Application of OHS and Green Construction in Denpasar Markets

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Abstract: Green technology applications have been widely applied in various buildings, like housing, office buildings, industry, or market. Besides that, it also pays attention to occupational health and safety (OHS), including in markets. Unfortunately, there is no data for these applications in Denpasar Markets. This paper evaluated the application of green technology and OHS in regional markets in Denpasar city with 10 markets in total. This research found a lack of OHS application in these 10 markets with various problems. Most of the markets lack equipment, and there are signs and rules in the form of SOPs that do not yet exist in each market. Things that cause vulnerability, such as fire, need to be anticipated as early as possible by implementing OHS SOPs, procurement of equipment, and inspections, especially electrical installations. For recommendations, market managers should cooperate with local governments and the private sector in the context of implementing OSH in markets, both in the form of financial assistance and assistance in implementing OSH socialization. In terms of green construction, the government should encourage new and renovated markets to use green construction by utilizing environmentally friendly materials and green technology.

1 INTRODUCTION

The market is one of the lifeblood of the community's economy, which in its operation requires many resources in the form of electrical energy, such as a night market and the use of water. Wise use is undoubtedly needed in order to obtain savings that result in economic terms. Besides that, its use does not cause harmful effects on humans and the environment. Therefore, it is necessary to apply green technology in the operation of these markets.

Green Technology, in general, is a technology to help reduce adverse effects on the environment while increasing productivity, efficiency, and operational performance of specific technologies. The main goal of Green Technology is to meet the needs of society in a way that avoids damaging the earth's natural resources. The main components of green technology are recycling, environmental improvement, and renewable energy sources. Recycling is a technology that helps manage and recycle waste materials such as glass, metal, paper, and plastic. These materials are reusable and must be recycled to prevent the depletion of the earth's resources. Environmental improvement removes contamination from soil, air, and water for the general protection of the environment. Renewable Energy Sources include the conversion of helpful energy. The four pillars of Green Technology are energy, environment, economic and social (Masjuki, 2013 and Noh, 2018).

Safety factors also need to be considered in the operation of a market. Of course, so many people will come and bring consequences in health and safety risks. For this reason, it is compulsory to carry out OHS (Occupational Health and Safety) procedures in the market to avoid or minimize the possibility of accidents with bad results.

In Denpasar, there are 16 regional markets as recorded in the Denpasar city database (Denpasar 2021). There are no records that present the application of green technology in all regional markets. The same applies to implementing OHS in the market, whether it already exists and is carried out according to existing procedures.

Green technology seeks to make buildings more energy-efficient and sustainable, thus having a larger carbon footprint and reduced environmental impact. Builders, building owners, and tenants are all aware of the considerable benefits of implementing green construction technology or green construction technology. The primary way to get the benefits of green technology is through greater energy efficiency. In the new building, green building construction role in every phase of development.

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Every aspect of the structure, including the site, the design, construction materials, and systems used to operate and maintain operations selected to be sustainable and energy-efficient.

In general, 30-40% of commercial buildings are usually empty at a specific time (Remøy, 2010). Green construction technology applications include utilizing motion detectors, RFID scanners, access card readers, and sensors to monitor the building sector's occupancy status. Each time the structure area becomes empty, this technology automatically turns off the light and adjusts HVAC, cooling, heating, and ventilation options. The owner of the building can realize savings of up to 30% in their energy expenditure by eliminating unnecessary energy use in this way (Valero & Adán, 2016).

Several studies have documented cases of "sick building syndrome," which can create an unhealthy working environment in commercial buildings, ancient buildings, and those located in hotter climates where the problem ventilation is a concern (Joshi, 2008; Camelia, 2011; Savanti, 2019; Aditama, 2002). When the HVAC system is left continuously working, then this HVAC system can accumulate condensation that allows unhealthy fungal spores to develop. With the application of energy-efficient green buildings, the system will automatically turn off the system HVAC when not needed to maintain the correct temperature and humidity for optimal health. Advanced software and sensors can be installed for 5 monitors the ventilation system to keep out CO2 from the garage or parking lot underground circulated throughout the building. Some of the sustainable construction technologies currently used in green construction are among them (Yu, 2014; Park, 2015; Mohanty, 2010).

