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Barriers to the Implementation of Environmental Management Measures in the Operation of Shop-House Enterprises in Bangkok Metropolitan Area

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ABSTRACT

Shop-house enterprises in Bangkok Metropolitan have so far been the best alternative of the citizens to earn income. At the same time, these enterprises also generate negative environmental and health consequences. While facing this dilemmatic situation, the implementation of environmental management measures (EMMs) to deal with environmental and health impacts generated by the enterprises is not presently practical. We identified some potential barriers. However, which one is the most influencing barrier to EMMs we must identify it. The study attempts to understand perceptions of different group of randomly selected stakeholders on the most influencing barriers given fourteen potential barriers to EMMs in Bangkok Metropolitan. The analysis shows that there are four essential barriers as perceived by the stakeholders that needs in-depth attention for the practical application of EMMs. By these critical barriers, policies should be directed to cope appropriately with the issues to accomplish better performance of shop-house enterprises in terms of environment and health.

1. Introduction

A shop-house is a building type that has the characteristics of both native and unique to urban areas of Southeast Asia (Kullathamyothin, 2006). This hybrid building form characterizes not only the historical centers of most towns and cities in the region but also newly developed arena including real estate development. Shop-houses are a remarkable feature of the architecture of many Southeast Asian cities including Bangkok, Phnom Penh, Vientiane, Hanoi and Ho Chi Minh City. We categorized some shop-house enterprises as part of an informal or unregulated economy. This enterprise is an unorganized sector with uncontrolled employment. A reliable classification of these enterprises is offered to facilitate a clear and unambiguous understanding of shop-house enterprises. The classification focuses on two criteria. These are: scale of enterprises and status of enterprises. Shop-house enterprises have more informal characteristics than formal characteristics.

Shop-house enterprises are likely to become more important, particularly in developing countries because of their roles in the informal economy. While their successes can significantly contribute to sustainable economic development, the large number of shop-house enterprises or micro-enterprises will also carry substantial environmental impacts because they are primarily located within or in proximity to residential areas. Their effects on the environment can be critical. For example, micro-enterprises may cause local pollution and land use conflict (Frijns and Van Vliet, 1999). Additionally, planning and other regulatory systems are rarely hospitable to micro-enterprises. There are good reasons for researchers to examine the untreated outputs of these shop-house enterprises or micro- enterprises because their successes can contribute significantly to the sustainability of economic growth and development.

As discussed above, shop-house enterprises have more informal than formal characteristics. The informal-formal sector dichotomy has been used as a conventional method of analyzing the structure of urban economies (Amin et al., 2006). The sample can be used to comprehend environmental and health impact of enterprises and their activities. Large scale industrial activities are primarily responsible for the majority of the pollution load and risk. Therefore, attention has not been focused on micro and small scale enterprises and their environmental performances (Frijns and Van Vliet, 1999). In short, micro-enterprises do not receive much attention in terms of policies. Small and medium enterprises (SMEs) are put on the economic development strategies (Ayanda, 2011). In contrast, micro-enterprises are supported separately as mean of earning subsistence incomes, especially in the current economic difficulties. There is no doubt that micro-enterprises also contribute to environmental pollution because infrastructure and mechanism do not support adequately and appropriately to deal with the pollutants. Some particular people criticize them as they produce liquid effluents, solid wastes, and air pollutants. They create smoke, noxious odors as well as toxic contaminants and discharge them into public drains, nearby land, water bodies, etc. (Frijns and Van Vliet, 1999).

Studies have shown that the informal sector can have positive economic impacts as well as negative environmental effects particularly on pollution control and waste management. Despite positive contribution of the informal sector to the creation of job opportunities, the informal sector can also be a pollution generator (Perera and Amin, 1996). The environmental pollution could then be the strongest negative impact of micro-enterprises as well.

The adverse impacts, i.e. environmental pollution and health hazards, are frequently cited to be reasons to control the informal sector and home-based enterprises (Perera and Amin, 1996). The informal sector can be a bigger polluter than the formal sector (Omuta, 1986; Sethuraman and Ahmed, 1992; Perera and Amin, 1996; Potipituk and Perera, 2013). Operate at home, enterprises can create dangerous conditions in what Sethuraman (1981) calls ramshackle, hazardous and visually intrusive sheds setup on spare land that are occupied by so many informal enterprises. Micro-enterprises indiscriminately use hazardous and inflammable substances, such as dyes, disinfectants and detergents, turning benign residential areas into unpleasant places replete with dangers and shedding pollution into the urban environment (Tipple, 2005a).

