

# T D R I

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**POLICY MEASURES TO  
FIGHT PM2.5 IN THE  
AUTOMOTIVE SECTOR**

**EFFECTIVE METHODS  
FOR PROMOTING  
ACCESS OF SMALL AND  
MEDIUM-SIZED  
ENTERPRISES TO  
CORPORATE PROCUREMENT**



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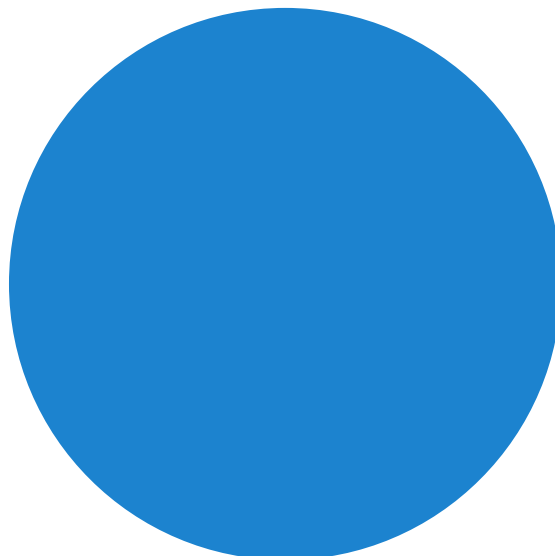
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# POLICY MEASURES TO FIGHT PM<sub>2.5</sub> IN THE AUTOMOTIVE SECTOR

*Kannika Thampanishvong  
Promphat Bhumiwat\**

## 1. INTRODUCTION

Air pollution, ranging from smog hanging over cities to smoke inside the home, poses a major threat to human health. According to World Health Organization (WHO), the combined effects of ambient (outdoor) and household air pollution cause about 7 million premature deaths worldwide every year.<sup>1</sup> Those premature deaths result largely from increased mortality from stroke, heart disease, chronic obstructive pulmonary disease, lung cancer and acute respiratory infections.<sup>2</sup> According to a joint study undertaken in 2016 by the World Bank and

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<sup>1</sup> *Source: [https://www.who.int/thailand/health-topics/air-pollution#tab=tab\\_1](https://www.who.int/thailand/health-topics/air-pollution#tab=tab_1)*

<sup>2</sup> *Source: [https://www.who.int/thailand/health-topics/air-pollution#tab=tab\\_1](https://www.who.int/thailand/health-topics/air-pollution#tab=tab_1)*

the University of Washington's Institute for Health Metrics and Evaluation, the premature deaths in Thailand due to air pollution in 2013 were estimated to be 48,819, which reflected an approximately 56 percent increase over the level in 1990 (World Bank, 2016). Such premature deaths due to air pollution result in a welfare loss of almost US\$ 63.4 billion or around 6.29 percent of Thailand's GDP and result in a loss of labor productivity valued at almost US\$ 2.4 billion.

Even though there are various types of air pollutants, such as lead, sulfur dioxide (SO<sub>2</sub>), nitrogen dioxide (NO<sub>2</sub>), carbon monoxide (CO), volatile organic compounds (VOCs), and ozone (O<sub>3</sub>), fine particulate matter 2.5 microns or smaller in diameter (PM<sub>2.5</sub>) is among the most widely discussed as it is so concerning for both the environment and people. According to the Pollution Control Department (PCD), large cities in Thailand have encountered PM<sub>2.5</sub> problems for several years. According to the data on concentration of PM<sub>2.5</sub> in Bangkok Province during the period 2011-2019 from the Pollution Control Department, the PM<sub>2.5</sub> concentration exceeded the safety standards established by WHO and the United States Environmental Protection Agency, especially during the months from December to March.

There are several sources of PM<sub>2.5</sub> depending on geographical location. In rural areas, the major source of PM<sub>2.5</sub> is open burning of agricultural residues. In large cities, such as Bangkok, the most important source of PM<sub>2.5</sub> pollutants that urgently need to be controlled is inefficient combustion of

diesel engine vehicles (Oanh, 2007; PCD, 2018; and Pongpiachan et al., 2015). This problem is particularly grave in large cities such as Bangkok with its huge number of motor cars and global notoriety for paralyzing traffic gridlocks. PM<sub>2.5</sub> is among the toxic pollutants contained in the exhaust fumes of motor vehicles, especially diesel engines. The amount of PM<sub>2.5</sub> in exhaust fumes depends on many factors, such as the technology of the engine, emission control standards, the type of automotive fuel, and the age of vehicles.

The main objectives of this study are to investigate the policy measures needed to tackle the PM<sub>2.5</sub> problem in the transport sector, focusing on measures to control PM<sub>2.5</sub> emissions from motor vehicles. The ultimate goal is to propose policy measures that would contribute to better air quality at reasonable costs to relevant stakeholders. In other words, the benefits derived from the policy measures should exceed the social costs.

## 2. RESEARCH METHODOLOGIES AND CONCEPTUAL FRAMEWORK

Two main methodologies were used in this study. The first methodology, the Tier 2 Top-down Approach for air pollution, was used to estimate the PM<sub>2.5</sub> levels of exhaust from different types of motor vehicles. It is important to remark that this study does not model the ambient PM<sub>2.5</sub> pollution concentration. The types of vehicles covered in this study include passenger cars, light-duty vehicles, heavy-duty vehicles and taxis. The following equation (1) is used to estimate the emissions of

PM<sub>2.5</sub> from such motor vehicles:

$$E_{(i,j)} = EF_{(i,j)} \times VKT_i \quad (1)$$

where  $E$  = the amount of emissions of air pollutant type  $j$  from vehicle type  $i$  in 1 year (unit: g)

$EF$  = emission factor for air pollutant type  $j$  from vehicle type  $i$  (unit: g/km)

$VKT$  = total vehicle kilometers traveled within 1 year by vehicle type  $i$  (unit: km)

The emission factors used in this study were based on the compilation by the laboratory of the Pollution Control Department as well as other studies both in Thailand and elsewhere.

The second methodology used to evaluate different policy measures is the incremental cost-effectiveness ratio. The concept underlying the incremental cost-effectiveness ratio is to compare the costs and effectiveness under the scenario without policy implementation (base case) and the scenario with policy implementation, which can be presented in the form of the following equation (2):

$$\frac{C_i - C_0}{E_i - E_0} \quad (2)$$

Where  $C_i$  = costs associated with implementation of policy measure  $i$

$C_0$  = costs under the base case scenario

$E_i$  = level of PM<sub>2.5</sub> emissions under policy measure  $i$

$E_0$  = level of  $PM_{2.5}$  emissions under the base case scenario

The policy measure to control  $PM_{2.5}$  emissions from motor vehicles with the lowest incremental cost-effectiveness ratio is the measure that is most cost effective and thus should be promoted. Figure 1 contains a summary of the conceptual framework used in this study.

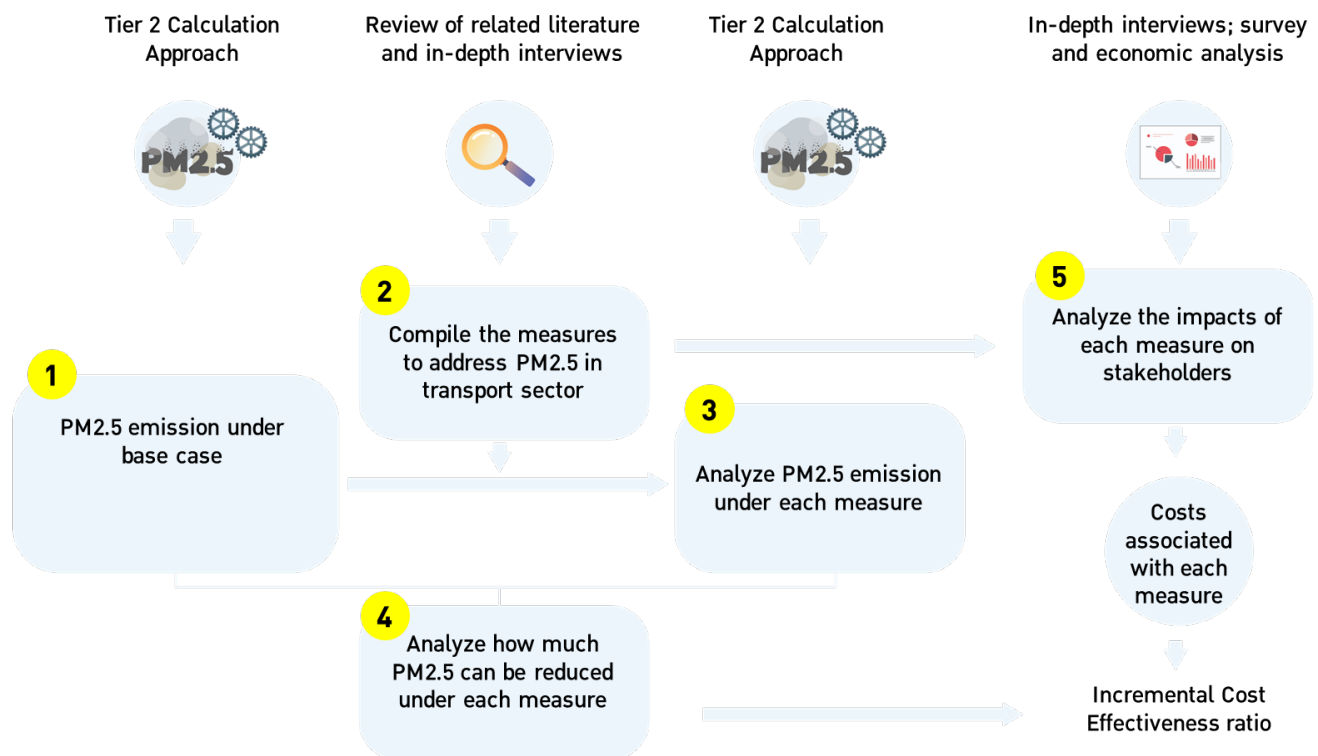
### 3. POLICY MEASURES TO CONTROL $PM_{2.5}$ EMISSIONS FROM MOTOR VEHICLES

There are several policy measures to control  $PM_{2.5}$  in the automotive and transport sectors. Policy options include both mandatory measures applied

by the government and voluntary efforts made by drivers. Examples of mandatory measures include raising the emission standards for vehicle exhaust, raising the emission standards for automotive fuel, and controlling the number of old vehicles via the establishment of a progressive rate for the annual vehicle tax or putting a limit on the age of vehicles. Examples of voluntary measures include reducing the use of private cars, switching to the use of public transport as well as switching to electric vehicles (EVs).

