

2nd International Conference On Innovation And Technology
For Sustainable Built Environment 2014

Architectural Transformation of a Night Market Stall

Lee Xia Sheng^{a,1*}, Lee Ching Hua^a, Cheah Shyn Yi^a, ZiSiang See^b

^a Lecturer, School of Architecture, Building & Design, Taylor's University, Malaysia

^b Faculty of Creative Industries, Universiti Tunku Abdul Rahman, Malaysia

Abstract

This paper would like to recognize and adapt upcoming trends in architectural design in its most basic and minimal form – a new-generation night market stall. The night market is a common scene in Malaysia that attracts both local townspeople and tourists for various reasons. Composed simply and usually of individual make shift stalls arranged in rows - it is worth noting that the design of these stalls have remained essentially the same for decades despite the rapid changes and technological advancements in architecture. Recent trends in the advancement of this field include the exploration and implementation of transformable structures and the study of flexibility as key architectural features. In addition to that, research is also being conducted to develop design and construction technologies for foldable kinetic architecture. Social behaviour and lifestyle patterns play a major role in the design of the built environment, thus it is important to observe and include in our research that our society has become increasingly digitally driven and media-oriented. It is therefore logical to look into new possibilities for architecturally transforming the design of the night market stall. This paper begins by presenting a specific study on the current functional and environmental requirements of night market stalls in Malaysia. These requirements are discerned and considered alongside selected current architectural developments as well as other emerging non-architectural technologies. Thereafter, we shall explore and propose the design of a new-generation night market stall from six key aspects – namely: 1) deployable structures, 2) portability, 3) flexibility, 4) digital adaptation, 5) media integration and 6) energy consumption.

Keywords: architecture; design; night market stall; transformation; deployable structure; portability; flexibility; digital adaptation, media integration; energy consumption

1. Introduction

A night market is a bazaar-like venue commonly found in East Asia where locals and tourists alike visit to shop, to eat out or simply spend leisurely time. Reasonable bargains can be customarily found from the stationary vendors or stores at here. Vendors operate from stalls of different forms that are made out of various types of materials. The stalls are often temporary and configured to suit the respective vendor's nature of business.

This design-oriented study aims to investigate and better understand the current setup of Malaysia's night market. A pilot study is conducted on the night market held weekly in the locality of SS2 in Petaling Jaya. Upon grasping the fundamental functional and environmental requirements of the night market stall, selected current architectural aspects such as: 1) deployable structure, 2) portability, 3) flexibility, 4) digital adaptation, 5) media integration and 6) energy consumption will be explored and integrated into the proposal and design of a new-generation night market stall.

2. Night Market Architectural Transformation

Hsieh and Chang (2006) suggest that the night market is a highly-favoured destination for tourists. Nor Khomar et al (2012) further explain that with its blend of sights and sounds as well as the kaleidoscope of colours that come alive by nightfall, this multiplicity of sensory triggers found in a night market makes it a remarkable and fascinating experience for tourists and visitors. However, night markets are still troubled by standing and as yet unresolved issues

* Corresponding author. Tel.: +603-5629 5000

E-mail address: xiasheng.lee@taylors.edu.my, leexiasheng@gmail.com.

such as being weather-dependant and having to rely on noise-inducing generators for power, both of which can be addressed and possibly solved through the transformation of the stall's design and construct.

2.1. Key aspects of night market stall transformation

Contextualizing a night market stall as adaptive architecture will help to further drive the potential of the architectural transformation of a night market stall by looking into the following key aspects.

2.1.1. Deployable Structure

Earlier research and studies such as the movement matrix of convertible roofs (Otto et al, 1971) and the ongoing investigations of highly flexible and deployable structures (Friedman, 2012) show that deployability has been one of the key criteria of adaptive architecture, thus indicating that the concept and notion of deployable structures have existed for some time now. An obvious feature of deployable structures is that it allows one the functional option of choosing when and where to “activate” the structure. This aspect is therefore not only relevant to that of a night market stall, but especially significant and beneficial in meeting its character of being a temporary kiosk.

2.1.2. Portability

Portable structures are usually the results of a problem-solving design approach that leads to wide diversity in form and function (Kronenburg, 2003). Ease of mobility is of high concern regardless of the different modes of transportation and types of suitable vehicles (i.e. van, truck, etc.) available and used to transport it, which will directly impact the dimensions and specifications of a night market stall. Additionally, under this key aspect, it is important to ensure that the safety and durability of the night market stall is not compromised by its convenience in portability.