In the case of the use of shop-houses in Thailand, one of the pertinent examples associated with shop-house policy, is the Building Regulation Act of 1979. The Act specifies the purpose of dual function shop-houses that is primarily residential with minor commercial use. The Act allows residents to do activities such as cooking, sewing, selling drinks and foods. However, no industrial or small factory could be operated within shop-houses. In short, the authorities restrict shop houses from engaging in most commercial or industrial activities. If a resident wants these regulations waived to use a shop-house for a commercial purpose or light enterprise, she/he must get approval from the local authorities prior to engaging in this activity. However, Hameed and Raemaekers (1999) identified a range of reasons that command and control measures like permissions are ineffective. They asserted that unmanageably high rates of urbanization, incomplete legislation, and uncoordinated planning and pollution control are the main factors leading to weak regulation. In Thailand, when people construct shop-houses for residential, commercial and industrial purposes they must submit different applications to various authorities to obtain permission. These agencies include, among others, the Social Security Office, Department of Industrial Promotion, the local administration organization. It is a lengthy and time-consuming process. The loose coordination and cooperation among the authorities further aggravated the problem. People then resist submitting the required applications and operate without authorization. As a result, pollution from shop-house enterprises goes uncontrolled.

Pollution control or any efforts of environmental protection are principally carried out to internalize the effects of pollution. An insightful concept to deal with this environmental impact is environmental management measures (EMMs). The use of EMMs is presently almost entirely limited to the formal sector in the formal economy while informal sector does not formally receive the same attention. It is part of the dichotomy between the formal and informal sectors. The difference is glaringly present when comparing formal and informal work environments. In the context of living environments, this contrast has long been present, for instance, between squatter or slum settlements and housing of the affluent (Amin et al., 2006). The urban squatters, usually, create social and environmental impacts, and slum settlements generate urban decay and can, therefore, create adverse environmental impacts as well.

In Thailand, the Bangkok Metropolitan, the capital city, is the largest economic entity and population center of the country. Another face of Bangkok completely exhibits the phenomenon of the formal-informal dichotomy, where the formal economy entirely meets informal economy at the same arena. This dichotomous event sometimes generates symbiotic mutualism that benefited for both the industry and the authorities particularly Bangkok Metropolitan Administration. However, amid loose coordination and insufficient policies on the informal sector, the Bangkok Metropolitan Administration Authority receives the environmental consequences generated by informal sector activities. There are presently limited rules on shop-house enterprises in Bangkok Metropolitan. Table 1 briefly describes the present building & environmental regulations and gaps on shop-house enterprises in Bangkok Metropolitan.

Table 1: *The present building and environmental laws and regulations of Bangkok Metropolitan Administration*

Regulatory Framework	Possible Gaps
The Building and Environment regulation No.55/1999 prescribes that shop-houses for the purpose of commercial and industrial activities must be approved by local authorities prior to operation. They must not operate in harmful and hazardous manner.	Home-based manufacturing and service activities use no explicit regulations on the buildings
The objective of the Building and Environment Regulations No.55/1999 is to ensure the safety and security for residents and neighborhoods	Although only micro-scale businesses are allowed to operate in shop-houses by city government, but operation of manufacturing and service activities are commonly found. The regulation does not correctly accommodate the present needs.

The effectiveness of existing EMMs to deal with the formal-informal dichotomy in the Bangkok Metropolitan Area remains unclear. This study attempts to recognize the formal-informal dichotomy of shop-house enterprises, which are the one operating in shop houses as an important subject matter for research in urban environmental management field. The current study tries to identify significant gaps pertaining to the formal-informal dichotomy of shop-house enterprises. The differences include lack of effective EMMs, regulatory and financial instruments as well as suasive measures, and lack of government support and coordination on environmental, economic, institutional, social, gender and equity matters. EMMs are presently used in isolation and without a full appreciation of the fundamental basis of their existence as policy instruments.

Development of small and medium-scale enterprises (SMEs) are one of the government's policies to promote economic development and investment. Meanwhile, most shop-house enterprises are operating in a quasi-policy environment. Lack of industrial, commercial or trade registration of micro-enterprises exemplify this quasi-policy environment although shop houses those are accommodating them are legal buildings. In effect, micro-enterprises operating in shop-houses evades local authorities despite locating with licensed premises. Only 8.1% of SMEs in Thailand receive governmental support to promote trading, commerce and investment. It indicates that the majority of SMEs are working very independently (DIP, 1997). Then it can be assumed that micro-enterprises operated almost 100% independently. Allowing micro-enterprises operating so independently and freely may be detrimental to the urban environment. Recognizing their environmental treat, the Vietnam government, for instance, has given

the SMEs time to clean up and obtain environmental performance certificate and license to operate in residential areas. Similar treatment when the micro-enterprises failed to relocate in specially demarcated zones.

