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Audit of Visitor Vandalism Behavior on Product Facilities in Surabaya City Green Open Area through Functional Design Aspects

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ABSTRACT

This research tries to study the safety aspects of City Park facilities by trying to harmonize the management process on the product design functionality of city park facilities with the expectations of visitors when doing activities. For the design process, the researcher used the concept development method of Function-Behavior-Structure (FBS) which is the theory of activity safety using a product design and combined with the principle of product prioritization through EARPS Environmental Assessment of Public Recreation Spaces Observational Measure mini version (EAPRS-Mini) to determine priority facilities that need attention based on the type of design elements used for activities. This research was conducted at a comprehensive type park in Surabaya City, Surabaya Zoo or Kebun Binatang Surabaya (KBS). While the measurement uses qualitative descriptive analysis from visitors to get data related to the needs of design problems, then the results of data processing are used by researchers to process data through tabulated data to get the desired results and the last stage is the recommendation of park facility product design derived from data processing.

KEYWORDS

Management; Product Design; Functional and Urban Park.

INTRODUCTION

The development of security design management in Open Green Space (OGS) facilities or city parks continues to be challenged by managerial parties, according to (Farkas et al., 2023) it is stated that in a decade there have been more and more cases related to vandalism and negative behavior of visitors in city parks due to unsatisfactory facility design. vandalism or negative behavior itself is closely related to public facilities according to, (Mahrous et al., 2018), He and Liu (2022), (Chuang et al., 2022), (Bhuiyan et al., 2021), (Shackleton & Njwaxu, 2021), (J. H. Wu et al., 2020) mention is a form of activity or activity of OGS visitors that can be considered "disturbing, making noise, harassing, damaging or deteriorating" the quality of facilities in public areas.

(Bhati & Pearce, 2017) states that vandalism is in the form of negative individual behavior that disturbs and damages facilities in public areas, such as: sitting on facilities, trespassing, damaging facilities, ignoring rules, defacing, or misusing property. Meanwhile, (Toet & van Schaik, 2012) explains that vandalism can also be a social nuisance, (Odufuwa et al., 2019) states that the types of vandalism can be divided into three categories based on their nature, namely: Breach of Public Space, namely vandalism that violates the rules, Violent Crime vandalism that disturbing other people, and Property Crime, which is vandalism that damages property.

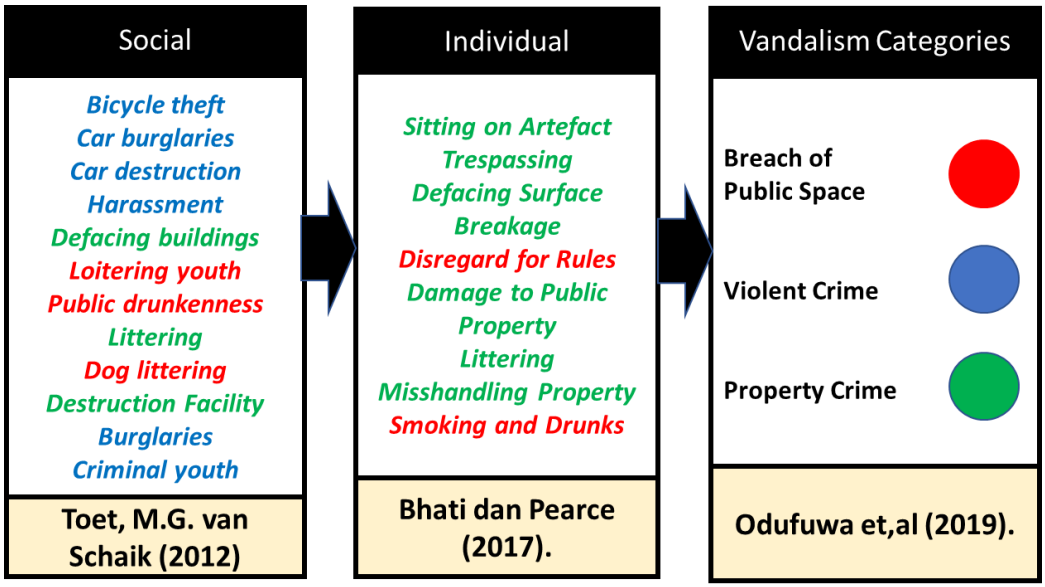

Figure 1: Different forms of vandalism behavior in the park

Park Vandalism Due to Poor Functional Management of Facility Products

(Othman El Sayed, 2019) states that poor management of the product design of activity support facilities can affect the occurrence of intentional or unintentional vandalism by visitors, for this reason, good management is needed to manage the design of facilities provided for visitors and the factor of design is important for the implementation of safe and comfortable park management. (K. C. Wu & Song, 2017) added that poor management factors in designing unsafe, unmaintained facility products cause negative behavior.