2 METHOD AND PROCEDURE

2.1 Method

This study uses a method that is a combination of qualitative methods in terms of assessing the condition and quality of the assessed variables and using quantitative methods to see and calculate the existence of variables according to the study. This research will conduct a field survey to regional markets in Denpasar regarding the application of green technology and OHS in these markets. The stages of this research are shown in Figure 1.

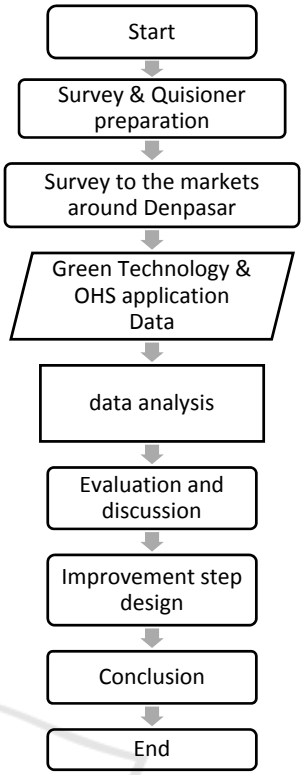

Figure 1: Research Stages.

At the initial stage, a survey tool will be designed and manufactured in a questionnaire containing questions related to green technology and OHS in the market. The survey will involve 4 students as field officers. Furthermore, the parties who manage the regional market will be contacted to ask permission to carry out the survey. After the licensing is complete, a survey is carried out to the markets. There are 16 regional/impress markets in Denpasar, both those that operate from morning to noon and those that operate at night, such as the Kreneng and Kumbasari markets.

The survey focused on each blood market's managers and asked the sellers in each of these markets. Direct observations were also carried out and also documented matters related to green technology and OHS. The data obtained will undoubtedly be used as material to evaluate and provide suggestions for improvement for each regional market in Denpasar.

2.2 Procedure

The research flow and procedure were developed to show the stages, outcomes, and achievement indicators at each stage, as shown in Table 1.

Table 1: Stages, outcome and achievement indicator.

No	Stages	Outcome	Indicator of achievement
1.	Preparation	Research work plan	Clarity of schedule and stages
2.	Questionnaire Creation	Questionnaire	Ready-to-use questionnaire with appropri-ate questions
3.	Field survey to get data in 10 regional markets	data on the application of green technology and OHS	- accuracy
4.	Data collection and sorting	-	- accuracy
5.	Data processing and calculations	Sorted data and ready for analysis	- relevance
6.	Preparation of evaluation analysis and discussion	Data tables, calculation results and graphs	Complete data
7.	Compilation of conclusions and suggestions as well as design of improvements that may be carried out by regional market managers	Analysis and discussion related to the application of green technology and OHS	Accuracy of data presentation/ display

3 RESULT AND DISCUSSION

3.1 Results

This research was carried out in 10 Regional Markets in Denpasar City by first asking permission from PD Pasar, which oversees all markets in Denpasar. Furthermore, a survey was conducted using a questionnaire to obtain input on the application of OHS and the use of green construction in each surveyed market. The results can be seen in Table 2 for green construction survey results and Table 3 for the application of OHS in the markets in Denpasar city.

Table 2: Green Construction Survey Results.

No	**Green Construction**	**Exist**		**Condition**	
		Yes	No	Good	Broken
1	Solar energy Plant	0	10	0	0
2	Biodegradable Material	0	10	0	0
3	Green insulation for walls	0	10	0	0
4	Smart Device-Energy saving	0	10	0	0
5	The roof is coated with special paint so that the room doesn't get hot	0	10	0	0
6	Sustainable resources (reycle-reuse)	2	8	0	2
7	Light-adjusting Smart Glass	3	7	3	0
8	Water efficiency technology	0	10	0	0
9	Technology Indoor: Non-toxic materials (wood, cork)	9	1	8	1
10	Energy Self-Sufficient Building	0	10	0	0
11	Rammed-earth brick, old brick, less emission	2	8	2	0

The survey was conducted to see the application of some green construction material or device installed in the market. These materials and devices such as solar panels, green insulation, smart devices, energy self-sufficient building and coated for the roof can help reduce energy use.