As mentioned previously,  $PM_{2.5}$  is one of the air pollutants which forms directly during combustion and is present in vehicle exhaust. Additional  $PM_{2.5}$  particles are generated by brake

Figure 1: Conceptual framework for this study





and tire wear. The levels of  $PM_{2.5}$  emissions in vehicle exhaust depend on various factors, such as technology and the vehicle emission standard, the fuel quality standard, the installation of pollution control equipment, and vehicle maintenance (Pollution Control Department, 2011). It is important to highlight that vehicle emission standards, fuel quality standards and age of vehicle are important determinants of  $PM_{2.5}$  emissions; therefore, in this study, three main policy measures are analyzed in detail, namely (a) raising the fuel quality standard from Euro 4 to Euro 5; (b) raising the vehicle exhaust emission standard to Euro 5, and (c) putting a limit on the age of vehicles. Details of each policy measure are as follows.

### **3.1 Raising the fuel quality standard from Euro 4 to Euro 5**

Under different fuel quality standards, the fuel composition – both gasoline and diesel – are different. The current fuel quality standard in Thailand is the Euro 4 standard. Enforcement of the Euro 5 fuel quality standard will take place in 2024 according to the Notification of the Department of Energy Business Re: Specification for Appearance and Quality of Engine Oil under the Fuel Trade Act B.E. 2543 (2000). The amount of air pollutants, such as sulfur (one of the sources of  $PM_{2.5}$ ), significantly declines as the fuel quality standard improves. By raising the fuel quality standard to Euro 5, not only does the amount of sulfur substantially reduce, other hazardous substances, such as polycyclic aromatic hydrocarbons (PAHs), which are causes of cancer,

also reduced as shown in Table 1.

### **3.2 Raising the vehicle exhaust emission standard to Euro 5**

To ensure that vehicle exhaust emissions in Thailand comply with international standards, Thailand adopted the European Emission Standards (Euro), starting with Euro 1 and gradually started making them more stringent. Table 2 contains a summary of the current vehicle exhaust standard used in Thailand classified by vehicle type. The concentration of air pollutants in the vehicle exhaust varies according to the vehicle exhaust emission standard. Table 3 shows the concentration of five types of air pollutants under each vehicle exhaust emission standard, covering carbon monoxide, hydrocarbons (HCs), nitrogen oxides (NOx), hydrocarbon and nitrogen oxides (HC + NOx) and particulate matter (PM). Table 3 shows that the concentration of particulate matter (PM) for diesel engine vehicles substantially reduces as the vehicle exhaust emission standard is raised from Euro 4 to Euro 5.

### **3.3 Putting a limit on the age of vehicles**

One of the factors that determines the amount of  $PM_{2.5}$  in vehicle exhaust is the age of vehicles. According to a study by the Pollution Control Department (2017),  $PM_{2.5}$  concentrations in diesel and gasoline engines are higher among vehicles that have been used for eight years or more and vehicles that have undergone engine modification. From the vehicle registration database of the Department

**Table 1: Components of diesel fuel and gasoline under Euro 4 and Euro 5 fuel quality standards**

|        | Units    | Euro 4 |          | Euro 5 |          |
|--------|----------|--------|----------|--------|----------|
|        |          | Diesel | Gasoline | Diesel | Gasoline |
| Sulfur | ppm      | 50     | 50       | 10     | 10       |
| PAH    | % weight | 11     | -        | 8      | -        |
| Olefin | % volume | -      | 18       | -      | 14       |

Source: Ministry of Energy (2019).

**Table 2: Current vehicle exhaust emission standard in Thailand, by vehicle type**

| Types of vehicles           | Current vehicle exhaust emission standard |
|-----------------------------|---|
| Motorcycle                  | Euro 3                                    |
| Light-duty gasoline vehicle | Euro 4                                    |
| Light-duty diesel vehicle   | Euro 4                                    |
| Heavy-duty diesel vehicle   | Euro 3                                    |

Source: Automotive Emission Laboratory, Pollution Control Department (2019).

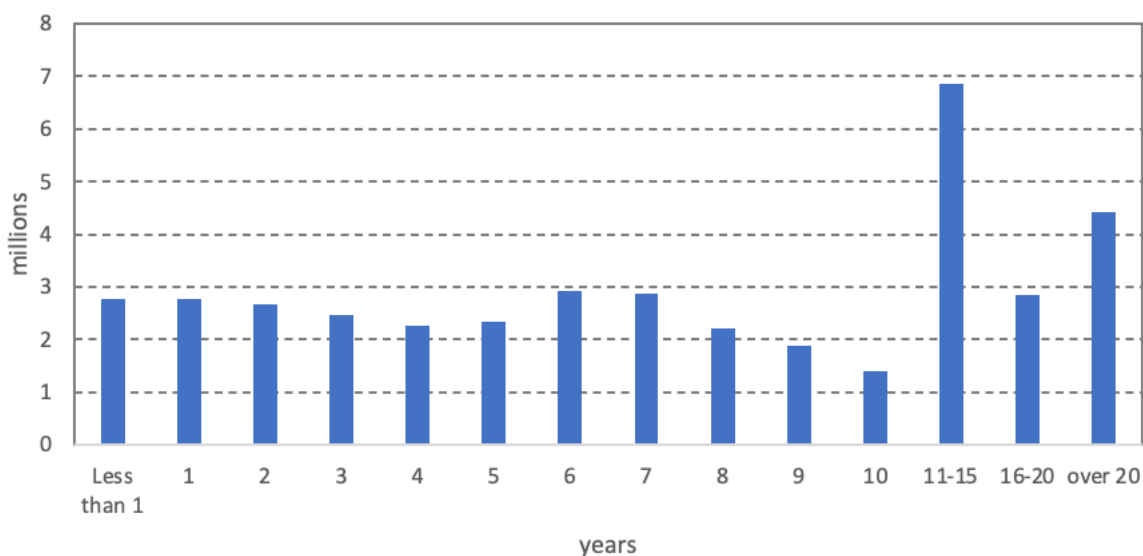
**Table 3: Concentration of pollutants in vehicle exhaust, by vehicle type and vehicle exhaust emission standard**

| Vehicle exhaust emission standard | Unit: g/km |        |          |        |                 |        |                    |        |          |        |
|-----------------------------------|------------|--------|----------|--------|-----------------|--------|--------------------|--------|----------|--------|
|                                   | CO         |        | HC       |        | NO <sub>x</sub> |        | HC+NO <sub>x</sub> |        | PM       |        |
|                                   | Gasoline   | Diesel | Gasoline | Diesel | Gasoline        | Diesel | Gasoline           | Diesel | Gasoline | Diesel |
| Euro 1                            | 2.72       | 2.72   | -        | -      | -               | -      | 0.97               | 0.97   | -        | 0.14   |
| Euro 2                            | 2.2        | 1      | -        | -      | -               | -      | 0.5                | 0.7    | -        | 0.08   |
| Euro 3                            | 2.3        | 0.64   | 0.2      | -      | 0.15            | 0.5    | -                  | 0.56   | -        | 0.05   |
| Euro 4                            | 1          | 0.5    | 0.1      | -      | 0.08            | 0.25   | -                  | 0.3    | -        | 0.025  |
| Euro 5                            | 1          | 0.5    | 0.1      | -      | 0.06            | 0.18   | -                  | 0.23   | 0.005    | 0.005  |

Source: Bureau of Fuel Quality (2009).



Figure 2: Number of vehicles registered in Thailand in 2019, classified by vehicle age



Source: Department of Land Transport (2020).

of Land Transport as of December 31, 2019 (Figure 2), vehicles 1-15 years old have the highest share at 16.84 percent, followed by vehicles which have been used for more than 20 years, with the share at 10.86 percent.

To manage and control the number of old cars which contribute to high  $PM_{2.5}$  emission levels, several measures can be used, such as setting a progressive rate for the annual vehicle tax, putting a limit on the age of vehicles, encouraging car owners to buy lower emission vehicles and providing discounts in exchange for old cars. These measures have proved effective in many countries, for instance, in Malta, the older are the cars, the higher are the