2.1.3. Flexibility

Adjustable and interchangeable components are key highlights in flexible furniture systems (Machado & Marsky, 1999). It is possible and plausible to fit the night market stall with such componentry so that it can be flexibly and authoritatively configured to meet different needs in different settings. Also, as faulty components can be easily replaced, its ease of maintenance is an added advantage of the adjustable and interchangeable component system.

2.1.3.1. Digital Adaptation

In interactive digital art, the degree of artist and participant engagement (Edmonds , 2010) can make both parties the creator of an unanticipated creative outcome. This burst of unexpected creative output can be further enhanced with rapid prototyping that emphasizes the intuitive creation process (Covarrubias and Bordegonia, 2014). Apparatus such as the rapid prototyping three-dimensional (3D) printer is a tool that allows for the involvement of both the customer-user and business provider in producing spontaneous and customizable products. An example of such a product is the external casing for mobile gadgets, a good that is now frequently found in night markets. Digital adaptation will also help streamline and partially automate the night market business.

2.1.3.2. Media Integration

Media-related elements including blogs, RSS feeds, video-streaming capabilities, podcasts, images, and downloadable documents such as fact sheets (Pettigrew and Reber, 2011) are possible forms of distribution that have been used for business communication purposes. These elements are widespread in both conventional and online media but rarely utilised in a night market environment. Multimedia-capable mobile devices or wearable computers that operate with augmented reality (Damian et al., 2013) will enable the customer-user to interact with extended

multimedia content via this technology in the setting of a night market. These can be easily achieved by providing an interactive media platform for and incorporating it into the design of the stall.

2.1.3.3. Energy Consumption

Night market businesses are usually powered by audibly discordant diesel-fueled generators that are not environmentally-friendly. Retractable solar roofs and rechargeable battery packs that store the roof's solar-generated electrical supply (Blieden et al, 1987) easily resolves this in place of the diesel-powered generator.

3. Pilot Study

A pilot study on the SS2, Petaling Jaya night market occurs regularly every Monday spanning from Jalan SS 2/61, SS 2/62 and SS 2/63 as shown in Figure 1. The objective of this pilot study is to understand the current setting up of night market stalls to relate with the selected six key aspects: 1) deployable structure, 2) portability, 3) flexibility, 4) digital adaptation, 5) media integration and 6) energy consumption.

The first part of pilot study is to collect primary data by mapping out the SS2, Petaling Jaya night market. This is carried out by observation and recording of the type of business in the night market. The category of night market business are listed in Table 1. The second part of pilot study is to record photographic images of selected stalls with digital camera. These images are used to analyse the methods of operation based on the six key aspects.



Figure 1. Location and Layout Map of SS2, Petaling Jaya night market

Table 1. Types of Night Market Business

No.	Category	Types
1.	Food and Beverage	Cooked Food, Cake, Fruit Juice, etc.
2.	Clothing	Shirts, Jeans, Dress, Skirt, etc.
3.	Accessories	Hand Bag, Shoe, Ring, etc.
4.	Gadgets' Accessories	Mobile Phone Housing, etc.
5.	Home Utensils	Knife, Spoon and Fork, Cup, etc.
6.	Fruit and Vegetables	Apple, Mango, Cabbage, etc.
7.	Raw Meat Product	Beef, Chicken, Fish, Prawn, etc.
8.	Other	Lock Smith Service, Compact Disk, etc.

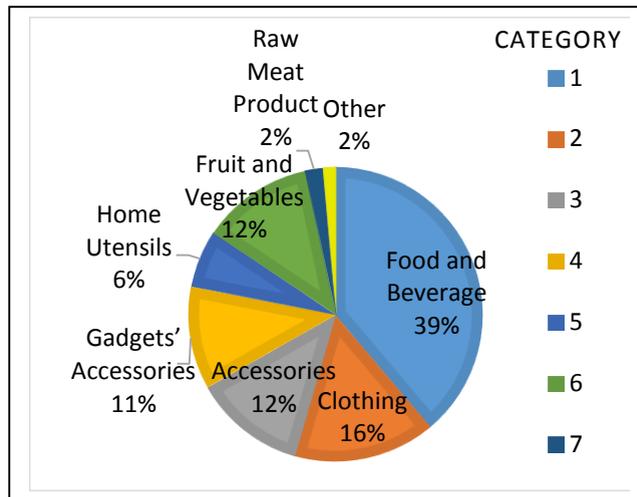


Figure 2. Percentage of different night market business category

Figure 2. indicates the percentage of different night market business category in SS2, Petaling Jaya night market. Different category may have different requirements and implementations from the six key aspects.