This study attempts to examine the effectiveness of applying the existing EMMs to shop-house enterprises at the city level and identify barriers to the implementation of environmental management measures in shop-house enterprises. It will lead to identifying potential EMMs that can be applied to all stakeholders including shop-house entrepreneurs, residents, planners and district managers.

2. Methodology

2.1 Description of study area

The authors conducted this study in Bangkok, the capital city of Thailand, because there is a very considerable number of shop-houses located here. We conduct the study in four Districts of Bangkok. They were *Bangkokyai, Parsricharoean, Bangkae* and *Nongklam.* The areas located along *Petchkasem* Road on the boundary of the Bangkok Metropolitan Administration. We selected these four Districts because of their variability of the types of enterprises present (Figure 1). They offer a mix of enterprises, such as commerce, service, and manufacturing. The study areas exist along the main arterial highway of *Petchkasem Road* within industrial areas in *Samutsakorn* Province. The selected study area represents a cross-sectional profile of the city. This area is one of the centers of commercial activities in the Bangkok. In the current study, shop-house enterprises were stratified based on their types of activities.

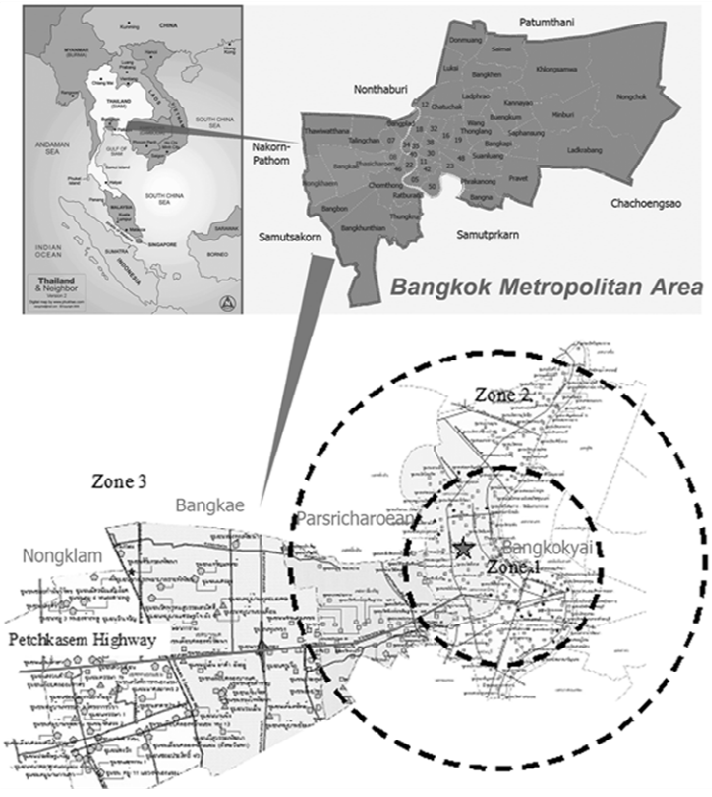

Figure 1: *Study area in selected four districts of Bangkok (Bangkok Metropolitan Administration, 2006)*

2.2 Data collection - a selection of respondents

Data collected in this study consists of primary data acquired from interviews, observations, and questionnaire surveys. We did a preliminary survey in 2012-13 to identify the potential respondents. Because study involved large areas, we clustered the areas by a random selection We used the following procedure to select the groups. A preliminary survey found that there were 60 clusters in the study area. These clusters were categorized into three groups according to the nature of their business, i.e., manufacturing, producing-cum-trading, and service. A number from 1 to 60 was assigned to each cluster. We draw random numbers in proportion to the size of the three groups. From this arrangement, we selected twelve clusters of shop houses. From these twelve clusters, we selected three clusters in each of the four study districts, i.e., *Bangkokyai, Bangkae, Prasricharoen*, and *Nongklam*. For each of these twelve clusters, we determined sample sizes and identified the and respondents.

Analysis was based largely on the perceptions of the three groups of stakeholders. The groups were Group 1: shop-house enterprises (245 respondents); Group 2: affected people who lived in the vicinity of shop house enterprises (245 respondents); and Group 3: relevant decision makers who enforced BMA policies (60 respondents). For the decision maker respondents (60), because of their exclusivity and rarity, the number of respondents was taken as many as possible. We calculated the sample size of first two groups of stakeholders at a-95% confidence level. Thus, the total number of respondents involved in the survey was 550.

2.3 Data analysis

The questionnaires were patterned to facilitate data collection and capture the views of different stakeholders as shown in the tree-hierarchy in Figure 2. We employ a step-wise regression analysis among the particular barriers in this analytical part.

We model the population regression by $y = \beta_1 + \beta_2 x_2 + \beta_3 x_3 + e$, where y is the population regression model and x_i is the independent variable.