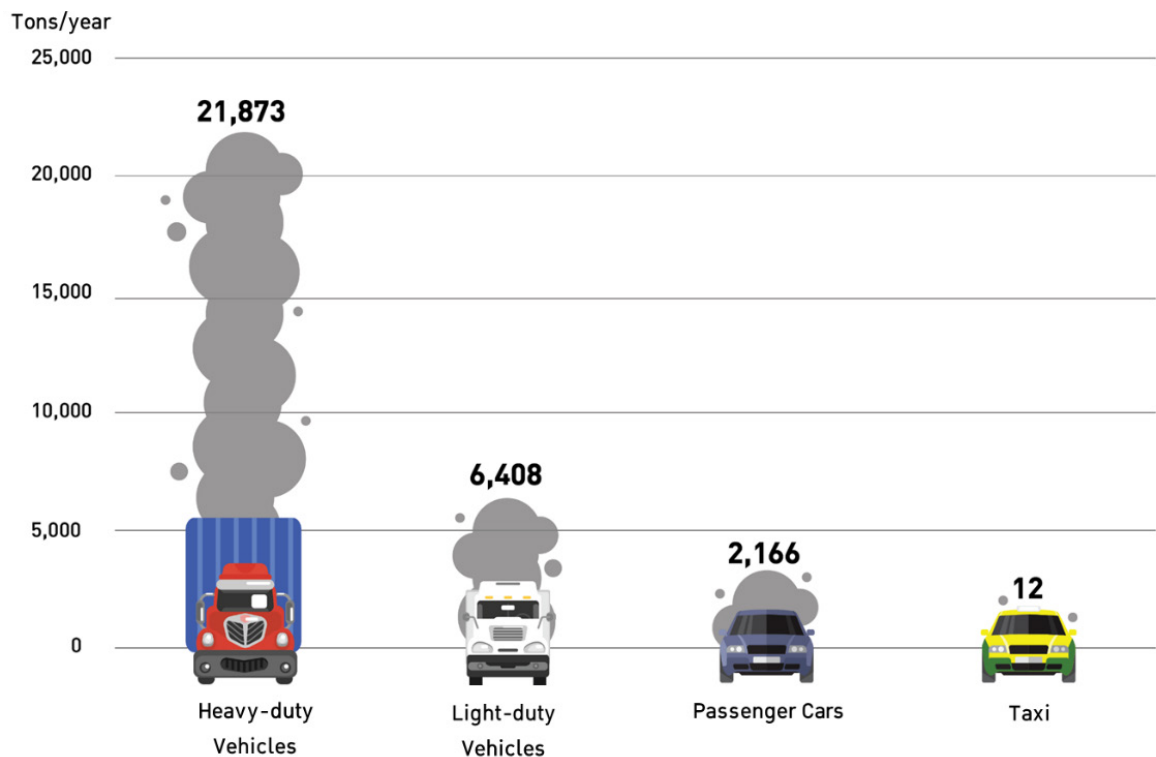
annual vehicle taxes. As a result, vehicle owners are motivated not to keep their cars too long. Another effective measure is state promotion through various forms of subsidies for buying electric vehicles with zero-emissions in exchange for old cars. In this study, the measure under consideration is putting a limit on the age of vehicles. It is emphasized in this study that the government should provide subsidies or other forms of support for owners of old cars when introducing such a measure as “putting age limits on vehicles” as there are still many users of old cars in the country and many of their owners have a low income and would certainly face financial problems if they had to buy new cars.

#### 4. EFFICACY OF DIFFERENT POLICY MEASURES TO CONTROL PM<sub>2.5</sub> EMISSIONS FROM MOTOR VEHICLE EXHAUST

To evaluate the efficacy of the above policy measures in controlling PM<sub>2.5</sub> emissions from motor vehicles in Thailand, in this study, we used the model presented in Section 2 to estimate the amount of PM<sub>2.5</sub> emissions from motor vehicles under each policy measure compared with the base case or the case without implementation of any policy measures. Figure 3 shows that the PM<sub>2.5</sub> emissions from motor vehicles per year broken down by vehicle types under the base case.

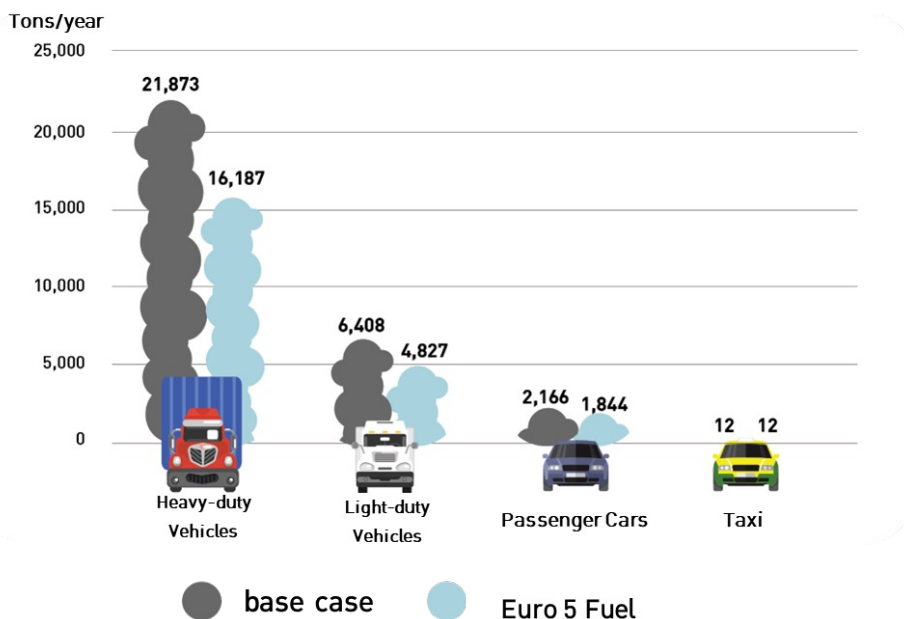
As shown in Figure 3, under the base case, the amount of PM<sub>2.5</sub> emissions from the exhaust of heavy-duty vehicles is the highest (21,873 tons per year), followed by the light-duty vehicles (6,408 tons per year), passenger cars (2,166 tons per year), and taxis (12 tons per year), respectively. Next, the first policy measure of raising the fuel quality standard from Euro 4 to Euro 5 is introduced. Figure 4 shows the PM<sub>2.5</sub> emissions under policy measure 1 and the base case.

Figure 3: PM<sub>2.5</sub> emissions from motor vehicles under the base case, by vehicle type



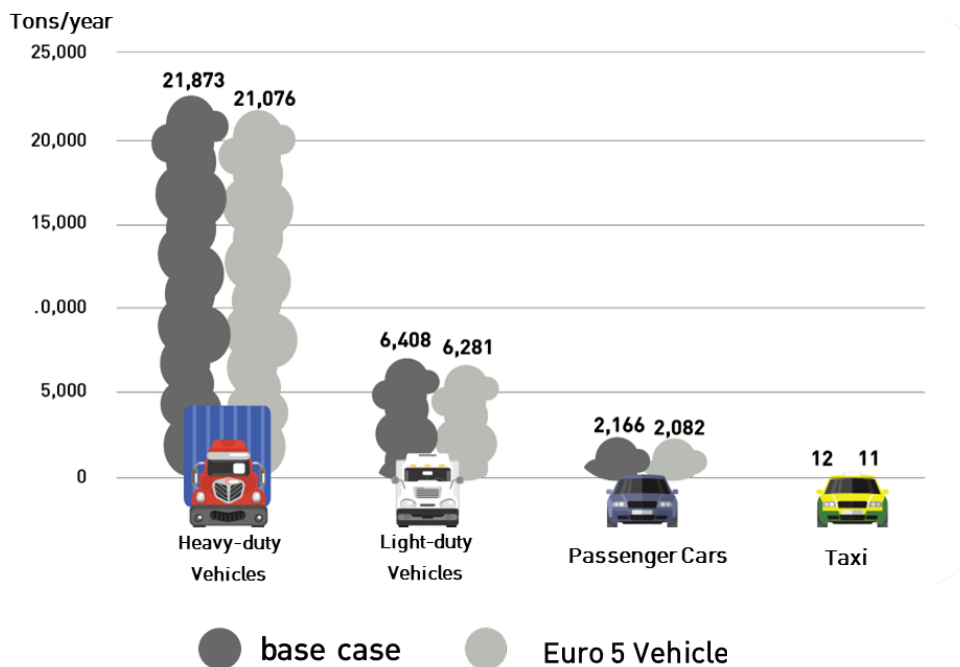
Source: TDRI (2021).

**Figure 4: PM<sub>2.5</sub> emissions from motor vehicles comparing the base case with the case involving a rise in fuel quality standard**



Source: TDRI (2021).

**Figure 5: PM<sub>2.5</sub> emissions from motor vehicles comparing the base case with the case involving a rise in the vehicle exhaust emission standard**



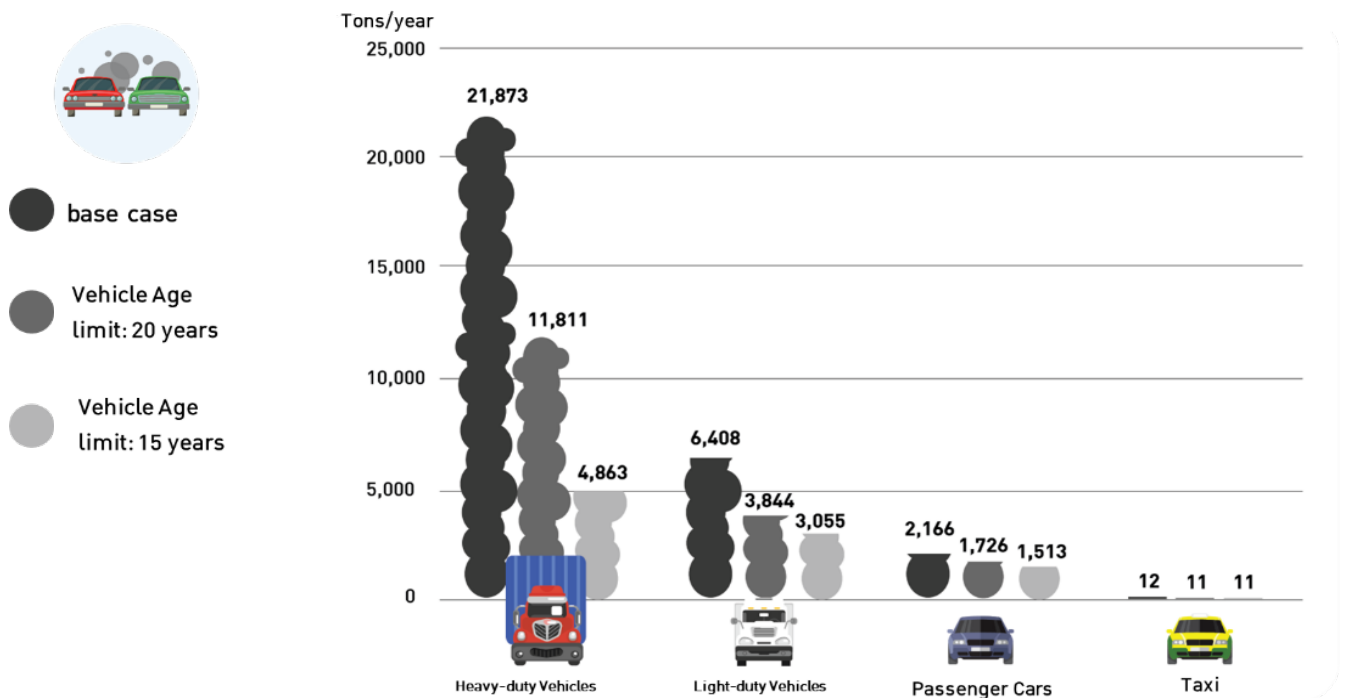
Source: TDRI (2021).