(Ottoni et al., 2016) Continue that vandalism or negative behavior of visitors can be caused by functional factors in the design of facilities that are not functioning optimally. (Kong et al., 2022) continued that facility products that lack function as activity support, support entertainment and recreation values, and lack of functional design can reduce visitor satisfaction thereby increasing negative behavior or vandalism.

(Restrepo et al., 2022) mentioned that the importance of safety management in the design of facility functionality needs to be carried out by designers in an effort to cause injury to unwanted actions by users. The following are examples of functional design factors that are not good at influencing injury or bad behavior:

Table 1: Injury causal factors of unsafe products

No	Causative Factors	Description	Example
1	Product design function is Not good	Unwanted Moving Products	Problems related to the product's stop or brake function moving when it should not.
2	Product design structure is Not good	The danger of Slipping or Falling	The product causes slips/trips, resulting in a potential fall hazard. Example: hinges protrude above the ramp surface.
3	Product design structure is Not good	Design, Material, or Manufacturing Defects	Product breakage/bending, poor material finishing (rough surfaces, sharp edges), pieces becoming loose or falling off.
4	Product design part attributes are Not good	Unstable	The product or part of the product (directly related to the product stability, such as a wheel) is wobbly, overturned, or uneven.

Source: Restrepo et al. (2022)

Based on the above review, there is also a need for management strategies to prevent injuries to users through safe design management of facilities to reduce the impact of negative visitor behavior. According to (Renaud et al., 2019) FBS or Function Behavior Structure is an appropriate management strategy to explain that the relationship between the functional features of the design on the product can affect the comfort and safety of its user activities, functional analysis. (Luo et al., 2023) In design studies, FBS can be used as a designer's intuitive consideration of how product functions can be subjected to a more systematic use of design. Analysis of the phases of the design process can be more detailed but more diverse in concept.

According to (L. Li et al., 2018) FBS has advantages over some previous design theories that utilize separate functional requirements and design parameters such as Quality Function Deployment (QFD), innovative solutions with the Theory of Inventive Problem Solving (TRIZ) and design alternatives can be evaluated with Analytic Hierarchy Process (AHP). Design methods for product representation such as Computer-Aided Design (CAD) and Finite Element Analysis (FEA) and others.

Problems

How does the application of FBS influence the functionality of product facility design on the bad behavior or vandalism of city park visitors?

Limitations

This research was conducted in priority city parks and priority facility products

Objective

This research has the following objectives:

1. To find out the causes and types of vandalism committed by visitors to city park facilities based on FBS.
2. To find out the main components of FBS facility products that cause visitors' bad behavior.
3. Formulate a management strategy for the design of city park facilities to reduce vandalism that best suits the activity.

Methodology

This research aims to develop a measurement of the security design of park facilities using the security theory approach to the functional design of facilities with FBS. The method of data collection and the mechanism used to interpret the data is using the method of observation on the subject and visitor behavior or called focused ethnography of various park facility products based on (Roeschley, 2023) which states that this type of method, researchers can limit the focus of observation on certain aspects or phenomena in a particular subject or environment. For example, researchers can focus on patterns of social interaction in the site area, changes in the system of the research subject, or the influence of security attributes on visitor behavior. The ultimate goal is to gain a deeper understanding of the phenomenon.

The research attributes use the FBS Function-Behavior-Structure theory approach. (FBS) According to (Sadeghi et al., 2017) based on the development of the FBS theoretical basis of The Function-Behaviour-Structure Framework (Gero & Kannengiesser, 2004) is a framework used in systems engineering to analyze and design complex systems. This framework combines three main elements: function, behavior, and structure of the system.

1. Function: Function refers to the main purpose or task of the product or system. It answers the question "What should the product do?" The function of the product is usually related to the performance of the product, e.g. producing a desired output or achieving a specific goal.
2. Behavior: Behavior refers to the way the system operates the product or responds to user actions. It answers the question "How does the system work?" System behavior involves interacting with inputs, processing information, and producing appropriate outputs.
3. Structure: Structure refers to the components of the product and the relationships between those components. It answers the question "How are the components interconnected?" Product structure involves modeling the components, relationships, and physical or logical layout of the product elements.

