

1nCEBS 2009 Shah Alam

1st National Conference on Environment-Behaviour Studies, Faculty of Architecture,  
Planning & Surveying, Universiti Teknologi MARA, Shah Alam, Selangor, Malaysia,  
14-15 November 2009

## Residents' Perceptions of the Visual Quality of On-Site Wastes Storage Bins in Kuching

Darylynn Chung<sup>a</sup>, Azizi Muda<sup>b</sup>, Che Musa Che Omar<sup>a</sup> & Latifah Abd Manaf<sup>a\*</sup>

<sup>a</sup>*Department of Environmental Management, Faculty of Environmental Studies, Universiti Putra Malaysia, 43400 Serdang, Malaysia.*

<sup>b</sup>*Department of Geography, Faculty of Social Science and Humanity, UPSI, Tanjong Malim, Perak, Malaysia*

---

### Abstract

Concerns regarding public health and aesthetics considerations of the on-site waste storage have arisen due to improper storage of waste. Research on resident's visual preferences and concerns for solid waste management facilities is still limited. Therefore, the goal of this study is to understand the perceived visual aesthetic quality of on-site waste storage facilities in Kuching, Sarawak. Since the privatization of solid waste management in Kuching, the concessionaire has been providing uniform mobile garbage bins to residents. This has improved the solid waste management systems. Photographs showing the mobile garbage bins provided by the concessionaire have the highest ratings.

© 2012 Published by Elsevier Ltd. Selection and peer-review under responsibility of Centre for Environment-Behaviour Studies (cE-Bs), Faculty of Architecture, Planning & Surveying, Universiti Teknologi MARA, Malaysia

*Keywords:* Visual quality; on-site storage; waste bins; solid waste management; Kuching

---

### 1. Introduction

Rapid urbanization and increasing population in Malaysia have implicitly leads to the increase of waste volume, particularly municipal waste. According to the Department of Statistics, the Malaysian

---

\* Corresponding author. Tel.: +6-03-8946 6733; fax: +06-03-8943 8109.  
*E-mail address:* [latifah@env.upm.edu.my](mailto:latifah@env.upm.edu.my)

population in 2008 is 27.73 millions. The average annual population growth rate is 4.5 percent and approximately 70 percent of this is urbanized population (UNICEF, 2004). In the capital city of Malaysia alone, solid waste generated could reach double the amount of 3.2 million tons a year to 7.7 million tons a year over the period of twenty years (Hassan, 2002; Hassan, et al., 2000). In 2006, the amount of waste generated in Malaysia was 7.34 million tons, which according to Siraj (2006) is enough to fill up 42 buildings of the same size as the Petronas Twin Tower. Unfortunately, the solid waste management technology and system are not developing at the same rate as the growth of population and waste generation rate. This has led to a “severe deficit” and consequently the Local Authorities have problems trying to provide good services according to the current situation (Rojas-Caldelas & Zambrano, 2008).

The functional elements of solid waste management from the point of generation to the final disposal are categorized into six: (1) waste generation; (2) waste handling and separation, storage, and processing at source; (3) collection, (4) separation and processing and transformation of solid wastes; (5) transfer and transport; and (6) disposal (Tchobanoglous, Theisen, & Vigil, 1993). For the purpose of this study, the researchers would focus mainly on the second element, particularly on the visual quality of on-site storage of waste. On-site storage of waste can be convenient to the waste generators, especially those who generate large amount of wastes every day. However, it has also arisen concern regarding public health and aesthetics considerations. The use of unsightly makeshift containers or open ground storage causes visual pollution (Tchobanoglous, et al., 1993) which will impair the image of a city.

Visual pollution is an aesthetic issue. It refers to the impacts of pollution that could damage our ability to enjoy a view, which includes visibility or limits our ability to view distant objects. Visual pollution is also used broadly to cover more subjective issues such as visual clutter, structures that encroach otherwise appealing scenes, as well as graffiti and other visual destruction (Stapleton). Human, as one of the components of the biodiversity, understand their environment through what they see and therefore, the perceptions of and preferences for the visual environment are part of what makes an environment psychologically comfortable (Xu, 1995). Environments that are considered to have high aesthetic value can significantly increase the general well-being of individuals who are in contact with the environment (Galindo & Rodriguez, 2000; Tweed & Sutherland, 2007).