Under the second policy measure “raising the vehicle exhaust emission standard,” Figure 5 shows the  $PM_{2.5}$  emissions from different vehicle types under this second policy measure in comparison with the base case. In comparison with the previous policy measure, the amount of  $PM_{2.5}$  emission reduction per year under this policy measure is not high. The third policy measure under consideration is putting a limit on the age of vehicles. Figure 6 shows the  $PPM_{2.5}$  emissions from different vehicle types under this third policy measure in comparison with the base case. It is interesting to highlight that, under

the scenario of limiting vehicle age to no more than 15 years, the extent of  $PPM_{2.5}$  emission reduction is the highest, especially from heavy-duty vehicles.

To sum up, comparing the efficacy of these three policy measures in reducing  $PM_{2.5}$  emissions from motor vehicles, Figure 7 shows that the third policy measure “putting a limit on vehicles’ age” is the most effective in reducing  $PM_{2.5}$  emissions compared with the other two policy measures. Table 4 summarizes the amount of  $PM_{2.5}$  emission reduction under each policy measure.

**Figure 6:  $PM_{2.5}$  emissions from motor vehicles comparing between the base case and the case putting a limit on vehicles’ age**



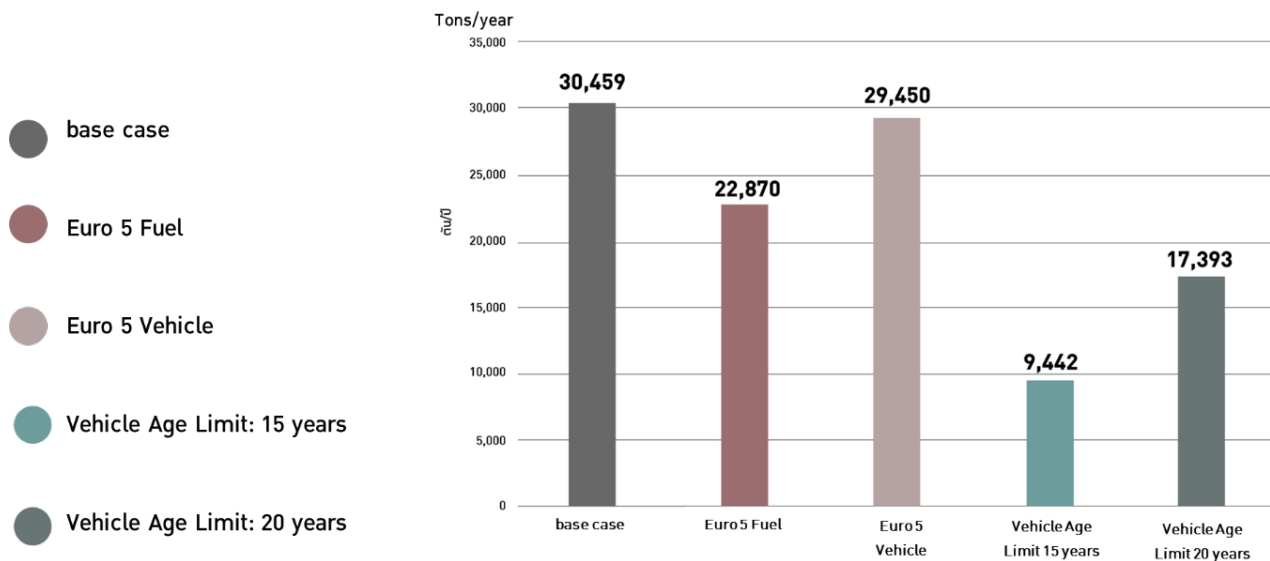
Source: TDRI (2021).

**Table 4: Estimated PM<sub>2.5</sub> emission reduction under each policy measure**

| Policy measures                           | Amount of PM <sub>2.5</sub> emission reduction (tons/year)                                   |
|---|--|
| Raising fuel quality standard             | 7,588  |
| Raising vehicle exhaust emission standard | 1,009  |
| Putting a limit on vehicles' age          | 21,017 under scenario with 15-year age limit<br>13,066 under scenario with 20-year age limit |

Source: TDRI (2021).

**Figure 7: Comparison of PM<sub>2.5</sub> emission from motor vehicles under the base case and the three policy measures**



Source: TDRI (2021).

## 5. INCREMENTAL COST EFFECTIVENESS OF POLICY MEASURES TO CONTROL PM<sub>2.5</sub> EMISSIONS FROM MOTOR VEHICLE EXHAUST

Even though the policy measure “putting a limit on vehicles’ age” can contribute to the highest reduction of PM<sub>2.5</sub> emissions from vehicle exhaust, it is important to analyze the impacts of policy measures on different stakeholders and estimate the incremental cost effectiveness of each policy measure before coming up with policy recommendation to put forward. Table 5 contains a summary of the incremental cost effectiveness estimation.

According to the incremental cost effectiveness analysis results shown in Table 5, raising the fuel quality standard has the lowest unit cost effectiveness ratio, followed by limiting vehicle age to no more than 15 years. However, in terms of effectiveness vis-à-vis reduction in PM<sub>2.5</sub>, the measure to put a 15-year age limit on vehicles has the highest efficacy. Nevertheless, it is necessary to adopt a combination of measures to achieve the highest efficacy in reducing PM<sub>2.5</sub> emissions, especially raising the fuel standard along with raising the vehicle exhaust emission standard and managing the number of old cars that are in use.

**Table 5: Results of incremental cost effectiveness ratios**

|   | Incremental Cost Effectiveness Ratios (THB) |
|---|---|
| Raise fuel standard to Euro 5                     | 1,035,032 - 1,611,105                       |
| Raise vehicle exhaust emission standard to Euro 5 | 15,851,426                                  |
| Vehicle Age Limit: 15 years                       | 14,027,116                                  |
| Vehicle Age Limit: 20 years                       | 14,920,182                                  |

Source: TDRI (2021).





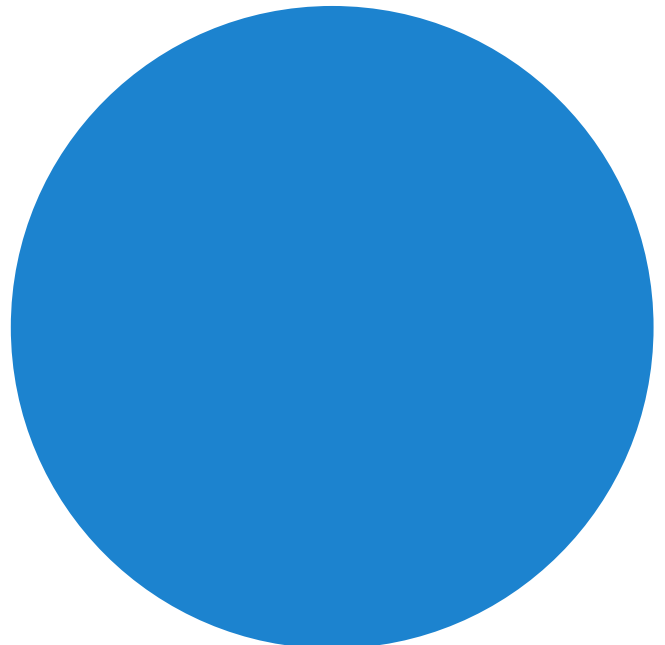
## 6. POLICY RECOMMENDATIONS TO CONTROL PM<sub>2.5</sub> EMISSIONS FROM MOTOR VEHICLES

To enact and implement policy measures to control PM<sub>2.5</sub> emissions from motor vehicles, it is crucial that the relevant government agencies have a clear timeline by dividing the measures into different phases, namely short term or immediate, medium term, and long term. The short-term or immediate measures consist of implementing strict vehicle inspection, particularly old diesel-engine vehicles, developing the database for air emission inventories as well as raising public awareness in order to foster understanding about the dangers of PM<sub>2.5</sub> and how people can protect themselves from being affected by PM<sub>2.5</sub>. For the medium-term policy measures, the government should introduce the higher level of Euro standards on emissions and gasoline, reform the annual vehicle tax structure, and initiate measures to reduce the number of old cars in the system, such as putting a limit on vehicle age. For the long-term horizon, the government should enact a long-term strategy to help the public switch to more environmentally friendly vehicles such as electric cars. In parallel, the mass transport system must be expanded to serve passengers efficiently and comprehensively. The government should encourage the public to reduce the use of private cars by promoting and developing the mass transportation system. For this measure to succeed, the government must make mass transportation comfortable and convenient. An extensive network of mass transport is crucial. The fees must also

be affordable. In parallel with the measures to reduce emissions from automobiles, there must be simultaneous efforts to tackle toxic pollutants from other sources, such as industry and the burning of agricultural residues.

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# EFFECTIVE METHODS FOR PROMOTING ACCESS OF SMALL AND MEDIUM-SIZED ENTERPRISES TO CORPORATE PROCUREMENT\*

Warawich Potranandana\*\*

## ABSTRACT

Despite being crucial to Thailand's economic system, small and medium-sized enterprises (SMEs) have been largely excluded from the corporate procurement process. This study examines various potential approaches for boosting SMEs' access to corporate procurement by reviewing international best practices of the United States, the United Kingdom, and India, and surveying opinions of different stakeholders. According to a SWOT (strengths, weaknesses, opportunities and threats) analysis, SMEs have strength in terms of agility but have weakness regarding business capacity and self-development perception and direction.