Table 3: Application of OHS in Markets in Denpasar.

Application of OHS		Yes	No
SOP	Market Management SOP	1	9
	Fire SOP	1	9
	SOP OHS	0	10
Danger	Access for firefighters	10	0
	Access for a fire engine	10	0
	Fire Estinguiser	2	8
	Enough number of Fire Extinguisher	0	10
	There is a fire alarm	2	8
	There is an evacuation route	1	9
	There is a meeting point	0	10
	There is a water hydrant	1	9
Signs	High Voltage Danger	0	10
	Danger of Excavation	0	10
	Danger of Slippery Road Jalan	0	10
Electrical installation	Cable according to standard	4	6
	Stop Contact according to standard	9	1
	Kwh Meter Maintained	9	1
	Plug installation does not exceed capacity	9	1
	Neat cable installation between merchants	6	4
Standard water installation	Good pipe connection	7	3
	faucet good condition	9	1
Toilet	Sufficient water	10	0
	There is a toilet	10	0
	Clean toilet	7	3
	separate male and female toilet	8	2
PPE Use & Availability	helmet	0	10
	gloves	0	10
	spectacles	0	10
	vest	0	10
	special shoes	0	10
	Face mask	10	0
	Earmuffs	0	10
Availability of first aid kit	First aid kit available	0	10
	Fill in the first aid box accordingly	0	10
	Easy-to-reach placement	0	10
	Contents are checked periodically	0	10
Garbage Handling	waste management standards	7	3
	trash can available	10	0
	waste sorting	1	9
	there is a garbage disposal schedule	10	0
Trade Placement	Neat and orderly trade placement	9	1
Parking	Enough parking area	7	3
	Neat car park	7	4
Floor condition	not wet, dirty, slippery	4	6
OHS Info	There is OHS info attached	4	6
Loudspeaker	Sufficient use of loudspeakers	8	2

3.2 Discussion

From the survey results on the use of green construction in the 10 markets studied, as shown in Table 2, it is generally still far from expectations. However, at least 9 out of 10 markets have implemented non-toxic materials, and 2 markets are still using the old bricks, which have the feature of low emission. There are 3 markets using glass to adjust lighting, although there is no intelligent device yet, enough for sunlight regulation. Furthermore, two markets have waste processing equipment, but both are in a state of disrepair where proper care is needed with the right human resources.

The data taken is about the implementation of OHS in 10 markets as presented in Table 1 by viewing/assessing the availability of SOPs, fire hazards, signs, electrical installations, standard water installations, toilets, use of PPE, availability of first aid kits, waste handling, merchandise placement, parking, floor conditions, OHS info, and loudspeakers.

As shown in Table 3, of the 10 markets surveyed, only Badung Market has SOPs for market management, fire SOPs, and OHS SOPs. This SOP is undoubtedly an undesirable condition considering as guidelines in the operation of a market.

Regarding the danger of fire, all markets have provided access for firefighters and fire trucks. However, unfortunately, only 2 markets, namely the Badung market and Kereneng market, provide fire extinguishers, which are not sufficient in number in the event of a fire. The 9 markets do not have instructions for evacuation routes or hydrants; only the Badung market provides them. Meanwhile, the sign of the rallying point in the event of immortality, the entire market does not exist, including high-voltage hazard signs, signs for excavation, and slippery floors not prepared by all surveyed markets.

For electrical installations that are vital because they often cause fires, most have met electrical installation standards such as using a well-maintained kWh meter, a suitable socket, or a socket that does not exceed the electrical load. However, this is still not the case in the Satria market, where the standard requirements have not been met. Six markets still do not use standard cables, including their connection installations, which of course, are at risk of fire.

In general, water installations are under good tap conditions and sufficient water, but there are still 3 markets where the pipe connections are still not good enough to allow water leakage.