In the FBS framework, system analysis and design are done by understanding and combining these three elements. System functions and behaviors are used as a guide to design the right structure, while the system structure can influence the desired functions and behaviors.

Research Data Source

The main data sources in qualitative research are words and actions, these sources are also related to the data processing process to determine priority park facility products based on the theoretical approach of the Environmental Assessment of Public Recreation Spaces Observational Measure mini version (EAPRS-Mini) – (Petrunoff, et al 2022) and (Geremiah, et al 2019). This analysis is used to determine the type of visitor priority facilities based on the suitability of motivations that can cause vandalism, this analysis uses an audit assessment of the Urban Park facility attribute feature scores. The rest is additional data such as documents and other literature.

Regarding the research location, researchers used a multifunctional or comprehensive type of urban park in the city of Surabaya. Comprehensive parks according to (Kong et al 2022), (Zhang and Zhou, 2018), and (Mahmoudi, et al 2022) explain this type of park has complete facilities and a larger area, and a variety of uses than other parks. For this reason, researchers used the Surabaya City comprehensive park Surabaya Zoo or Kebun Binatang Surabaya (KBS), which is the most extensive comprehensive park and is known by the public.

Results and Discussion

After conducting in-depth observations or focused ethnography of the KBS area on two weeks of pecan weekends and holidays, namely on May 26 and 27, 2023, and June 3 and 4, 2023 which were carried out starting at 09.00 - 15.00 WIB on 4 spatial gathering areas that are most crowded, namely: play areas, culinary or dining areas, entrance areas, and open stage areas, the qualifications of the types of priority facilities that are most used by visitors and forms of vandalism are as follows:

Table 2: List of facility products by use in prioritized spatial areas of the park

KBS Spatial Area	Product Facilities	
Playground Area	a.	Seating/ Bench
	b.	Playground Facilities
	c.	Waste bins
	d.	Garden lights
	e.	Visitor's table
Food Area	a.	Seating
	b.	Dining Table
	c.	Sink
	d.	Trash Bin
	e.	Guardrail
Open Stage Area	a.	Seating
	b.	Stage
	c.	Trash Bin
	d.	Visitor Tables
	e.	Guardrail

From the data above, it can be concluded that seating, tables, and trash cans are the top priority with a score of 3 or high, while guardrails are medium priority or 2, and then washbasins, stages, and lights occupy a priority scale of low or 1. So from here, the researcher tries to continue the design audit on a high and medium priority scale while the low priority does not match the mini EARPS priorities. To see the form of vandalism in the most frequently used facilities.