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\* The article is based on "A Work on Integrated Network for SMEs Promotion: Study of the Effective Methods for Promoting SMEs' Access to Corporate Procurement," which was completed in August 2022. The project was funded by the Office of Small and Medium Enterprise Promotion (OSMEP).

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Moreover, with regard to external factors, while there are opportunities because various organizations are willing to support SMEs as part of their corporate social responsibility (CSR) activities, the threat is that measures for supporting them are not explicit and only partly successful. Thus, purchasing incentive schemes for SMEs are advocated in order to suggest effective measures to promote SMEs' access to corporate procurement. In addition, tax incentives for businesses implementing suppliers' development programs and SMEs' reducing costs by using businessdevelopment services (BDS) are suggested in order to increase SMEs' competency. Finally, the development of an integrated procurement platform should be promoted to facilitate corporate procurement procedures for SMEs to improve and make the environment, information, transaction, and institutional business ecosystems more conducive, as well as the financial digital footprint of SMEs.

## 1. INTRODUCTION

Complementarity between businesses generates mutual benefits (British Academy of Management, 2014) through supply chains (i.e. vertical relationship) and knowledge creation and sharing (i.e. horizontal relationship) (Rothwell, 1989). Although SMEs usually lack potential more than large companies do, their agility and industry-related privileges highlight their advantages. As a result of such processes, SMEs are able to improve their standards while major companies can obtain a greater variety of high-quality goods and services,



while promoting economic, social, and environmental benefits.

Additionally, sustainable procurement is an increasingly important global trend of large corporations. Moreover, in the face of supply chain disruption, the business continuity management strategy requires more suppliers and a greater digital transformation in the procurement process (Deloitte, 2021).

Unfortunately, although SMEs have been crucial for Thailand's economic system, this trend is not easily achieved. In 2021, SMEs accounted for 99 percent of businesses, 72 percent of total employment, and 35.3 percent of the country's GDP.<sup>1</sup> Nonetheless, most procurements involving SMEs as suppliers of goods and services are public ones through the Thai SME-GP platform, encompassing 139,049 enterprises, 1,076,671 items of goods and services, and public procurement values in fiscal year 2021 and in the first two quarters of fiscal year 2022 of 551,365 million and 316,643 million baht, respectively.<sup>2</sup> Yet, in the case of corporate procurements, these have been mostly indirect procurements employing labor ranging from low- to semi-skilled. Therefore, as the government cannot simply force businesses to procure goods and services from SMEs, this implies that a policy gap remains to facilitate SMEs in the corporate

procurement process using sufficient and effective incentives and regulations to promote a level playing field.

The issue of promoting SMEs' access to corporate procurement is relatively new. Moreover, there are few studies that systematically gather and analyze relevant measures. Therefore, in the context of Thailand, the objective of this study is to compile, analyze, and suggest amendments to those existing policies in order to meet the demands of buyers, sellers, and supporting agencies. The method is adapted from selected steps of design thinking, namely empathizing, defining, and ideating issues. These processes include reviewing domestic and international practices, surveying opinions of various stakeholders using in-depth interviews, questionnaires, and focus group sessions to synthesize the SWOT of SMEs in accessing corporate procurement. Ultimately, the outcomes are policy recommendations and their prototyped subset for a quick-win and high-impact pilot project based on an action priority matrix.<sup>3</sup>

The paper is organized as follows. Section 2 illustrates current practices in Thailand, as well as reviews best practices in the United Kingdom, the United States, and India. Section 3 provides results from in-depth interviews, questionnaires, and focus group sessions. Section 4 analyzes those results using the SWOT analysis framework. Section

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<sup>1</sup> *Dashboard SME Big Data, Office of Small and Medium Enterprise Promotion (www.sme.go.th), retrieved August 23, 2022.*

<sup>2</sup> *SME Registration System of the Thai SME-GP Platform, Office of Small and Medium Enterprise Promotion, retrieved August 23, 2022.*

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<sup>3</sup> *The final step of design thinking, namely testing, requires the Office of Small and Medium Enterprise Promotion (OSMEP) to test the prototype with actual users and survey opinions, which can be achieved in the future.*

5 concludes with policy recommendations and a proposed pilot project.

## 2. SMES AND CORPORATE PROCUREMENT IN THAILAND AND SELECTED INTERNATIONAL BEST PRACTICES

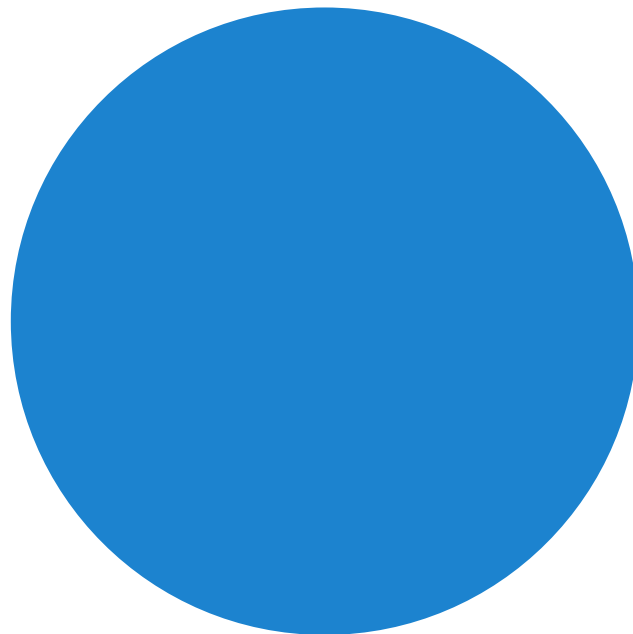
### 2.1 Current policies and practices in Thailand

Currently, the Thai government is implementing various measures to support SMEs in corporate procurement as follows.

1. The “Big Brother” tax incentive scheme encouraged large businesses with assets exceeding 200 million baht and 200 or more employees to support smaller businesses by sharing knowledge and research and development (R&D). The benefit provided was a two-time deduction in expenses of less than 10 percent of net profit before charity expense deductions. Nevertheless, the scheme was not fully utilized because finding evidence to be presented to the Federation of Thai Industries (FTI) is usually difficult.

2. The Board of Investment (BOI) offered merit-based incentives to encourage large firms to assist domestic raw or intermediate goods producers by exempting them from corporate income tax by 200 percent. However, as of February 2022, no investors had applied for the tax exemption, possibly due to concerns about trade secrets or inconsistent timing with their business strategy.

3. Financial institutions helped improve financing facilities, such as factoring, escrow accounts, and crowdfunding. Yet, these innovations



were not highly popular because SMEs usually fail the credibility test.

4. Various organizations have improved business-to-business (B2B) corporate procurement platforms, such as the Federation of Thai Industries’ FTI e-Business, National Bureau of Agricultural Commodity and Food Standards’ DGTFarm, Department of Business Development’s PhenixBox and OTOPsMART, Organization for Small and Medium Enterprises and Regional Innovation of Japan’s T-GoodTech, including private platforms, such as Office Mate and Pantavanij. However, inadequate incentives granted to encourage firms to participate and high expenses are currently restricting the success of these platforms.

5. BOI promoted face-to-face business forums, generating revenue of business matching by 19,143.27 million baht in fiscal year 2021. Nonetheless, the limitations were that SMEs frequently refused to provide essential information about their business profile, and the Personal Data



Protection Act (PDPA) B.E. 2562 (2019) increased the difficulty in sharing information between organizations.

6. Credit term regulation by Trade Competition Commission of Thailand (TCCT) assigns firms to pay for agricultural and general goods and services within 30 and 45 days, respectively. Fines involve a payment of no more than 10 percent of that year's revenue. Practically, however, lack of credit term data and burden of proof of SMEs in petitioning are hampering the procedure.

7. Merger and acquisition (M&A) firms, such as Lotus's, are required to increase their purchases of goods and services from SMEs by 10 percent annually for 5 years.

8. Financial institutions and regulating agencies developed Smart Financial and Payment Infrastructure for Business to promote digital supply chains for financing.

Indeed, various documents state that businesses supporting SMEs typically experience increases in revenue, cost savings, and higher brand value, which ultimately generate spillovers to the broader society (Center for an Urban Future, 2012; INSEAD, EcoVadis and PWC, 2010; World Economic Forum, 2015). Thus, as there are numerous implementation gaps in providing SMEs with access to corporate procurement in Thailand, it is important to improve these incentivizing measures by first reviewing international best practices.

## 2.2 International Best Practices

This study selected three countries, namely

the United Kingdom, the United States, and India, which have policies promoting corporate procurement access of SMEs using online marketplaces. Table 1 summarizes the primary characteristics of each country's policies.

In the United Kingdom, the London Development Agency and Olympic Delivery Authority utilized the London Olympic Games 2012, which involved various infrastructure mega-projects, to develop a digital one-stop-service platform called "CompeteFor" to enable main contractors to search for sub-contractors, including numerous specialized SMEs, using questionnaires to assess their qualifications. In addition, to facilitate SMEs in the corporate procurement process, it legislated the Prompt Pay Act, mandating that the government must pay its main contractors within 30 days,<sup>4</sup> and an abandonment of pre-qualification questionnaires (PQQ) for B2G transactions worth less than £100,000.

In the United States, the federal-level Small Business Administration (SBA) developed the American Suppliers Initiative (ASI) platform to provide a calendar of business matching forums.<sup>5</sup> Similar programs were applied at the state

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<sup>4</sup> For additional information, see <https://www.gov.uk/guidance/doing-business-with-government-a-guide-for-smes>.

<sup>5</sup> In 2012, SBA attempted to encourage SMEs to access procurement information of large firms by cooperating with the IBM Foundation to develop a platform for SMEs to provide information about their goods and services, which would be submitted to 15 large firms participating in the project, namely AMD, AT&T, Bank of America, Caterpillar, Citi Group, Dell, Facebook, IBM, JPMorgan Chase, John Deere, Kellogg's, Office Depot, Pfizer, UPS and Wells Fargo.