There has been extensive research conducted to improve the understanding of visual aesthetic qualities of landscapes (Arriaza, Cañas-Ortega, Cañas-Madueño, & Ruiz-Aviles, 2004; Bulut & Yilmaz, 2008; Coeterier, 1996; Priestley & Evans, 1996; Wong & Domroes, 2005), which more often than not examined visual preferences for the natural landscape. On the other hand, research on resident’s visual preferences and concerns for solid waste management facilities is still limited. For a more effective solid waste management practice, it is essential to understand how people perceive the visual quality of on-site storage facilities of wastes.

The ultimate goal of this study is to understand the perceived visual aesthetic quality of on-site storage facilities of wastes at collection points within Kuching City. To achieve this goal, there are certain objectives to be accomplished, which are:

- To study the design and types of bins used by the public for on-site storage of domestic wastes;
- To investigate the problems of solid waste management systems as perceived by the public; and
- To investigate the visual quality of on-site waste containers as perceived by the public.

## 2. Literature review

Visual assessments methods have been utilized by many researchers to improve the understanding of aesthetic qualities of landscapes (e.g. Coeterier, 1996; Arriaza et al., 2004; Bulut and Yilmaz 2008). A study done by Coeterier (1996) summarized a 20 years study on landscape perception and evaluation. It

was pointed out that environmental attributes (in the case of landscape assessment) do not only determine perception but also act as qualities, which determines landscape evaluation.

Visual preference studies have also evolved from assessing landscape to assessing other forms of urban design (e.g. Nasar and Hong, 1999), and such infrastructure as electrical transmission line (Priestley and Evans, 1996) and urban automated transportation system (Bernasconi et al., 2009). In a study of visual preferences for urban signscape, Nasar and Hong (1999) adapted similar methods used in assessing scenic beauty of landscapes and concluded that, “empirical data on human responses can build a knowledge base to guide development of appearance regulations and review”.

Typically, two types of approaches have been adopted in visual assessment, expert approach and the perception-based approach. According to Daniel (2001), in the case of visual landscape assessment, expert approach “translates biophysical features of landscape into formal design”. On the other hand, perception-based approaches utilize biophysical features of a landscape as stimuli that induce aesthetically relevant psychological responses through relatively direct sensory-perceptual processes and/or through intervening cognitive constructs. Perception based approaches utilize human perceptual judgments as indicators of visual aesthetic quality (Bernasconi et al., 2009).

### **3. Research methodology**

#### *3.1. Study Area*

Kuching city, located in East of Malaysia, is the fourth largest city of Malaysia. The city of Kuching lies within the district of Kuching which covers an area of 1,863 square kilometres (719 sq mi). The district of Kuching is administered by three local governments, namely Kuching North City Hall (DBKU), Kuching South City Council (MBKS) and Padawan Municipal Council (MPP).

The solid waste management in Kuching city is taken care of by Trienekens (Sarawak) Sdn. Bhd., the operating company appointed by Sarawak Waste Management Sdn. Bhd. Since 1999, the company has been providing uniform mobile garbage bins to residents and commercial areas. This is one of their strategies of implementing integrated solid waste management and to provide satisfactory services to city dwellers.

#### *3.2. Photographic Survey*

The first step of the research is photographic survey of the type of waste bins in Kuching city. Photographs of bins at different type of residential areas and commercial areas were taken to identify the type of bins available for users. The photographs are then being categorized according to the type of bins.

For the visual assessment, six photographs of different types of waste receptacles were used to assess the residents' perceptions of the visual quality of each scene. The selected photographs were used for the visual appraisal section of the questionnaire. The breakdown of this section was based on (a) descriptive scales, measuring the physical attributes of the selected scenes; (b) affective scales, mainly to measure the reactions or mood of the respondents when exposed to the scenes; and (c) appraisal scales, indicating the aesthetic value and quality of the scenes (after Galindo & Rodriguez, 2000). The respondents assessed the photographs one at a time to avoid making comparisons.