We assumed that the error e is independent with constant variance (homoscedastic). We wish to estimate the regression line: $Y = a + b_1 x_2 + b_2 x_2 + \ldots + b_n x_n$, where Y is the dependent variable, x_i is the independent variable, a is a constant, $b_1 \ldots b_n$ is the slope of the line; n is the total number of variables: 14.

We also analyzed the respondent's perceptions on environmental and health impacts generated by shop-house enterprise.

2.4 Relevant Policies and Regulations

2.4.1 Public Health Act 1992

The Public Health Act of 1992 is on public health protection and environmental public health. The Public Health Act of 1992 regulates all activities, businesses and enterprises that create environmental and health impacts due to anthropogenic activities at household level to large industries. Notification of Department of Health is one of the three important issues regulated in the Public Health Act of 1992. It took effect in 2000 and also included the identification of health risk activities

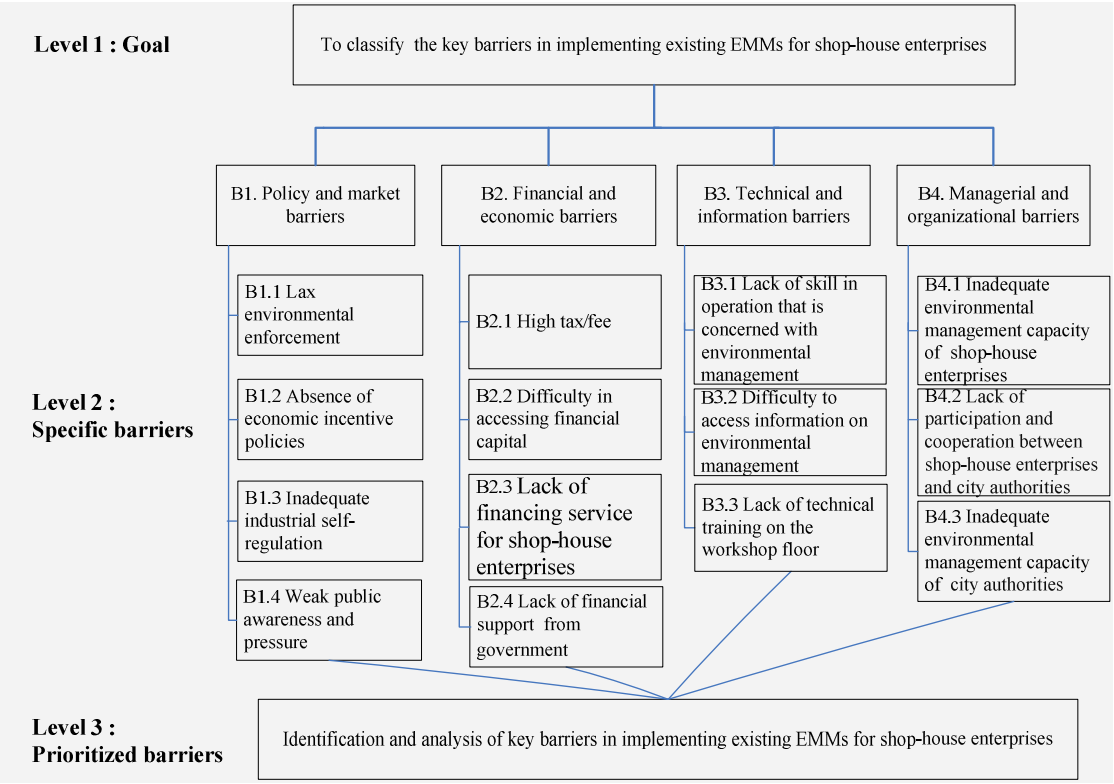

Figure 2: *Tree-hierarchy of the key barriers to the implementation of environmental management measures in shop-house enterprises.*

or businesses as the follow up Statute of Bangkok Metropolitan in 2000. The information describes that there are 13 types of health risk activities or businesses that generate environmental impact and health risk for people.

2.4.2 Factory Act 1992

The identification of a plant, which most probably generates environmental and health impacts, is classified in Factory Act, 1992. The Act classifies three groups of companies, i.e. Group 1: the company that is engaged in the business immediately without necessary to notify the authorities. Group 2: company that is subjected to the notification requirement prior to engaging in the business and Group 3: service that is subjected to permit application prior to engaging in the business. Factory Act 1992 also regulates the location of facility, environment, description and interior of the plant, machinery, equipment, or material used. The plant workers, control of release of waste, pollutants, or other materials affecting the environment, safety in operating a company, license fee and annual fee for factory operation.