**Table 1: Case Studies Comparing International Best Practices**

| Dimensions   | United Kingdom  | United States   | India  |
|--|---|---|--|
| Procurement information source                                     | <a href="https://www.competefor.com/">https://www.competefor.com/</a>   | <a href="https://asi.mybusinessmatches.com/">https://asi.mybusinessmatches.com/</a>   | <a href="https://www.msmemart.com/">https://www.msmemart.com/</a>  |
| Strengths  | Transparency  | Various measures adopted, and coordination between private sector and NGOs  | Conglomeration of SMEs   |
| Regulating agency  | London Development Agency   | - Federal level: Small Business Administration (SBA)<br>- Government agencies at the state and city levels  | Ministry of Micro, Small and Medium Enterprises (MSME)   |
| Implementing agency  | Private company: BiP Solutions Co. Ltd.   | NGO, government agencies at the state and city levels, private companies  | National Small Industries Corporation (NSIC)   |
| Coverage   | London and perimeter  | Whole country   | Whole country  |
| Methods for granting SMEs access to corporate procurement          | <b>CompeteFor</b> is a B2B platform for main contractors with the government in London’s mega project procurement announcing searches for sub-contractors, containing the features of scoring, shortlisting using questionnaires, requesting quotations, and announcing the selection outcome | - Encouraging major private companies to support SMEs through CSR with local NGOs<br>- <b>American Suppliers Initiative (ASI)</b> platform for providing business-matching calendar in face-to-face business meetings | <b>MSMEMart</b> is a B2B one-stop-service platform for providing e-catalog, e-RFQ, e-tendering for both domestic and international markets   |
| Methods for facilitating SMEs in the corporate procurement process | <b>Prompt Pay Act</b> forces the government to pay for its main contractors within 30 days to facilitate the public sector supply chain   | <b>Prompt Pay Act</b> forces the government to pay its main contractors within 14 or 30 days, and the main contractors to pay for its sub-contractors within 7 days, and so on  | <b>Micro, Small and Medium Enterprises Development (MSMED) Act, 2006</b> , mandates that the government must pay compound interest (3 times the policy rate) to SMEs whenever it makes payments to SMEs later than 45 days |
|  | Abandoning pre-qualification questionnaires for B2G transactions worth less than £100,000 to reduce SME’s burden  | SBA is a representative of SMEs in proposing and monitoring improvements of governmental regulations and privileges for SMEs, such as reducing or eliminating fines   | - Training and developing skills<br>- Encourage SMEs toward external markets   |

Source: Author’s compilation.

level, such as in California and Ohio.<sup>6</sup> At the local level, this also involved encouragement of major private corporations, such as JPMorgan Chase and Goldman Sachs, to engage in CSR activities alongside non-governmental organizations to support SMEs. Finally, the Prompt Pay Act, which applies to government, main and sub-contractors with the government, and the SBA being a representative of SMEs, whose duty is to propose and monitor improvements in governmental regulations and privileges for SMEs, also help facilitate SMEs' access to corporate procurement.

In India, the Ministry of Micro, Small, and Medium Enterprises (MSME) and National Small Industries Corporation (NSIC) developed a one-stop-service online marketplace called MSMEMart, providing an e-catalog, e-RFQ (request for quotation), and e-tendering for both domestic and international markets. Furthermore, the Micro, Small and Medium Enterprises Development (MSMED) Act A.D. 2006 penalizes the government for late payments,<sup>7</sup> provides for training and developing skills, and encouraging SMEs toward external markets, all of which facilitate SMEs' access to corporate procurement.

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<sup>6</sup> For example, Ohio's platform is called Ohio Business Matchmaker, which is accessible at [https://www.ohiobusiness-matchmaker.com/?utm\\_medium=email&utm\\_source=govdelivery](https://www.ohiobusiness-matchmaker.com/?utm_medium=email&utm_source=govdelivery).

<sup>7</sup> In practice, MSME established a website (<http://samadhaan.msme.gov.in/>) for SMEs which are contractors with the central or local governments to monitor the payment process and to file complaints in cases of late payment, which would be examined within 15 days after submission of the complaint.

In conclusion, these international examples imply five key elements for enhancing SMEs' ability to participate in corporate procurement. First, it is important to create channels for SMEs to receive information on corporate procurement. Second, the platforms must be user friendly, transparent, and have a specific agency to regulate it. Third, the measures need to be suited to the context to deal with diverse SMEs' problems. Fourth, it is necessary to have councilors to support information throughout the procurement process. Finally, local authorities, as in the case of the mayor of London, need to increase their roles in assisting SMEs.

### **3. RESULTS FROM IN-DEPTH INTERVIEWS, QUESTIONNAIRES, AND FOCUS GROUP DISCUSSION**

#### **3.1 In-depth Interviews**

In-depth interviews were conducted between January and May 2022 with 20 agencies, 13 of which are private corporations, and 7 are governmental and related organizations; the interviews inquired about the roles and policies of buyers, sellers, and supporting agencies in the corporate procurement of SMEs, obstacles, needs for governmental assistance, experiences, and targets. Table 2 summarizes the challenges faced by SMEs in gaining access to corporate procurement from different stakeholders' perspectives.

According to Table 2, it is obvious that both buyers and sellers find it challenging to advance

**Table 2: Summary of Challenges of SMEs in Corporate Procurement as Revealed in In-depth Interviews**

| Process                                 | Buyers (large firms)  | Sellers (SMEs)  | Supporting agencies  |
|---|---|---|--|
| Announcing the procurement              | <ul style="list-style-type: none"> <li>- Difficulty in searching channels and high costs</li> </ul>   | <ul style="list-style-type: none"> <li>- Lack of knowledge about channels of communication, which occasionally have access costs</li> </ul>   | <ul style="list-style-type: none"> <li>- Lack of explicit mandate from high-level executives</li> <li>- Lack of hosting agencies for coordinating information base</li> <li>- Lack of buyers' and SMEs' information for designing and evaluating new measures</li> <li>- Ineffective implemented measures due to complex processes, inactive announcement, and trade secret issues</li> <li>- Issues with regulations, such as PDPA, and the non-discrimination principle of the World Trade Organization increasing the difficulty in designing measures to support SMEs</li> </ul> |
| Selecting and making a contract         | <ul style="list-style-type: none"> <li>- Risks associated with dealing with new suppliers</li> <li>- Various measures needed, such as business profile, for evaluating candidates (that normally would not meet the criteria)</li> <li>- Complex process</li> </ul> | <ul style="list-style-type: none"> <li>- Prohibited opportunities to offer goods and services deals</li> <li>- Lack of resources for self-evaluation, differentiation, diversification</li> <li>- Lower standard of goods and services and corporate management than that required by buyers</li> <li>- Lack of economies of scale and thus higher prices</li> <li>- Complex process involving preparation of numerous documents</li> </ul> |  |
| Supplier development and job submission | <ul style="list-style-type: none"> <li>- Costs involved in supplier development program</li> <li>- Lack of self-development ethic of SMEs</li> <li>- Undesirable quantity and quality of goods and services</li> </ul>  | <ul style="list-style-type: none"> <li>- Lack of resources, and effects from external factors that prevent just-in-time production</li> <li>- Inability to access appropriate financial assistance due to inadequate credibility</li> <li>- Complex job inspection process</li> </ul>   |  |
| Payment                                 | <ul style="list-style-type: none"> <li>- Incomplete documents from SME causing delayed payments</li> <li>- Cash management process, especially in dealing with the government, causing difficulty in making faster payment</li> </ul>                               | <ul style="list-style-type: none"> <li>- Long credit term due to low negotiating power, sometimes resulting in liquidity problems</li> <li>- Long payment process depending on documents and frequency of payments</li> </ul>   |  |

Source: Author's compilation.

corporate procurement for SMEs due to the high searching costs for new suppliers, costs associated with document preparation, the complexity of processes, and the unfavorable standards of SME

suppliers. In addition, the supporting agencies also mentioned problems about unclear direction and hosting organizations, poorly executed measures, and issues with both domestic and international

regulations. Therefore, various loopholes exist for additional analyses and policy recommendations.

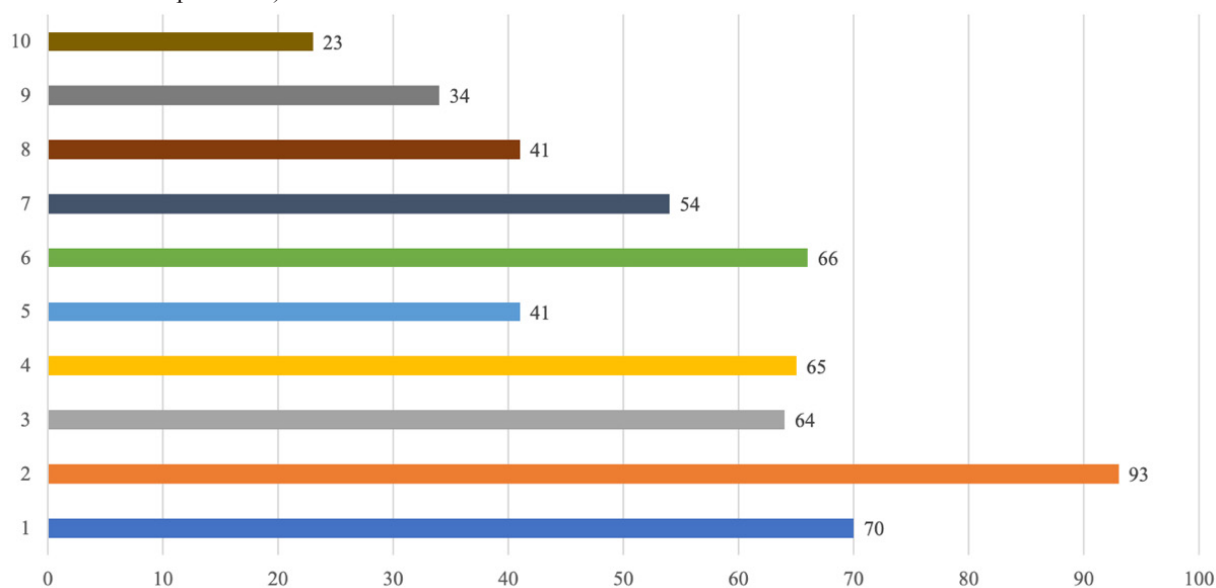
### 3.2 Questionnaire

The online questionnaire was distributed between February and June 2022. A total of 111 organizations responded, the majority of which were Bangkok-area manufacturing, commercial, and service entrepreneurs. Micro, small, medium, and large-sized businesses made up 22, 42, 13, 23 percent of the samples, respectively. Interestingly, more than half of these enterprises spend less than 10 percent of their annual procurement budget on goods and

services from SMEs, which are frequently selected based on the potential and ability of SMEs in terms of price, ability to produce and deliver goods and services, quality, and credibility. However, impacts of current government policies and tax incentives are the weakest. Regarding the results of the survey, Figure 1 shows the number of respondents selecting five desirable measures to support purchasing goods and services from SMEs, while Figure 2 illustrates the proportion of the measures in which respondents expressed interest in the first order categorized by size of businesses.