#### *3.3. Data sampling*

The total number of household in the three councils in Kuching is approximately 85,000 with a total number of approximately 560,000 inhabitants. Having considered Yamane's (1967, 1983) sampling method, a total of 400 respondents is required for this study.

The sampling procedure for this study was clustered random sampling whereby the participants were from areas under the jurisdiction of DBKU, MBKS and MPP. A list of municipal waste collection areas were obtained from the local authorities. Each area consisted of several residential areas and each area was assigned codes. The codes were listed in Microsoft Excel and 5 areas were randomly selected from the lists giving a total of 15 areas.

### *3.4. Data Analysis*

Statistical analyses were conducted using statistical software, SPSS Version 17. Descriptive statistics were used to organize and present the respondents' demographic profile and responses towards the solid waste management problems as well as the visual quality ratings.

The principle of perception is about how we make sense of the information that we receive through the sensory organs of the body. While sensation is the information that we receive directly from the sense organ, perception involves analyzing and interpreting that information (Hayes, 1994). While there are arguments regarding the reliability and validity of both approaches, a study by Priestley and Evans (1996) in assessing resident's perception of electrical transmission line found that lay people's appraisal of visual impacts does not necessarily coincides with the assumptions made by experts. Therefore, it is crucial to also understand the perceptions of the non-experts in planning and managing a place.

## **4. Results and discussions**

### *4.1. Demographic profile*

The proportion of male and female among the respondents is 48.4 percent males and 51.6 percent females. The respondents were represented by the major ethnic group in Malaysia, Malay (26.0 percent), Chinese (48.9 percent), Indian (1.5 percent), Iban (11.4 percent), Bidayuh (9.0 percent), Melanau (1.4 percent) and other minor ethnics (1.2 percent). 65.5 percent of the respondents are between 20 to 39 years old. 25.1 percent of the respondents received upper secondary education, 20.2 percent received certificate or diploma while 30.9 percent are university graduates. The survey was conducted at different types of residential areas. Majority of the respondents resides in terraced housing areas (68.6 percent) followed by 10.2 percent living in Kampung houses. The rest were semi-detached, bungalow, flats and shop houses.

### *4.2. Design and types of bins used as on-site waste receptacles*

The management of solid waste in Kuching, the capital city of Sarawak, is taken care of by Trienekens (Sarawak) Sdn. Bhd. Trienekens is the operating company appointed by Sarawak Waste Management Sdn. Bhd. Trienekens and was awarded a 25 years concessionaire for the collection and treatment of solid wastes within the jurisdiction of the three local councils of Kuching (Tang, Soon, & Larsen, 2003).

Since the official operation in June 2000, the company has been providing uniform mobile garbage bins (MGB) of standard sizes to residents and commercial areas. The residents in Kuching are provided with 120-litres MGBs whereas shop-houses and flats were provided with 240-litres MGBs or 660-litres MGBs. Table 1 summarizes the dimension, capacity and other specifications of the MGBs. The company also provides 1100-litres and 10m<sup>3</sup> Roll-on-roll-off (RoRo) containers to markets, industrial areas and

shopping centers. Other than that, Trienekens is responsible for educating the residents the right way of taking care of the MGB. To date, this system has improved the solid wastes collection system especially in residential areas.

Table 1. Types and designs of Mobile Garbage Bins

Capacity (Liter)	Dimension (mm)	Other specifications
120	475 x 480 x 885	Two / four wheeled
240	660 x 587 x 1000	Compatible with the automatic lifter of collection truck
660	1360 x 770 x 1180	High density polyethylene (HDPE) resin

#### 4.3. Public's perceptions of the problems of solid waste management system

The second objective of the study was to investigate the problems of solid waste management (SWM) systems as perceived by the public. Respondents were asked to rate the seriousness of the problems at their residential areas based on a scale of 1 to 5. The problems were identified based on previous interviews with the public health officers of all three local councils. Generally the respondents rate the SWM problems in the residential areas as moderately serious (Table 2).

