garden concept is considered new in Malaysia. Although this development is growing especially in the urban areas particularly in Klang Valley, the contribution of this concept is mostly seen as an addition to the open space provision for property development with limited land area [1]. In concern of this situation, thus the primary goal of this study is twofold. Firstly, it investigates the spread of rooftop gardens in property developments in Malaysia. Since the growth of this concept is already promising in Klang Valley, thus this study considers the southern area of the country where one of its economic development regions is situated namely as the Iskandar Malaysia. Secondly, the perception of property developers, being the key agent of spatial development in

the region is also examined as to ascertain the potential of the rooftop garden concept in Iskandar Malaysia.

## 2 Review of literature

Rooftop gardens can be located at any intermediate floor level, as podium deck or on top of the building. Generally, a rooftop garden plays the same function as the neighbourhood park in residential areas, except the physical location of the landscape that is situated higher than the ground level. Therefore, some of the landscapes are also known as 'sky garden' because of its high location [20]. This landscape also designed as an amenity for passive recreational purposes for the building occupants such as for walking, sitting and viewing. Some of the facilities provided include bench, children playground, swimming pool, barbeque area, indoor game facilities and many others. Besides, this landscape are also complete with landscape element such as variety types of plants, artificial fountains and also sculptures which meant to provide visual impacts to the occupants.

The rooftop garden concept has grown rapidly along with the improvement of modern technology. The benefit of this landscape has been acknowledged and well recognize in social, economic and environmental aspects. Therefore, the utilization of this landscape is not exclusive or rigid to one purpose only as it may bring aesthetic, social, economic and environmental benefits.

For instance, in terms of amenity and aesthetic value, the rooftop garden can serve as a medium of interaction and communication that enhance social relationships among the community. Indirectly, it may create sense of belonging, social support, healthy living and provide opportunities to fill their time with meaningful activities with family [3]. In fact, its existence in a working environment may improve performance, focus, work satisfaction and motivation [21]. In addition, the rooftop garden is also recognized as the urban green areas to preserve habitat of animals that having difficulties to live in urban areas such as birds and insect's species [13].

The contribution of rooftop garden to the environment is indeed undeniable. It is proven that rooftop gardens help to manage storm water in the built-up area [22–24] and reduce noise [3, 24, 26]. Indirectly, the roles played by the rooftop garden to the environment have economically benefiting the society. This type of landscape may help to reduce the cost of additional storm water infrastructure [27], increase the lifespan of the roof membrane from cracking due to the expansion and contraction of the membrane as a result of changes in weather and temperature [28] and reduce the cost of energy consumption [29–32]. In some other countries, rooftop gardens were used as organic food production areas of vegetables and fruits [19]. Production of agricultural products on the roof has been done in several countries such as in Toronto [33] and at Changi Hospital in Singapore [31]. The high demand for organic agricultural products has made this project successful in securing the return of capital plus a profit.

Due to its effectiveness in solving several environmental issues, this concept has gaining support from several governments in the world that aims to minimize



environmental issues and creating healthy living environment in the city [3, 19]; thus, creates another submarket in the property industry to be explored and ventured by property developers. In order to meet a specific submarket, being innovative is crucial for developers to update their products and processes to survive in the changing trends and environments [34]. Developers will try to distinguish themselves to one another through the creativity of design and land planning approach [35]; in which, the rooftop garden would be one of them.

Drewett [36] believes that the role of developers is central to every development process. To decide on the final outcome of their product, developers are guided by their economic interest and understanding of how the decision would benefit their economic interest [37, 38]. Drewett added that developers are economic in character. Thus, their main interest is profit [39–41]. In order to maximise profit, they should know what the market wants to buy, what is currently selling and how consumers would respond to their products. Thus, it can be assumed that in deciding the final outcome of their product, developers would decide based on their understandings on demand characteristics of consumer and their own economic interest that is the profit. But, that is not all. Within an interactive agency model's framework, it is noted that developers make decision only when they have fully considered the risks they may face from the decision they would be committed to [38, 42, 43]. In the next section, developers' understanding on the rooftop garden concept is examined. This understanding would represent their perception towards this landscape, thus lead to the potential of this submarket in the selected case study area.

### 3 Results and discussion

This research was exploratory in design. Therefore, data have been collected through face to face interview using structured set of questions. The questions asked in the interview seek to identify the property development projects that apply the rooftop garden concept, the developers' involvement and their understanding that may influence their decision in the application of the rooftop garden concept.