Figure 3. Food and beverage is the biggest category



Figure 4. Different types of tray and rack to display merchandise

The pilot study observed the following characteristics of night market stalls that can be enhanced via the six key aspects highlighted:-

- 1) Deployable structure - most of the stalls are made up of detachable items that require substantial time and effort during in both setting up and packing away.
- 2) Portability - some of the racks are single pieces with sharp edges which complicate and burden the loading and unloading process.
- 3) Flexibility - the stalls do not have the flexibility of being configured into different settings for other categories of business and use.
- 4) Digital adaptation - very limited, only usage of personal devices.
- 5) Media integration - very limited, only usage of static light panels.
- 6) Energy consumption – diesel-based power generator, vehicle battery for emergency.

Upon observing the current circumstances and make up of the night market stall, it is concluded that there is much room for the improvement of the stall with the implementation and integration of the six key aspects into its design and construct.

4. Conceptual Design of a New Generation Night Market Stall

A conceptual design named as Market Box that was developed from the findings of the pilot study outlined above is as follows:

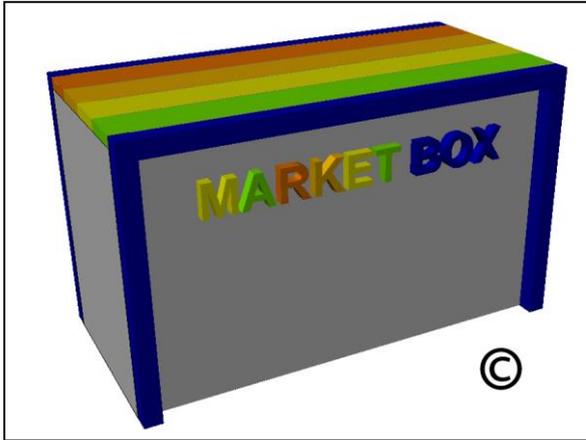


Figure 5. Market Box in box form

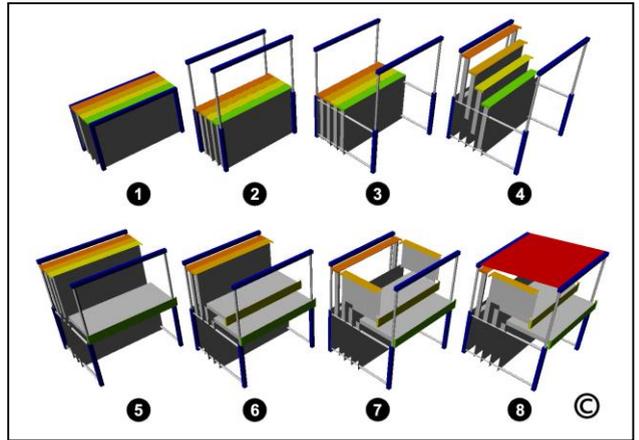


Figure 6. Steps of setting up Market Box

The Market Box, as illustrated in Figure 5., designed to the simplest form of a box for the ease of transportation and storage when not in use. However, Market Box can be deployed easily and quickly in a few steps as illustrated in Figure 6. This illustrated process aims to reduce the manpower and time required in setting up the stall. The procedure includes deploying the major frame, the adjustable and interchangeable components followed by the retractable solar roof. This simplified design and process will aid in increasing the efficiency of the night market operators.