All 10 markets provide toilets, but 3 markets still need to be kept clean, and separate toilets for men and women are needed.

Regarding the use and availability of PPE and first aid kits, the results were surprising. No PPE or first aid kits were found in all the markets visited. This result is certainly far from the expected standard.

The waste management in these 10 markets is still inadequate. Although all of them provide garbage bins, only 7 have waste handling standards. In addition, only 1 provides sorting the types of waste, namely at the Ketapian market. Almost all garbage disposal schedules already have, except for the unscheduled Lokita Sari Market and the unscheduled merchandise placement for the traders.

A parking lot is also assessed for its adequacy and neatness, which results in 7 out of 10 markets having implemented it well. However, for the market floor, 6 of them are still ducks or slippery or dirty. Furthermore, it turns out that not all markets have posted OHS information in strategic places, 6 of which have not implemented it. As for the announcement tools, 8 out of 10 already have them.

3.3 Improvement Suggestion

The suggestions that can be submitted as improvement steps that may be carried out in implementing OHS and the use of green construction in the market can be seen in Figure 2.

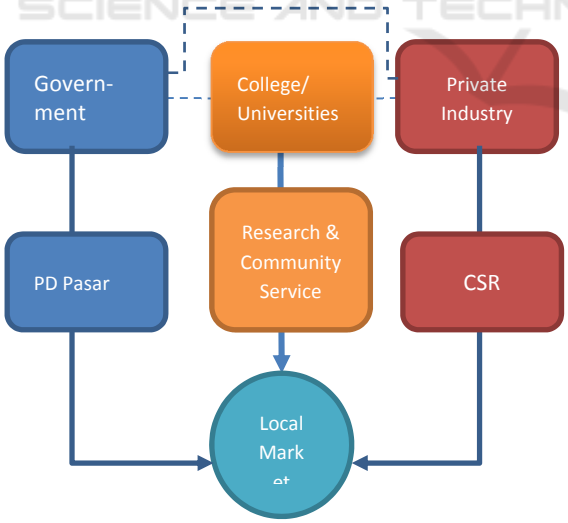

Figure 2: Proposed improvement.

First, PD Pasar, the manager of existing markets, should start enforcing SOPs on OHS, which PD Pasar should already own. If you do not have an SOP, you can, of course, adopt SOPs that already exist in other areas. Furthermore, PD Pasar and the manager conduct socialization in markets about OHS, intending to educate the public, both traders and buyers, by explaining what steps must be taken in implementing OHS and the dangers that may occur if they do not implement OHS properly.

Second, in terms of the scarcity of PPE equipment (personal safety equipment), fire, first aid kits, and vital signs, we can cooperate with the private sector, for example, through CSR (Corporate Social Responsibility) from large companies.

Third, by cooperating with local governments, both district and provincial, if possible, repair damaged equipment and additional tools for reuse, recycle, and place human resources who can operate and maintain equipment adequately accompanied by an adequate budget.

Fourth, periodically carry out inspections, maintenance, and repairs, especially on electrical installations in each market, considering that fires often occur result from problems with electrical installations.

Fifth, in terms of green construction, the government as the policyholder should encourage the development of new and renovated markets to use green construction by utilizing environmentally friendly materials and green technology, which has an effect on the environment as well as on the economy.

Sixth, in terms of development, research and service, the market can cooperate with local universities.

4 CONCLUSIONS

This research found that there is still a lack of OHS application in 10 markets in Denpasar with various problems. The research also found that most of the markets lack equipment, and there are signs and rules in the form of SOPs that do not yet exist in each market. Market managers need to anticipate things that cause vulnerability, such as fire, as early as possible by implementing OHS SOPs, procurement of equipment, and inspections, especially electrical installations, and their feasibility. Market managers should cooperate with local governments and the private sector in the context of implementing OHS in markets, both in the form of financial assistance and assistance in implementing OHS socialization. In terms of green construction, the government should encourage the development of new and renovated markets to use green construction by utilizing environmentally friendly materials and green technology, which affects the environment and the

economy. Universities can also be invited to research and community service for local markets.

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