The whole empirical works took place in the southern part of Peninsular of Malaysia namely Iskandar Malaysia, an economic development region established around 2006. This region was set to become the most developed region in Southern Peninsular Malaysia; where the total population is expected to reach 3.0 million people by 2025 [44, 45]. In Iskandar Malaysia, 20 property developers have volunteered to participate in the interview. From the interview, it was identified that slightly more than half of the interviewed developers (55 percent) have applied the rooftop garden concept in their property development projects. The projects are as listed in the following Table 1.

It can be seen clearly in Table 1 that all projects are in the form of service apartment. In Malaysia, this residential type of development is developed on commercial land. As a whole, these projects will be completed between 2014 and 2018; thus, shows that the rooftop garden concept is a brand new product in



Table 1: Property developments with a rooftop garden.

Name of Project	Type of Project	Expected Completion	Location
Park Regency	Service Apartment	2014	Plentong
The Seasons		2015	Larkin
The Garden Residences		2016	Skudai
Tritower Residences		2017	Johor Bahru
The Aliff Residences			Tampoi
D'Tasek			Taman Tasek
Austin Regency			Mount Austin
NOVA			Taman Tasek
Setia Sky 88			Johor Bahru
8scape		2018	Tampoi
Marina Cove			Johor Bahru
The Platino			Skudai
D'Summit			Kempas
Paragon Suites			Johor Bahru

case study area. Even though the remaining developers have yet adopted the rooftop garden concept in any of their property development projects, but all of them did expressed interest in using it in the future. This interest is driven by their understanding of the benefits that the rooftop garden concept would bring to the society. During the interview, several rooftop garden's benefits have been listed by all of interviewed developers (refer Figure 1).

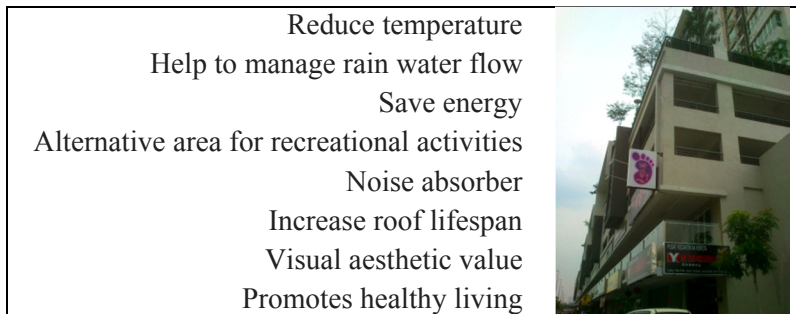


Figure 1: The benefits of the rooftop garden concept from the developers' perspective.

The benefits listed in Figure 1 represent the knowledge of the interviewed developers on the rooftop garden concept. It shows that this concept is not uncommon among those developers. The unwillingness of developers who were yet adopting the rooftop garden concept is influenced by a number of reasons: demand uncertainties, complex design, poor knowledge about the technology as well as high development and maintenance cost. As they explained, these

reasons may affect profit; thus, would be detrimental to their economic interest. These reasons were also agreed by the developers who are involved in developing those projects in Table 1. They were all in the opinion that the government should provide incentives to foster the adoption of the rooftop garden concept by the industry players in this country as what has been implemented in Singapore.

## 4 Conclusion

In conclusion, the rooftop garden concept is considerably new in Iskandar Malaysia because the earliest project with that landscape will complete only by 2014. Nevertheless, from the interview, it is expected that it has high potential in Iskandar Malaysia based on the respondents' high interest which was based on their knowledge about the benefits of the rooftop garden. Cost and profit have become their major concern before they can adopt the concept in their property development project. Therefore, it is highly recommended for the government to play their role to facilitate this kind of innovation in a way to promote as well as to achieve sustainable development aspiration.