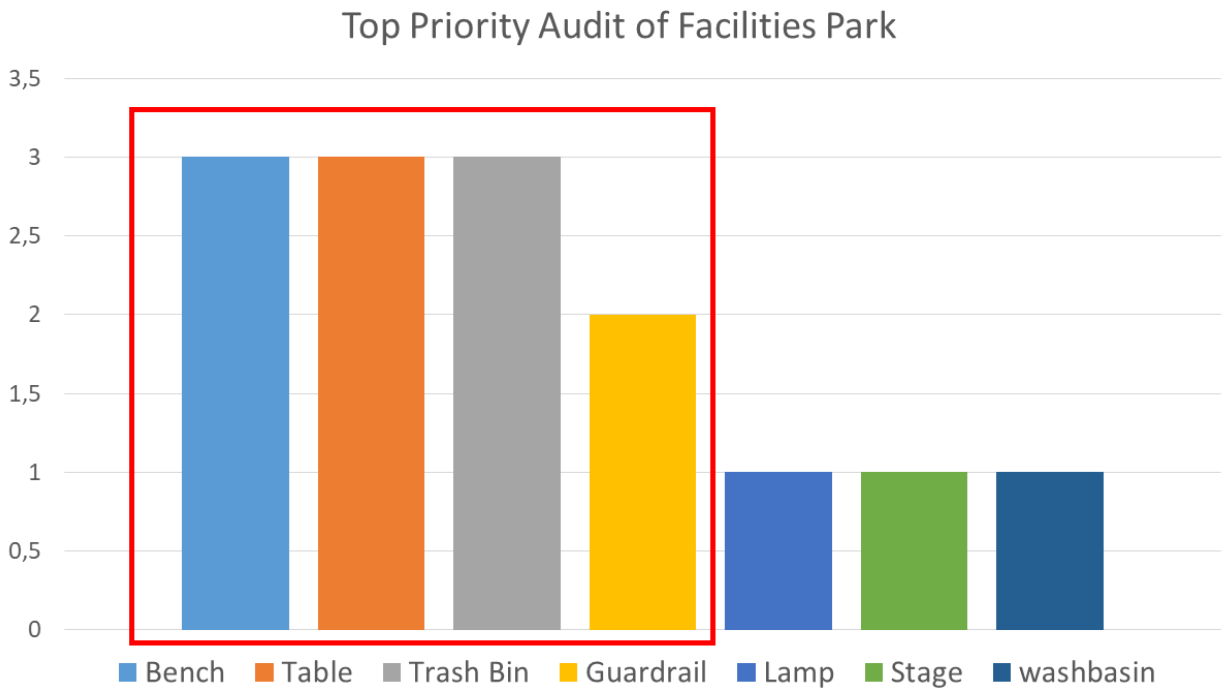

Figure 2: Prioritized facility groups

Audit of FBS management implementation

Furthermore, the researchers conducted a questionnaire survey to 100 respondents who were divided into the first week of 50 people and the second week of 50 KBS visitors who had used the 4 main facilities, namely benches, tables, trash bins, and guardrails in the 3 spatial areas that experienced the most vandalism using the attributes in the FBS to further classify the form of problems and user understanding of facility products based on function-behavior-structure. This survey uses a Likert scale of 1-5 from no problem on a scale of 1 to 5 on a scale of very problematic. The following are the results of the questionnaire.

Table 3: Product measurement audit of prioritized KBS facilities based on FBS

Facilities	There is a problem with the product function (Function)	Problems in using the product (Behavior)	There are problems with product components (Structure)
Bench	5. 33	5. 30	5. 38
	4. 26	4. 23	4. 22
	3. 30	3. 27	3. 11
	2. 14	2. 10	2. 10
	1. 7	1. 10	1. 19
Table	5. 54	5. 27	5. 40
	4. 18	4. 26	4. 24
	3. 12	3. 30	3. 18
	2. 12	2. 13	2. 12
	1. 4	1. 14	1. 6
Trash Bin	5. 43	5. 25	5. 28
	4. 26	4. 42	4. 30
	3. 11	3. 11	3. 22
	2. 8	2. 18	2. 7
	1. 12	1. 5	1. 13
Guardrail	5. 38	5. 56	5. 31
	4. 31	4. 13	4. 26
	3. 5	3. 10	3. 22
	2. 14	2. 10	2. 11
	1. 12	1. 11	1. 10

Based on the audit results from tabulation measurements, it shows that there is an influence of FBS on park facility products. Facilities that experience forms of vandalism get answers above the average problem from the aspects of the FBS attribute, for example in the Trash bin, some visitors commit vandalism in the form of littering because functionally the trash can is small and does not fit a lot of accumulated garbage, then in behavior that how to open the difficult trash lid (rotated) makes visitors throw garbage not inside but outside the trash bin and visitors' lack of understanding of the components of the trash can lid locking handle results in the trash can not be closed properly. Whereas other products such as guardrails experience vandalism due to confusing functions with boundaries, chairs, and tables have many damaged and rusty components with sharp edges that are prone to injuring visitors and negative behavior occurs because visitors are scratched.

Figure 2: Forms of negative behavior and vandalism of visitors due to FBS in poor facilities

Conclusion

This article provides an overview of the audit of public facilities in city parks by considering the design aspects of product functionality. The results obtained correlate with the cause of visitor vandalism due to confusion and dissatisfaction when using facilities based on function, behavior, and structure. These results are important for park managers or designers to better consider the sustainability of services to visitors by considering the product functionality design of facilities.

This research has shortcomings, namely the lack of comprehensive testing measurement tools carried out, although it can still provide simple results. However, the researcher hopes that future studies can use better statistical measurement tools and more respondents so that the results obtained are more credible. Furthermore, it is hoped that for future research is how this FBS method can be developed and collaborated with other methods so that the research is more comprehensive in providing results and a more diverse location area can also make different results in research.

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