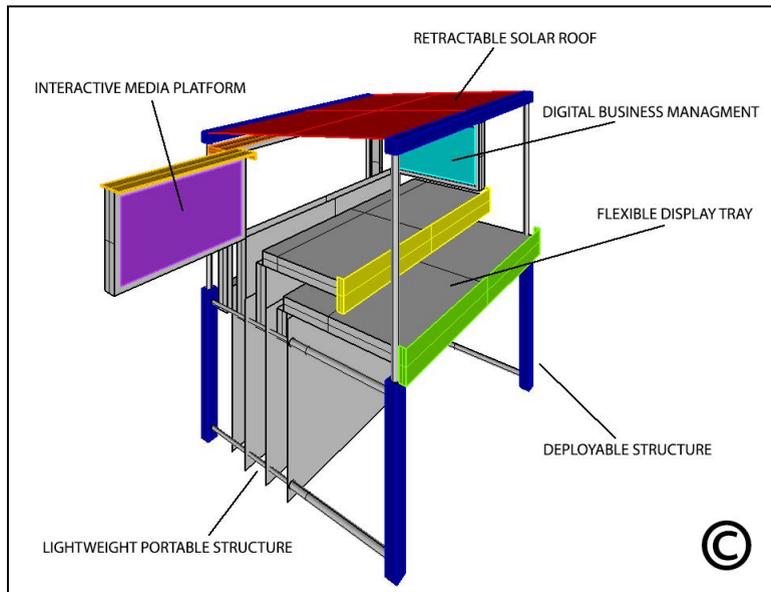


Figure 7. Transformation of night market stall incorporating the six key aspects

The conceptual design of the Market Box is to integrate different key aspects of current architectural development as illustrated in Figure 7. which ultimately triggers the transformation of night market. The major features that should be incorporated in the design include:

- a) A deployable structure that can be handled rapidly with ease and minimal manpower
- b) A lightweight, portable structure that can be easily loaded and unloaded from vendor's vehicle
- c) Flexible display tray/rack that can be replaced and interchanged for different needs and purposes
- d) Digital business management that improves business operations and service
- e) Interactive media platform that is consistent with current lifestyle, communication and consumption trends
- f) Retractable solar roof that promotes sustainable energy generation and usage

Ideally, multiple units of the Market Box can also be combined and configured into larger and more sophisticated systems that have greater influence and use compared to a single, stand-alone unit.

5. Conclusion

The form and method of operation of night market stalls have, for decades, remained mostly unchanged despite the rapid changes and technology advancement in architecture. It is a suitable time now to transform the night market by adapting to modern needs and situations in the design of a new-generation night market stall. Such an initiative can start by looking into key architectural design aspects that include but are not limited to deployable structure, portability, flexibility, digital adaptation, media integration and energy consumption. Ideally, such a transformation will bring about various benefits such as greater tourist attraction, a cleaner and quieter environment, and pleasurable experience for visitors, among others.

Acknowledgements

The authors would like to acknowledge the School of Architecture, Building & Design, Taylor's University for their technical and financial support of this paper. The authors also extend their appreciation to the vendors who operate in the SS2, Petaling Jaya night market and have aided in providing valuable feedback and permission to be photographed during the pilot study, and to Mr. Loh Kwan Seng for his help during the site visit. Finally, the authors would like to thank all family members for their care and understanding throughout the duration of this research.

References

- Blieden, R., Hanak, J. J., Kuypers, B., & Young, J. (1987). "Retractable power supply." U.S. Patent No. 4,636,579. Washington, DC: U.S. Patent and Trademark Office.
- Covarrubias, M. & Bordegonia, M. (2014). Interaction with virtual aesthetic shapes through a desktop mechatronic system. *Virtual and Physical Prototyping*, Vol. 9, No. 1, pp. 27-43.
- Damian, I., Kistler, F., Obaid, M., Bueling, R., Billingham, M. & Andre, E. (2013). Motion Capturing Empowered Interaction with a Virtual Agent in an Augmented Reality Environment. *International Symposium on Mixed and Augmented Reality 2013*.
- Edmonds, E. A. (2010). The art of interaction, *Digital Creativity*, 21 (4), 257-264.
- Friedman, N. (2012). Investigation of highly flexible, deployable structures: review, modeling, control, experiments and application. PhD thesis. Budapest University of Technology and Economics.
- Hsieh, A., and Chang, J. (2006). Shopping and Tourist Night Markets: A Case in Taiwan. *Tourism Management*, 27(1): 138-45.
- Kronenburg, R. (2003). *Portable architecture*. Routledge. pp.5
- Machado, J. U., & Marsky, M. L. (1999). "Flexible furniture system with adjustable and interchangeable components." U.S. Patent No. 5,943,966. Washington, DC: U.S. Patent and Trademark Office.
- Nor Khomar, I., Khursiah, A. A., Amri, A. (2012). Dynamism of a night market. *Journal of Case Research in Business and Economics*. Volume 4 - July, 2012: 1-15.
- Otto F et al. (1971). *Convertible Roofs*, Institut for Lightweight Structures, Univ. Stuttgart, IL5
- Pettigrew, J.E., & Reber, B.H. (2011). Journalists' opinions and attitudes about dialogic components of corporate websites. *Public Relations Review*, 2011, Vol. 37, No. 4, pp. 422-424.