(a) Bangkok Metropolitan Administration Ordinance

Bangkok Metropolitan Administration (BMA) is a particular administration at the local level. With respect to SMEs matters, BMA has responsibilities also to control and supervise unregistered shop-house enterprises in the Bangkok Metropolitan under the Factory Act 1992. The City Regulations are typically proposed by Bangkok Governor and endorsed by BMA Council. There are two primary departments under the Permanent Secretary of BMA, who has the responsibility to control and improve environmental quality. They are the Department of Environment and the Department of Health.

The BMA Council launched the BMA Ordinance on Health Risk Activities or Businesses under the Public Health Act, 1992. The rules and procedures for obtaining permits, licenses and fee rate are included. In the Ordinance, there are 13 types of health risk activities or businesses that are considered having potential harm to the health. The activities include farming; animal husbandry and animal products. The ordinance also covers food processing, beverage, and drinking water; drugs, pharmaceutical products, medical devices, cosmetics, and cleaning products; agriculture; metal and mineral processing; automobile and machinery. The plants producing wood and pulp processing; services; textile; rocks, soil, sand, cement, or other similar materials; petroleum, coal, and chemical substance are required getting permit. Other companies such as publishers, waste collectors, electronic devices repairs, and storage must also have licenses.

Urban environmental management practices and strategies of Bangkok Metropolitan are designed to enhance practical duty of health risk activities or businesses in Bangkok. The purposes are to control sanitation, wastewater management, and solid waste management of health risk activities or businesses; and to control workplace: ventilation, dust, soot, noise. Also, to identify the scope of permission in health risk activities or businesses; to control raw material collection and use; to do risk assessment on activities or businesses; and to control harmful gas and substance.

The above types of business that potentially create health and environmental risks are required to obtain an operational permit from the environmental and sanitary divisions at the district offices where the company located. The license is valid for one year after date of issue. The authority will penalize any business operating without a license by imprisonment not exceeding six months or fined not exceeding 10,000 baht, or both. The division will inspect the site's sanitary conditions,

possibility of environmental disturbances, pollution treatment, and worker welfare. In addition, all businesses must comply with other relevant laws and regulations such as regulations on building control and regulations on city planning. Later in 2003 and 2005 this ordinance was amended and improved to be expedient to national health and environmental policies, frameworks, strategies, and activities.

(b) Charges, Fees, Fine and Imprisonment

Factory Act 1998 recognizes a small company or factory type-I according to the place where product or service are carried out by manpower of 8-20 workers or machine five up to 20 horse-powers (HP). The license fee for the factory type-I is: 500 Baht for the company that uses machinery of not more than 5 HP and 1000 Baht for the facility that uses machinery of 5-20 HP. Comparatively, Public Health Act 1995 requires that any industries or enterprises must have licenses when their business covers "140 Health Risk Activities or Businesses." The license fee of Health Risk Activities or Businesses is from 200 to 10,000 baht per year depending on the type of activities and the total number of horse-power of machines.

3. Results

The dilemma of shop-house enterprises as economic generators and environmental polluters, may lead to the need of optimum policy on ease entry and little pollution. Formulating this policy is not an easy task. In order to suppress the environmental pollution by shop-house enterprises, EMMs could be applied. In the meantime, ease entry needs identification of present barriers. To overcome the barriers to entry and for the effective implementation of environmental management measures in shop-house enterprises, we need to identify the barriers. We also need to create a preferential environment for the thriving of existing EMMs for shop house enterprises. Based on the inventory, the following barriers are identified as shown in Table 2.

Table 2 *Barriers to environmental adaptation*

Barriers according to Post and Altman (1994)	
Industry barriers	Organizational barriers
• Capital costs • Competitive pressure • Industry regulations • Technical information • Uncertainty about potential results	• Employee attitude • Inadequate top management leadership • Poor communications • Past practice
Barriers according to Hillary (2004)	
External barriers	Internal barriers
• Cost of certification/verification • Insufficient drivers and uncertainty about market benefits • Institutional weaknesses • Lack of support and guidance	• Lack of human resources • Wrong perception of Environmental Management Systems (EMSs) • Difficulties with the implementation of EMSs • Negative attitudes and unfavorable firm culture
Barriers according to Shi et al. (2008)	
External barriers	Internal barriers
• Policy and market barriers • Financial and economic barriers	• Technical and information barriers • Managerial and organizational barriers
Barriers according to Chan (2008)	
External barriers	Internal barriers
• Certifiers/verifiers • Economics • Institutional weaknesses • Support and guidance	• Resources • Understanding and perception • Implementation • Attitudes and company culture

There are many literatures that studied on barriers to environmental management. Post and Altman (1994) classify the barrier set to environmental adaptation into two groups: industrial and organizational barriers. Industrial barriers are related to the type of business activity that companies engaged, and these restrictions mainly affect firms operating in the most highly polluting sectors. Regulatory barriers, however, affect firms regardless of the business activity in which they are engaged, given that they originate from firms' particular organization and standard practices. Post and Altman's barriers classification (1994) shows some remarkable similarities with that proposed by Hillary (2004) ten years later. According to Shi et al., (2008), there are internal and external barriers in environmental management measures for shop-house enterprises. The internal barriers include technical and information and managerial and organizational aspects, and the external barriers include policy and market and financial and economic aspects.