Since the privatization of the SWM, the concessionaire implemented an integrated system to provide a more efficient and effective service to the public. The introduction of the mobile garbage bins (MGB) usage has improved the collection system as well as the aesthetics problems (Ng, 2009). The MGB is designed to be compatible with the automatic bin lifter of the collection truck. This ensures time-efficient collection and proper handling of the MGBs which reduces damage of bins during collection. At terraced housing areas, SWM problems are minimal as the residents are responsible of taking care of their own MGB. On the other hand, for communal bins such as 660L MGB and RoRo containers, problems such as overflowing waste, indiscriminate waste disposal, foul odor, leachate and scavenging have been an unsolved problems for the local authorities (Ng, 2009).

Table 2. Problems of SWM at residential areas

Item	Problems of SWM	*Seriousness (percent)				
		1	2	3	4	5
1	Overflowing wastes at waste containers	14.1	15.6	33.6	21.7	15.1
2	Vandalism of waste containers	21.4	25.3	30.7	12.7	10.0
3	Littering around waste containers	12.4	19.5	26.3	26.8	15.1
4	Inappropriate location of containers	21.7	26.5	31.6	14.4	5.8
5	Foul odour	14.4	18.0	31.6	19.2	16.8
6	Visual blight at dumping sites	17.0	17.5	29.9	21.9	13.6
7	Misuse of on-site disposal facilities	23.1	32.1	23.8	13.6	7.3
8	Failure of on time collection	14.6	25.5	29.7	19.7	10.5
9	Residents are not concern about the cleanliness of on-site waste containers	12.2	17.3	34.8	21.9	13.9
10	Lack of enforcement and monitoring by authorities	7.8	17.0	37.2	22.1	15.8

\*Scale for seriousness of the problems: 1 Not serious – 3 Moderate – 5 Very serious

There are also several factors to be considered for on-site storage of wastes such as the types of containers used and the container locations. Improper management of waste containers could cause public health and aesthetic issues. Aesthetics issues are related to the production of odors and unsightly conditions when care is not given to the cleanliness of the waste containers and its surroundings (Tchobanoglous, et al., 1993). In this study, more than 60 percent of the respondents disagreed that problems such as damaged bins, exposed waste containers (without lids), usage of non-standardized waste containers and unsuitable location of waste containers cause visual pollution (Table 3). However, 52.8 percent respondents did think that overflowing wastes at waste containers caused unpleasant sight. From the results, it can be said that the residents' perceptions of aesthetics quality varies according to their knowledge, culture and socio demographic background. There are generally two factors as to why we could expect these perceptions to vary across socio demographic groups (Bales, 1985). Firstly is the difference in exposure towards the problems, for instance, the type of residence and occupations. Secondly is the difference in taste, which is entirely subjective.

Table 3. Problems of SWM that cause visual pollution



Item	Problems of SWM	Agree (%)	Disagree (%)
1	Damaged waste containers	37.7	62.3
2	Exposed waste containers (without lids)	37.0	63.0
3	Usage of non-standardized waste containers	16.1	83.9
4	Overflowing wastes at waste containers	52.8	47.2
5	Improper location of waste containers	14.8	85.2

#### 4.4. Visual assessment of on-site waste storage containers

The third objective of this study was to investigate the visual quality of on-site waste containers as perceived by the residents in Kuching. The assessment was based on three scales, (a) descriptive scales, measuring the physical attributes of the selected scenes; (b) affective scales, mainly to measure the reactions or mood of the respondents when exposed to the scenes; and (c) appraisal scales, indicating the aesthetic value and quality of the scenes (after Galindo & Rodriguez, 2000).