**Figure 1: Measures to Encourage Purchasing Goods and Services from SMEs**

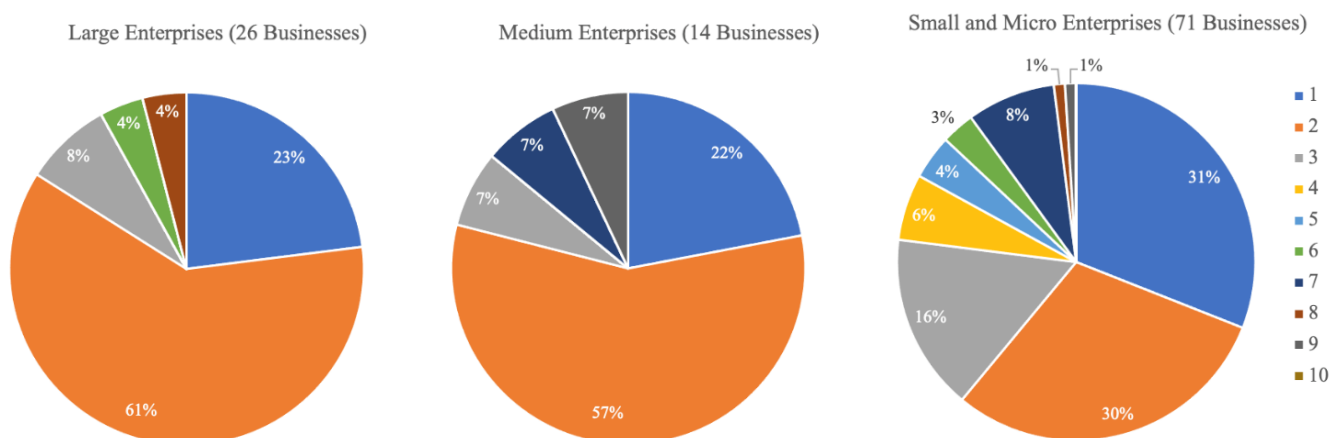
(Unit: Number of respondents)



Source: Author's compilation.

Notes: 1. Public mechanisms for SMEs meeting with business partners; 2. Tax incentives; 3. Financial incentives in terms of low-interest credits; 4. Financial incentives in terms of coupons to support expenditures; 5. Financial incentives in terms of supply chain financing; 6. Encouragement for quality certification application and registration; 7. Credit term regulation; 8. Providing middle entity for administrating payments between buyers and sellers; 9. Cost reduction of credit rating in financial markets; 10. Granting the country-level honor awards.

**Figure 2: Measures to Encourage Purchasing Goods and Services from SMEs (First order Interested), by Size of Enterprises**



Source: Author's compilation.

Notes: Chart legends are the same as those of Figure 1.

According to Figure 1, the majority of the entrepreneurs in the sample favor tax incentives, public mechanisms for SMEs involvement in business matching and encouragement for quality certification application and registration. Furthermore, Figure 2 suggests that the desired measures vary depending on the size of the business. Medium- and large-sized firms advocate tax incentives to promote the purchase of goods and services from SMEs. On the other hand, the measures advocated by entrepreneurs of micro and small firms are public mechanisms for SMEs meeting with business partners to gain access to potential buyers, tax incentives, financial incentives in terms of low-interest credits, and credit term regulation, respectively.

### 3.3 Focus Group Sessions

Three separate focus group meetings were held with the Office of Small and Medium Enterprise Promotion (OSMEP), private companies, commercial banks, the Federation of Thai SME, FTI, Thai Chamber of Commerce (TCC), BOI, and other organizations under the Ministry of Finance. Two of the focus group discussions were public hearing meetings in February and June 2022, while the last session was the result publicizing meeting in August 2022. The numbers of attendees were 74, 42, and 123 persons, respectively. Two issues were discussed, which were the pain points in the corporate procurement process with SMEs and factors to improve SMEs' access to the corporate procurement process.



The largest problem is the limited capability of SMEs to supply goods and services for major companies. Examples include the limited range of SMEs' goods and services available, inability to differentiate themselves from other producers, inability to improve themselves, lack of economies of scale, unstable production standards, inadequate platforms providing SMEs' business profile and credibility for offering, selling and gaining access to credits at reasonable costs, lack of experience in document preparation, and lack of a conducive business environment, such as attractive incentives or strongly enforced credit term regulation.

Three key elements are suggested to enhance SMEs' access to the corporate procurement process. The first is to recognize the demands of large corporations and create incentives for them to purchase goods and services from SMEs, including educating stakeholders about the nature of SMEs, rewarding customers with tax privileges, and pointing out the importance of doing so as a CSR activity. Second, it is essential to create a conducive environment for purchasing goods and services from SMEs. This includes constructing a central database of business profiles and an online B2B marketplace using digital finance, such as expanding the Thai SME-GP platform to cover B2B and B2C transactions. Finally, SMEs also need to improve their capabilities to be readily available to sell goods and services to large firms through adopting innovations invented by governmental organizations, receiving training from the Thai Industrial Standards Institute (TISI) to obtain a Thai Industrial Standard

for SMEs, which reduces the costs of proving their standards, and preparing to learn the demands of buyers so that they can respond quickly.

#### **4. SWOT ANALYSIS OF SMEs' POSITION IN THE CORPORATE PROCUREMENT PROCESS**

According to the findings discussed previously, this study applied the SWOT analysis framework for identifying appropriate improvements for SMEs in granting access to the corporate procurement process. The 3P principle, considering people, product, and process, is used to identify the internal factors, or strengths and weaknesses. However, a PESTEL (political, economic, social, technology, environment, and legal) analysis is used to identify external factors, or opportunities and threats. The analysis can be summarized as follows.

##### **(1) Strengths**

SMEs have uncomplicated administration processes, implying that they can respond rapidly to customers' demands. In addition, there are numerous SME prototypes which have successfully developed innovations to expand business relationships with other companies. Finally, larger companies buying goods and services from SMEs would be well perceived as conducting CSR through engaging with communities in a more concrete manner than other activities.

##### **(2) Weaknesses**

SMEs have limited capacity for production, delivery of goods and services, and after-sales

services, increasing difficulties for them to access direct procurement and skilled-labor service procurement. Partially, this is because SMEs tend to lack a self-improvement attitude and the direction needed to create uniqueness and diversification. Additionally, this is also due to the unfavorable business environment in which SMEs are placed, such as the absence of a procurement information center, an efficient procurement process, a traceability system enabling buyers and financial institutions to be confident in the credibility of SMEs through such indicators as sustainability or digital footprints, and a protection system for SMEs being exploited by buyers through, for example, credit term regulation.

### **(3) Opportunities**

Numerous stakeholders are expressing their willingness to support and regulate business dealings between SMEs and larger enterprises. The first group of supporting public organizations for SMEs comprise: BOI, TISI, Bank of Thailand (BOT), FTI, TCC, Thai Bankers Association (TBA), Purchasing and Supply Chain Management Association of Thailand (PSCMT), and Federation of Thai SME. The second group consists of major corporations recognizing the importance of sustainable procurement under environmental, social, and corporate governance by supporting SMEs. In addition, a growing number of technological advances are facilitating SMEs in corporate procurement, such as artificial intelligence (AI) and big data when applying for digital finance for transaction-based lending, integrated procurement

platforms, virtual reality and augmented reality for building customers' immersive experience.

### **(4) Threats**

National-level policies and strategies for supporting SMEs in the corporate procurement process are not explicit. In particular, although some incentivizing measures have been implemented, requirements and procedures for applying for these companies' special privileges, such as the Big Brother or BOI merit-based incentives, are complicated and cumbersome. Additionally, inadequate resources of supporting groups lead to inconsistent and ineffective interventions. This issue is exacerbated by conditions of the PDPA, which complicate inter-organizational information-sharing. As a result, there are insufficient data to identify target groups, analyze demands from the private sector, and assess the efficacy of current interventions.

## **5. CONCLUSION AND POLICY RECOMMENDATIONS**

### **5.1 Policy Suggestions for Promoting SMEs' Access to Corporate Procurement**

Based on discussions with many stakeholders, there are three main factors that influence whether corporations choose to purchase goods and services from SMEs. First, it is essential to have regulations and policies to assist, foster, and regulate the transactions. Thus, incentives are needed to persuade major companies to buy goods and services from SMEs. Second, it is vital to create a conducive



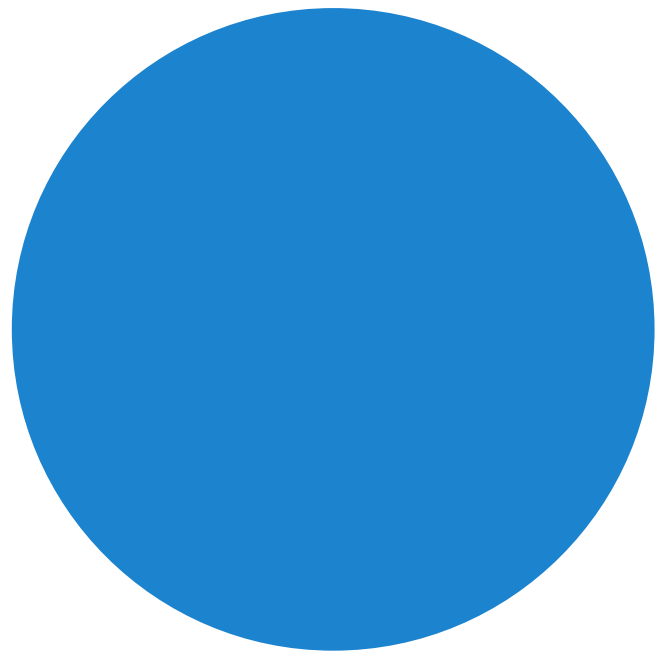
business environment to facilitate transactions between SMEs and buyers. Third, SMEs also need to develop themselves to prepare for the dynamically shifting demands of buyers. In turn, each of these suggested dimensions can be transformed into the following policy recommendations.