In the case of shop-house enterprises operating in Bangkok Metropolitan, Table 3 shows the barriers to implementing environmental management measures.

Table 3 *List of four possible barriers in Bangkok Metropolitan*

No.	Possible Barriers	Description
B1	Policy and market barriers	
B1.1	Lax environmental enforcement – X_1	Weak enforcement of environmental regulations due to delay in the adoption of environmental management.
B1.2	Absence of economic incentive policies – X_2	There are no economic incentives such as tax exemptions and grants to support shop-house enterprises
B1.3	Inadequate industrial self-regulation – X_3	Government assistance or initiatives fail to result in self-regulation at the manufacturing level.
B1.4	Weak public awareness and pressure – X_4	Weak public awareness and insufficient community pressures on shop-house enterprises to improve their environmental performance are common problems.
B2	Financial and economic barriers	
B2.1	High tax/fee – X_5	Higher costs to spend for tax/fee
B2.2	Difficulty in accessing financial capital – X_6	Financing channels for shop-house enterprises are very limited in Thailand, especially for environmental management projects.
B2.3	Lack of financing service for shop-house enterprises – X_7	Thai financing service institutions are insufficient, and most of them are more willing to serve big companies than shop-house enterprises.
B2.4	Lack of financial support from government – X_8	There is no budget for both environmental management and economic support of shop-house enterprises
B3	Technical and informational barriers	
B3.1	Lack of skill in operation on environmental management – X_9	Weak skill in environmental management operation from initial to finalized process
B3.2	Difficult to access information on environmental management – X_{10}	Shop-house enterprises face difficulty in accessing and appreciating environmental management related information and Acts.
B3.3	Lack of technical training – X_{11}	In shop-house enterprises, training programs for the employees to operate and maintain environmental management at shop floor level are insufficient.
B4	Managerial and organizational barriers	
B4.1	Inadequate environmental management capacity of shop-house enterprises – X_{12}	Shop-house enterprises lack the necessary managerial and technical capacity to implement environmental management.
B4.2	Lack of participation and cooperation between shop-house enterprises and city authorities – X_{13}	Weak coordination in environmental management operation between shop-house enterprises and district officers.
B4.3	Inadequate environmental management capacity of city authorities – X_{14}	City authorities lack the necessary managerial and technical capacity to implement environmental management.

There are numerous barriers to environmental adaptation. The authors adopt these barriers to this study by considered the external and internal environmental barriers. Based on Table 3, there are 14 barriers identified. We grouped the barriers into four major categories: (1)

policy and market (2) financial and economic constraints (3) technical and informational aspects and (4) managerial and organizational barriers.

3.1 Analysis on Group 1 Respondents

We analyzed the perceptions of 245 respondents (Group 1) of the owner of shop-house enterprises against 14 variables. The analysis on 14 independent variables (X_1 to X_{14}) reveals that the most influencing factors of the implementation of existing EMMs are lax environmental enforcement (X_1) and difficulty to access information on environmental management (X_{10}). We counted the variables at significance level of 5%. Table 4 shows the regression analysis of group 1. The most influencing factor in group 1 is lax environmental enforcement (X_1) with β = -0.238, and the difficulty to access information on environmental management (X_{10}) with β = -0.218. Both contributing factors explain the satisfaction of implementation the existing environmental management measures in shop-house enterprises by 8 percent with Standard Error of the estimate = 0.647. The estimate the regression line of this group is $Y_{group1} = 3.147 - 0.185X_1 - 0.104X_{10}$.

Table 4: *The regression coefficients in raw score (b) and a standardized score (Beta- β) of (Group1)*

Key Barriers (Variable)	R^2	Adjusted R^2	b	Std. Error	Beta (β)	t	sig
B1.1 Lax environmental enforcement	0.040	0.036	-0.185	0.052	-0.238	-3.593*	0.000
B3.2 Difficulty to access information on environmental management	0.087	0.080	-0.104	0.029	-0.218	-3.533*	0.000

*a= 3.147, Std. Error of the estimate = 0.647, *Significance at 5%*

From above regression equation, b value of lax environmental enforcement (X_1) is -0.185. It explains that when the score of lax environmental enforcement decreased by 1 unit, the satisfaction in the implementation of existing environmental management measures will increase by 0.185 unit. Similarly, b value of difficulty to access information on environmental management (X_{10}) is -0.104. It shows that when the score of difficulty to access information on environmental management reduced by 1 unit, the satisfaction in the implementation of existing environmental management measures will increase with 0.104 unit.