Fig. 1 to 3 are the photographs and the mean ratings for each scale. Fig. 1(a), 1(b) and 2(a) show three different types of on-site waste receptacles commonly used as domestic waste receptacles at residential areas. Fig. 2(b), 3(a) and 3(b) are the communal bins that are commonly used at residential flats, commercial areas and shophouses. Fig. 1(a) and 2(b) have the highest mean ratings for all three scales. The waste containers in Fig. 1(a) and 2(b) are the 240L and 660L mobile garbage bins provided for the residents in Kuching. On the other hand, the waste bin in Fig. 1(b) is made of concrete material and is fixed to the ground. The surroundings of the waste bin looked filthy. Fig. 3(b) has also the lowest mean ratings probably due to the overflowing of waste around the waste bins which create unpleasantness to the viewers.

While the perceptions of cleanliness and attractiveness is entirely subjective, it is still deemed possible that there is a collective consensus in what people might consider as clean or dirty, attractive or ugly (Carlson, 2000). Visual perception is a function of the interaction between people and the environment. Zube, Sell, & Taylor (1982) proposed that there are three main components for visual perception: human, the visual resource and the interaction. The interaction component is what results in the outcomes of the response human has on the resources.

There are several reasons identified by researchers as to why there are differences in terms of public responses and their behaviors toward environmental problems. One of the main reasons is that the public may take for granted the responsibility of protecting the environment because of the assumptions that the government has taken care or might take care of the responsibility. Other than that, the public might not have access to sufficient information and knowledge about the ways of taking part and be more environmental friendly (Dunlap, 1989 in Scott & Willits, 1994). Nevertheless, in depth studies need to be conducted to study in our local context, the factors that influence the attitudes and behaviors of the public towards the visual quality of the environment.



Fig. 1. (a) Mean ratings: a1.34, b2.12, c1.31; (b) Mean ratings: a3.43, b4.60, c3.34



Fig. 2. (a) Mean ratings: a1.91, b2.16, c1.74; (b) Mean ratings: a2.94, b3.84, c2.84



Fig. 3. (a) Mean ratings: a1.23, b1.74, c1.22; (b) Mean ratings: a1.10, b1.44, c1.10

Note: *a* Physical attribute: 1 Very dirty, 2 Dirty, 3 Clean, 4 Very clean; *b* Feelings: 1 Very disgusted, 2 Disgusted, 3 Used to it, 4 Comfortable, 5 Very comfortable; *c* Appraisal: 1 Very unattractive, 2 Unattractive, 3 Attractive, 4 Very attractive.

## 5. Conclusion

The general objective of the study was to investigate the perceived visual aesthetic quality of on-site waste storage facilities. Since the official privatization of SWM in Kuching, the concession company has been providing uniform mobile garbage bins (MGB) of standard sizes to residents and commercial areas. This has gradually improved the SWM systems. In general, the solid wastes management problems in Kuching city are perceived to be moderately serious. Other than that only overflowing wastes at containers is the main problem that creates visual pollution. It was also found that the photographs showing the MGBs have the highest mean ratings for all three scales, which are the descriptive, affective and appraisal scales.

Nonetheless, there are other factors that could influence the residents' perceptions and attitudes towards the solid waste management problems, and also towards the visual aesthetics quality of on-site



waste storage facilities. Therefore, further studies are necessary to investigate the reasons for the perceptions and attitudes to vary.

In addition, people often overlooked the aesthetics problems of on-site waste storage facilities. Planners often emphasized on improving the technical elements of an integrated solid waste management system, such as improving the waste collection system so as to minimize collection time in order to cater for larger collection areas. Having state-of-the-art waste collection and disposal facilities is not the ultimate solution for solid waste management problems. It has to be the integration of all the functional elements of the solid waste management system. Therefore, it is important to understand the behavior and perceptions of residents towards the visual aesthetic quality on-site waste storage facilities.

## Acknowledgements

The authors wish to express a deep gratitude to all of the enumerators who helped in carrying out the survey and to the residents in Kuching, Sarawak who agreed to participate in the survey. The authors are very grateful to the anonymous reviewers for their valuable comments and suggestions. This research was provided with a grant from the Ministry of Science, Technology and Innovation, Malaysia (MOSTI).