To incentivize large corporations to purchase from SMEs, three measures are recommended. The first measure is a reward card based on the purchase value of goods and services from SMEs, which can be exchanged for high-quality goods and services or discounts, such as the government's co-payment or sales promotion scheme for SMEs, discounts for OSMEP's business development service, country-level honor awards, and the opportunity to meet with the Prime Minister or other high-level executives for discussing relevant problems and solutions. The second alternative is tax incentives for purchasers from SMEs, which need to be flexible and able to accrue over time, such as a deduction of corporate income tax or such local authorities' taxes as land and building tax or signboard tax. The final policy choice is that the purchasers may receive additional rights, such as access to the previously ineligible government consumption stimulation programs, such as co-payment, the ability to serve as the main contractor with the government's mega projects if they intend to sub-contract SMEs, and the right to list stocks on the Thailand Sustainability Investment (THSI) list of the Stock Exchange of Thailand.

Then, to create a conducive business environment for SMEs, four strategies are proposed.

The starting point is to provide market access for SMEs through B2B and B2B2G sub-contractor procurement information platforms, business matching forums, and SMEs consortiums to raise production capacity beyond that of any single SME. Subsequently, it is recommended to construct a burdenless procurement process through an integrated procurement platform, ranging from selection to payment and evaluation processes. The inclusion of an evaluative measure based on buyers' criteria is useful in identifying development gaps for SMEs while reducing the opportunity cost of buyers in searching for the best match. Thereafter, an additional financial traceability system using FinTech, such as a digital supply chain financing database, decreases risks of double financing and costs of financial institutions examining evidence, and boosts the SMEs' credibility. Lastly, there should be protection systems for SMEs, such as an SOS center and credit term regulation under supervision of TCCT, specifying that main contractors with the government are required to pay their SME sub-contractors on time in order to avoid penalties on subsequent contracts.

Eventually, aside from incentivizing buyers and building a conducive business environment, SMEs ought to have their potential increased through incentives for training, cost savings, and targeted measures. In particular, the government may incentivize large corporates to arrange self-development and training sessions for their suppliers in exchange for flexible and financially traceable tax privileges or the right to count the number of SMEs' employees



as trained workers to reach the free-of-charge criteria for the Skill Development Fund. All SMEs may benefit from entirely subsidized public workshops or financially assisted B2B workshops with domestic or multinational companies. Moreover, to reduce SMEs' operating costs, there should be an expansion in the number of service providers in the BDS system, more provision of financial credits, such as factoring and supply chain financing, and construction of a conglomeration of SMEs to purchase inputs at lower prices. Finally, there should be targeted measures based on SMEs' needs, including the use of credit cards for purchasing production-related inputs.

To summarize, these suggested measures to promote SMEs' access to corporate procurement can be classified according to their impacts on corporate procurement decisions and duration of implementation (i.e. resources and effort used) as shown in Table 3.



**Table 3: Classification of Measures to Promote SMEs' Access to Corporate Procurement, according to Impacts on Corporate Procurement and Duration of Implementation**

| Policy characteristics                           |             | Duration of implementation  |  |
|--|-------------|---|--|
|  |             | Long  | Short (quick win)  |
| Impacts on SMEs' access to corporate procurement | High impact | <ul style="list-style-type: none"> <li>• Tax privileges when purchasing goods and services from SMEs</li> <li>• Right to participate in government's consumption stimulation scheme, such as the half-half program</li> <li>• Fee reduction for factoring or supply chain financing</li> <li>• Center compiling and managing procurement orders from numerous SMEs</li> <li>• Credit voucher for purchasing factors of production</li> <li>• Supply chain financing using FinTech</li> <li>• Credit term database</li> <li>• SOS center for SMEs</li> </ul> | <ul style="list-style-type: none"> <li>• Reward card in exchange for free goods and services from SMEs</li> <li>• Reward card in exchange for discount on goods and services from SMEs</li> <li>• Reward card in exchange for discount in using business development service</li> <li>• Supplier development program in exchange for tax privileges</li> <li>• SMEs' discount for business development service</li> <li>• Corporate procurement information center</li> <li>• Corporate procurement information center sub-contracting for public projects</li> <li>• Integrated procurement platform</li> <li>• Database and instruments for evaluating sellers based on specified requirements</li> <li>• Digital supply chain financing database</li> <li>• Requirement for corporates contracting with public organizations to pay SMEs on time</li> </ul> |
|  | Low impact  | <ul style="list-style-type: none"> <li>• Reward card in exchange for opportunities to meet the Prime Minister or other high executives</li> <li>• Setting procuring SMEs as a criterion for listing stocks on the Thailand Sustainability Investment list</li> <li>• Requirement for public organizations to pay their contractors on time</li> </ul>   | <ul style="list-style-type: none"> <li>• Reward card in exchange for honor awards</li> <li>• Right to contract with the government if corporates plan to sub-contract SMEs</li> <li>• Cooperating and financing supplier development workshop</li> <li>• Business matching forum for SMEs with limitations in terms of potential</li> <li>• Constructing SME consortium</li> </ul>   |

Source: Author's compilation.

## 5.2 Example of a Pilot Project

In order to effectively organize the above-mentioned measures, policymakers should start by implementing quick-win and high-impact initiatives as shown in the top-right panel of Table 3. Therefore, this study recommends the prototyped

seven measures, encompassing all three dimensions for enhancing SMEs' involvement in the corporate procurement process.

Regarding purchasing incentives, priority should be given to OSMEP and platform developers creating a procurement platform which involves a

reward card feature system. The points might be accumulated based on the value of the goods and services purchased or an increase in the purchasing value from that of the previous period, which may then be redeemed for goods and services, discounts from SMEs, or discounts on business development service.

Concerning a conducive business environment for SMEs, numerous strategies are suggested. First, to build an information business ecosystem, an integrated procurement data center for B2B and B2B2G transactions is advocated to improve business matching efficiency. Second, to build a transaction business ecosystem, it is advised that an integrated procurement platform be built for the selection, order administration, charging, payment, and procurement efficiency evaluation processes. Additionally, to strengthen the Smart Financial and Payment Infrastructure for Business, such as the BOT's PromptBiz, the platform might connect transaction and payment data with databases of financial institutions and the government's tax system. The platform is expected to increase efficiency, reduce costs and errors, enhance traceability, promote faster payment to SMEs, and enable SMEs to evaluate and develop their potentials. Third, to construct a digital footprint, traceable digital supply chain financing databases should be improved to boost credibility and the opportunity of SMEs to gain access to significant finance at affordable rates. Finally, to promote the institutional business ecosystem, the Comptroller General's Department should legislate regulations

to force main contractors of the government to pay SMEs on schedule by increasing the penalty under the Trade Competition Act B.E. 2560 (2017) for late payments. To enforce the regulation, there might be a platform which specifies the credit term and actual timing of payments that are accessible to TCCT and OSMEP, and enables SMEs to file a complaint with OSMEP when being exploited by their business partners.

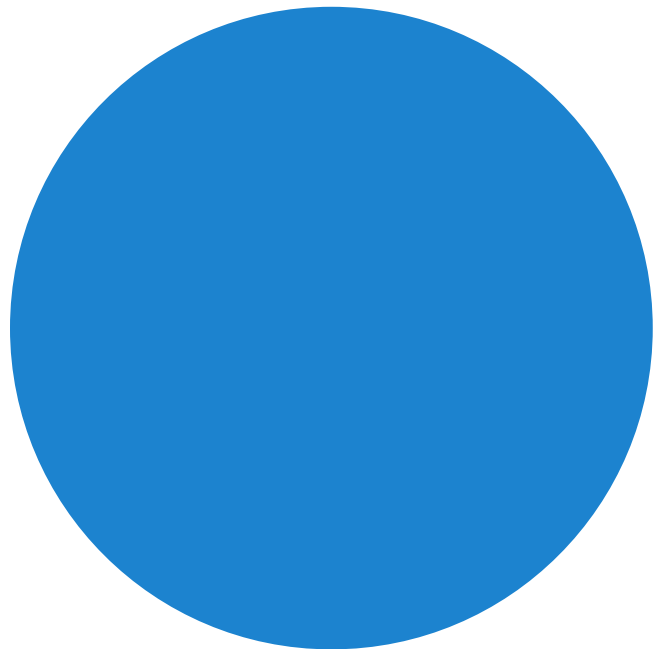
With respect to developing the potential of SMEs, this study suggests prioritizing the suppliers' development program using tax incentives. Moreover, to lower operating costs of SMEs, OSMEP and relevant organizations are advised to launch a program to convince service providers to participate in and improve the quality of the BDS system so that SMEs can obtain business development services at reasonable prices.

As these measures for optimal procurement are appropriately implemented, mutual benefits between SMEs and buyers may be expected so that SME businesses in the country will thrive, and buyers will receive a wide selection of in-demand goods and services. Ultimately, healthy economic, social, and environmental systems will foster the virtuous circle of SMEs' access to the corporate procurement processes even further into the future.



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ประเทศไทย (ทีดีอาร์ไอ)**

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