3.2 Analysis on Group 2 Respondents

Analysis on 245 group 2 respondents on 14 independent variables reveals that the most contributing factor to the implementation of existing EMMs is lack of participation and cooperation (X_{13}). With the significance at 5%, the regression analysis of group 2 is presented in Table 5.

Table 5: *Regression coefficients in raw score (b) and a standardized score (Beta- β) of Group2*

Key Barriers (Variable)	R^2	Adjusted R^2	b	Std. Error	Beta (β)	t	Sig.
B4.2 lack of participation and cooperation	0.051	0.042	-0.232	0.101	-0.227	-2.302*	0.023

*a= 2.997, Standard Error of the estimate = 0.716, *Significance at 5%*

The most influencing factor of group is X_{13} with β = -0.227. This factor explains the achievement on the implementation of existing environmental management measures in shop-house enterprises by 4.2 percent and Standard Error of the estimate is 0.716. The regression line is estimated as $Y_{group2} = 2.997 - 0.232X_{13}$. This equation explains that when the score of b decreases by 1 unit, the satisfaction in the implementation of existing environmental management measures will increase with 0.232 units.

3.3 Analysis on Group 3 Respondents

Group 3 respondents are decision makers of the Bangkok Metropolitan. There are 60 respondents. The analysis on Group 3 respondents on 14 independent variables shows that the most contributing factors to the implementation of existing EMMs are inadequate environmental management capacity of shop-house enterprises (X_{12}) and lack of participation and cooperation between shop-house enterprises and city authorities (X_{13}). With the significance at 5%, the regression analysis of group 3 respondents is presented in Table 6.

The most influencing factor of this group is inadequate environmental management capacity of shop-house enterprises (β = -0.363), and the second most influencing factor is a lack of participation and cooperation between shop-house enterprises and city authorities (β = -0.343). Both contributing factors explain the satisfaction in the implementation of existing environmental management measures in shop house enterprises as 23.4 percent and Standard Error of the estimate = 0.750. The estimation of the regression line is described as $Y_{group3} = 6.731 - 0.253X_{12} - 0.600X_{13}$.

From the above equation, b value of the inadequate environmental management capacity of shop-house enterprises is -0.253. It shows that when the score in inadequate environmental management capacity of shop-house enterprises decreased by 1 unit, the satisfaction in the implementation of existing environmental management measures will increase by 0.253 unit. Similarly, b value of the lack of participation and cooperation between shop-house enterprises and city authorities is -0.600. It analogously shows that when the score of lack of participation and cooperation between shop-house enterprises and city authorities decreased by 1 unit, the satisfaction in the implementation of existing environmental management measures will increase by 0.600 unit.

Table 6: *Regression coefficients in raw score (b) and a standardized score (Beta- β) of the Group3*

Key Barriers (Variable)	R^2	Adjusted R^2	B	Std. Error	Beta (β)	t	Sig.
B4.1 Inadequate environmental management capacity of shop-house enterprises	0.151	0.132	-0.253	0.092	-0.363	-2.746*	0.009
B4.2 lack of participation and cooperation between shop-house enterprises and city authorities	0.268	0.234	-0.600	0.231	-0.343	-2.593*	0.013

*a= 6.731, Std. Error of the estimate = 0.750, *Significance at 5%*

4. Discussion

Based on the perception of Group 1 respondents, the most contributing factors to the implementation of existing EMMs are lax environmental enforcement (x_1) and difficulty to access information on environmental management (x_{10}). The respondents perceived that local authorities did not carry out strict inspections and strong punishment in exercising their authoritative power in environmental management measures. As a

result, the environmental impacts are significant. In addition to that, most unregistered shop-house enterprises are neglected. The relationship between relevant authorities and the owners of shop-house enterprises is not that smooth. It makes the difficulty in accessing information on environmental management. That is why these factors could be the barriers to the implementation of environmental management measures in the operation of shop-house enterprises.

Possible coping strategies on this issue include intensifying the environmental management tools and law enforcement by the relevant authorities, public campaign for the owners and operators of the shop-house enterprise, establishment of information center for the shop-house enterprise matters in the locality for the openness and easiness of getting information. Supporting education and research in a related field is also possible because when people gained the knowledge in environmental management, they can quickly adopt the knowledge in their business or activities to improve their productivities and work environment. NEMA Uganda (2009) suggested that establishing resource center to be an easily accessible source for appealing authoritative information would bring the concept of individual responsibility in environmental and resource protection into the public domain. In the case of Bangkok Metropolitan, the environmental information centers can be provided in each district office to disseminate the environmental practices and information for the communities. The proposal can be an excellent way to eliminate the difficulties in accessing the information on environmental management.