## References

- Arriaza, M., Cañas-Ortega, J. F., Cañas-Madueño, J. A., & Ruiz-Aviles, P. (2004). Assessing the visual quality of rural landscapes. *Landscape and Urban Planning*, 69, 115-125.
- Bales, K. (1985). Determinants in the perceptions of Visual Blight. *Human Ecology*, 13(3), 371-387.
- Bulut, Z., & Yilmaz, H. (2008). Determination of landscape beauties through visual quality assessment method: a case study for Kemaliye. *Environmental Monitoring Assessment*, 141, 121-129.
- Carlson, A. (2000). *Aesthetics and the environment: the appreciation of nature, art and architecture*: Routledge.
- Coetier, J. F. (1996). Dominant attributes in the perception and evaluation of the Dutch landscape. *Landscape and Urban Planning*, 34, 27-44.
- Galindo, M. P. G., & Rodriguez, J. A. C. (2000). Environmental Aesthetics and Psychological Wellbeing: Relationships Between Preference Judgements for Urban Landscapes and Other Relevant Affective Response. *Psychology in Spain*, 4(1), 13-27.
- Hassan, M. N. (2002). *Solid waste management in Malaysia: can we charter future strategies?* Paper presented at the International Conference Environmental Management: Ten Years after Rio. Article Number 8, Universiti Putra Malaya.
- Hassan, M. N., Chong, T. L., Rahman, M. M., Salleh, M. N., Zakariah, Z., Awang, M., et al. (2000). *Solid Waste Management – What's the Malaysian Position*. Paper presented at the Seminar on Waste to Energy 2000.
- Ng, S. W. (2009). Solid Waste Management in MPP, Kuching. Kota Padawan, Kuching.
- Priestley, T., & Evans, G. W. (1996). Residents perception of a nearby electric transmission line. *Journal of Environmental Psychology*, 1, 65-74.
- Rojas-Caldelas, R. I., & Zambrano, E. A. C. (2008). Urban observatories opportunities for environmental monitoring: Solid wastes. *Waste Management, In Press*.
- Scott, D., and Willits, F. (1994). Environmental attitudes and behavior: A Pennsylvania survey. *Environment and Behavior*, 26(2), 239.
- Siraj, M. (2006). Waste Reduction: No Longer an Option but a Necessity. *Bernamea*.
- Stapleton, R. M. Visual Pollution. Retrieved 22 August, 2008, from <http://www.pollutionissues.com/Ve-Z/Visual-Pollution.html>
- Tang, H. H., Soon, H. Y., & Larsen, I. (2003). *Solid Waste Management in Kuching, Sarawak*.
- Tchobanoglous, G., Theisen, H., & Vigil, S. A. (1993). *Integrated Solid Waste Management: Engineering Principles and Management Issues*. New York: McGraw-Hill.
- Tweed, C., & Sutherland, M. (2007). Built cultural heritage and sustainable urban development. *Landscape and Urban Planning*, 83, 62-69.
- UNICEF (2004). Malaysia – Statistics: Retrieved 23 March, 2009, from [http://www.unicef.org/infobycountry/malaysia\\_statistics.html](http://www.unicef.org/infobycountry/malaysia_statistics.html)
- Wong, K. & Domroes, M. (2005). The visual quality of urban park scenes of Kowloon Park, Hong Kong: likeability, affective appraisal, and cross-cultural perspectives. *Environment and Planning B: Planning and Design*, 32(4), 617-632.

- Xu, Y. (1995). Sense of place and identity. East St. Louis Action Research Project Retrieved 19 September, 2008, from <http://www.eslarp.uiuc.edu/la/la437-f95/reports/yards/main.html>
- Yamane, T. (1967). *Elementary sampling theory*: Prentice-Hall Englewood Cliffs, NJ.
- Yamane, T. (1983). *Statistics: an introductory analysis*: Harper & Row New York.
- Zube, E., Sell, J. & Taylor, J. (1982). Landscape perception: research, application and theory. *Landscape Planning*, 9(1), 1-33.