## References

- [1] Department of Country and Town Planning (2005). *Planning Standard of Rooftop Garden Development*. Kuala Lumpur: Research and Development Unit, Department of Country and Town Planning, Peninsular Malaysia.
- [2] Yuen, B. and Hien, W. N. (2005). Resident perceptions and expectations of rooftop gardens in Singapore. *Landscape Urban Plan.* 73(4), pp. 263–276.
- [3] Wong N. H. and Chen, Yu (2009). *Tropical Urban Heat Island: Climate, Building and Greenery*. New York: Taylor and Francis Group.
- [4] Osmundson, Thompson (1999). *Roof Gardens: History, Design and Construction*. New York: WW Norton & Company.
- [5] Buletin Rancang Selangor (2008). Department of Country and Town Planning, State of Selangor from <http://www.jpbdselangor.gov.my/Laporan/BuletinRancang/JPBDbulletin2008.pdf> retrieved on May 18th, 2011.
- [6] Roslina Sapawi (2009). *Urban Heat Island Mitigation through Green Roof Technology*. Sarjana Pengurusan Persekitaran. Fakulti Kejuruteraan Awam, Universiti Teknologi Malaysia.
- [7] Wong, N. H., Cheong, D.K.W., Yan, H., Soh, J., Ong, C.L. & Sia, A., (2003b). The effects of rooftop garden on energy consumption of a commercial building in Singapore. *Energy and Building.* 35. pp. 353–364.
- [8] Bass, B. and Baskaran, B., (2003). *Evaluating Rooftop and Vertical Gardens as an Adaptation Strategy for Urban Areas*, NRCC-46737, Institute for Research in Construction, National Research Council Canada, Ontario, Canada.



- [9] Thompson, J. W., and Sorvig, Kim (2008). *Sustainable Landscape Construction: A Guide to Green Building Outdoors*. Washington D.C: Island Press.
- [10] Liu, Karen (2003). *Engineering performance of rooftop garden through field evaluation*. RCI 18th International Convention and Trade Show Tampa, Florida 13-18 March 2003. pp. 1–15.
- [11] Wong N. H., Chen, Y, Ong, C.L. and Sia, A. (2003a). Investigation of thermal benefits of rooftop garden in the tropical environment. *Building and Environment*. 38, pp. 261–270.
- [12] Liu, K. K. Y. (2002). Energy efficiency and environmental benefits of rooftop gardens. *Construction Canada*. 44(2). pp. 17, 20–23.
- [13] Canero, R. F and Redondo, P. G. (2010). Green roofs as a habitat for birds: a review. *Journal of Animal and Veterinary Advances*. 9(15), pp. 2041–2052 from <http://www.medwelljournals.com/fulltext/?doi=javaa.2010.2041.2052>
- [14] Getter, K. L. and Rowe, R. B. (2006). The role of extensive green roofs in sustainable development. *Hort Science*. 41. pp. 1276–1285.
- [15] Yeang, Ken and Spector, Arthur (Ed.) (2011). *Green Design: From Theory to Practice*. United Kingdom, London: Black Dog Publishing.
- [16] Brenneisen, S. (2004). Green roofs – how nature returns to the city. *Acta Hortic*. 643. pp. 289–293.
- [17] Chan, Catherine (2014). *Social Performance of Communal Sky Garden in a Dense Urban City - Hong Kong*. Seminar of Skyrise Greenery, 22nd April 2014, Hong Kong from [http://www.greening.gov.hk/en/knowledge\\_database/doc/seminar/Social\\_Performance\\_of\\_Communal\\_Sky\\_Garden\\_in\\_a\\_dense\\_urban\\_city\\_HK.pdf](http://www.greening.gov.hk/en/knowledge_database/doc/seminar/Social_Performance_of_Communal_Sky_Garden_in_a_dense_urban_city_HK.pdf)
- [18] Gosh, S., Vale, R., & Vale, B. (2008). Local food production in home gardens: Measuring on site sustainability potential of residential development. *International Journal of Environment and Sustainable Development*, 7, pp. 430–451.
- [19] Hui, Sam C. M. (2011). *Green roof urban farming for buildings in high-density urban cities*. Hainan China World Green Roof Conference 2011, Hainan (Haikuo, Boao and Sanya) China. 18–21 March 2011.
- [20] Hui, Sam C. M. (2010). *Development of technical guidelines for green roof systems in Hong Kong*. Proceeding of Joint Symposium 2010 on Low Carbon High Performance Buildings, Hong Kong. 23 November 2010.
- [21] Kaplan, S. (1995). *The urban forest as a source of psychological well-being*. In G. A. Bradley (Ed.) *Urban forest landscapes: Integrating multidisciplinary perspectives*. Seattle: University of Washington Press. pp. 101–108.
- [22] Koehler, M., Schmidt, M., Grimme, F. W., Laar, M. and Gusmao, F. (2001). *Urban water retention by greened roof in temperate and tropical climates*. Conference of the 38th IFLA World Congress, Singapore.
- [23] Berndtsson, J. C., Emilsson, T. And Bengtsson, L. (2006). The influence of extensive vegetated roofs on runoff water quality. *Science of the Total Environment*, 355, pp. 48–63.