As found in the survey, shop-house enterprises are geographically scattered. Thus, it is difficult to manage the environmental and health impacts generated by the shop-house enterprises. We suggested that relevant authorities can accommodate the possible transformation of the enterprises from non-registered to registered ones, without consequences to the enterprises, for instance, fees and lengthy procedure. The result can help the local authorities to conveniently control and monitor the environmental and health impacts and therefore improve the performance of shop-house enterprises. The authority should increase the number of district officers and enhance their capacity to monitor and supervise all shop house enterprises.

According to the perception of group 2 respondents who are the communities living the surrounding shop-house enterprises, the lack of participation and cooperation among main stockholders was considered as the most significant factor. They perceived that the local authorities and shop-house enterprises did not actively engage and work together to cope with the issues. Local people observed that local authorities did not know and understand the real problems on the site. They found that when local authorities inspected and captured illegal shop-house enterprises, the authorities then punished these illegal shop-house enterprises by closing the business or applying high fine and the enterprises. However, after quite sometimes, the illegal enterprises operate again. It is because of either the presence of a barrier to entry or the punishment that does not produce a deterrent effect to the violators. No smooth communication between shop-house enterprises and district officers would create the problems in management.

The way out of this issue is an improvement of communication and coordination between relevant authorities and shop-house enterprise owners and operators. Both parties should mutually respect and understand the respective roles of them. The authority should promote easy entry without sacrificing the adverse effects. Continuous control and inspection with sufficient tools and personnel can help to improve the situation and performance of the shop-house enterprises. At the end of the day, environmental and health impacts of the enterprises would be minimized.

Based on the perceptions of group 3 respondents, the most influencing factors of the implementation of existing EMMs are inadequate environmental management capacity of shop-house enterprises (X_{12}) and lack of participation and cooperation between shop-house enterprises and relevant authorities (X_{13}). Respondents agreed that the number of operational staff to deal with shop-house enterprise was insufficient. There is only few staff who understood environmental management practices. This limitation hampers the communication between shop-house business and relevant authorities. As previously discussed, the capacity of the owners and operators of shop-house enterprises in managing the environmental impacts created by their company is insufficient. They can operate a business, but they failed to cope with the consequences.

This study suggests that the government should provide sufficient budget to hire more qualified operational staff. Along with this, provision of financial and promotional incentives to dedicated staff is expected to increase the motivation of employees. Collaboration among top managerial positions and experts from universities should be promoted to improve organizational capabilities and operational effectiveness in environmental management. It is necessary to organize hands-on training in environmental management for executive staff. This training needs a complement of regular upgrading of skills and exposure to new approaches and ideas.

The perception-based solution discussed in this section provides a general picture on how to cope with the adverse environmental consequences produced by the operation shop-house enterprises. Although the solution is not limited to what perceived by the stakeholders, but the authorities must be able to explore in-depth to the root of the problem. Comprehensive solution on the environmental and health impacts generated by shop-house enterprises is necessary.

5. Recommendations and conclusions

There are many possible barriers identified in the operation of shop-house enterprises in Bangkok Metropolitan. The stakeholders perceived that there are, at least, four factors that most influential to the implementation of environmental management measures towards better performance of the enterprises on environmental and health aspects. These factors are lax environmental enforcement, inadequate environmental management capacity of enterprises, inadequate industrial self-regulation, and difficulty to access information on environment management.

The overall plan to improve the performance of shop-house enterprises through Environmental Management Measures should suggest the sufficing environmental management tools and effective law enforcement. We recommend to built and intensify the communication among stakeholders. The authorities should be proactive in bridging the gaps among stakeholders for the effectiveness of environmental management measures implementation in the operation of shop-house enterprises. Improvement of quality and quantity of staff of the authorities should also become priority of the government, along with capacity building for relevant staff of the authorities.

Although this study suggests the most essential aspects to improve environmental management standards, but the authorities are recommended to attend to all fourteen variables for the

comprehensiveness of the strategies. In a synergistic manner, all stakeholders should pursue to accomplish practical environmental management measures towards the improvement of performance of shop-house enterprises for more livable and well-being of Bangkok Metropolitan communities. The results of this study are expected to be useful to the BMA and other local administrators with the similar problems. They are not only in Thailand but also in the cities of other developing countries. It is especially valid in Southeast Asia where many cities have large numbers of shop houses.

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