- [24] Mentens, J., Raes D. and Hermy, M. (2006). Green roof as a tool for solving the rainwater runoff problem in the urbanized 21st century? *Landscape Urban Planning*, 77(3), pp. 217–226.
- [25] Hendricks N. A. (1994). *Designing green roof systems: A growing interest*. Professional Roofing. pp. 20–24.
- [26] McMarlin, R. M. (1997). Green roofs: not your garden-variety amenity. *Facilities Design and Management*, 16 (10), p. 32.
- [27] Scholz-Barth, Katrin. (2001). *Green Roofs: Stormwater Management From the Top Down*. From [http://www.edcmag.com/CDA/ArticleInformation/features/BNP\\_Features\\_Item/0.4120.18769.00.html](http://www.edcmag.com/CDA/ArticleInformation/features/BNP_Features_Item/0.4120.18769.00.html) retrieved on 5th February 2011.
- [28] Peck S. W., Callaghan, C. and Bass, B. (1999). *Greenbacks from green roof: Forging new industry in Canada*. Status Report on Benefits, Barriers and opportunities for green roof and Vertical garden technology diffusion. Ottawa Canada Mortgage and Housing Corporation.
- [29] McPherson E. G., Lee, P. H. & Gordon, M. H. (1988). Impacts of vegetation on residential heating and cooling. *Energy and Building*, 12, pp. 41–51.
- [30] Akbari, H. & Taha, H. (1992). The impact of trees and white surfaces on residential heating and cooling energy use in four Canadian cities. *Energy*, 17(2), pp. 141–149.
- [31] Nathan, D. (1999, May 28). *Hospital's garden feeds patients*. Singapore: The Straits Times in Wong, N. H., and Chen, Y. (2009). *Tropical Urban Heat Island, Climate, Building and Greenery*. New York: Taylor and Francis Group.
- [32] Hitoshi, C. (2000). The sky, the limit. *Look Japan*. 46(535), pp. 6–15.
- [33] TFPC. (1999). *Feeding the city from the back forty: a commercial food production plan for the city of Toronto*. Toronto: Toronto Board of Health.
- [34] Nor'Aini, Yusof and Nazirah Zainul Abidin (2007) A Proposed Method for Measuring Innovativeness of Private Housing Developers in Malaysia. *Malaysian Journal of Real Estate*, 2 (1), pp. 55–60.
- [35] Johnson, D. (2008) *Residential Land Development Practices: A Textbook on Developing Land into Finished Lots 3rd Edition*. United States of America: ASCE Press.
- [36] Drewett, R. (1973) The Developers: Decision Processes. In P. Hall, H. Gracey, R. Drewett, and R. Thomas, *The Containment of Urban England: Volume II – The Planning System: Objectives, Operations, Impacts*. London: George, Allen and Unwin Ltd.
- [37] Lambert, C., and Underwood, J. (1984) *The Role of Local Plans in the Land and Development Process*. University of Bristol: School of Advance Urban Studies.
- [38] Maziah Ismail (1996) A Review of the Models of Land Development Process: The Agency Models. *Buletin Ukur*, 7 (2), pp. 80–99.
- [39] Cadman, D. and Topping, R. (1995) *Property Development 5th Edition*. United Kingdom: E&FN Spon.





- [40] Asiah Othman (2006) Developers' Strategies in Dealing with Planning Controls: It's Impact on the Urban Housing Development. *Malaysian Journal of Real Estate* , 1 (2), pp. 7–16.
- [41] Czamanski, D. and Roth, R. (2009) *Characteristic Time, Developers' Behaviour and Leapfrogging Dynamics of High-rise Buildings*. Retrieved October 12, 2010, from Springer-Verlag.
- [42] Barrett, S. and Whitting, G., (1983) *Local Authorities and Land Supply*. Bristol: University of Bristol.
- [43] Gore, T. and Nicholson, D. (1991) Models of the Land Development Process: A Critical Review. *Environment and Planning A* , 23, pp. 705–730.
- [44] Maimunah Jaffar (2010) Peranan IRDA Dalam Merangsang Industri Perumahan di Selatan Johor. *Proceeding for Seminar Halatuju Pembangunan Perumahan di Selatan Johor*, 12 April.
- [45] Ainur Zaireen Zainudin, Maslinda Abd Latiff, Norhidayah Md Yunus, Nor'Aini Yusof, Megat Mohamed Ghazali Megat Abdul Rahman and Khadijah Hussin (2012) Housing Developers' Initiative In Supporting Sustainable Housing Development In Iskandar Malaysia. *International Journal of Real Estate Studies*, Volume 7 (1), pp. 24–29.

