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Article

Impact of tax policies and strategies on tobacco consumption behavior of individual—Evidence from Thailand

Supit Boonlab[1], Sanitdech Jintana[1,*], Pongsatean Luengalongkot[2], Nonglakhana Waiprom[3]

[1] Public Management Innovation Program, Faculty of Liberal Arts, Rajamangala University of Technology Thanyaburi (RMUTT), Khlong Luang 12110, Thailand
[2] Faculty of Political Science and Law, Burapha University, Saen Suk 20130, Thailand
[3] Department of Humanity, Faculty of Liberal Arts, Rajamangala University of Technology Thanyaburi (RMUTT), Khlong Luang 12110, Thailand
*** Corresponding author:** Sanitdech Jintana, sanitdech_j@rmutt.ac.th

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Abstract: The government's increased cigarette tariff aims to lower smoking rates and avoid adverse impacts. This study's goal was to offer process innovation for lowering Asian' smoking behavior. The participants were chosen by stratified random selection from a total of 738 people residing in Pathum Thani Province, Thailand. The instrument was a questionnaire. A software programmer was used to examine descriptive and inferential statistics using EFA and one-way ANOVA techniques. A strategic framework guideline using a SWOT analysis and TOWS matrix to encourage smoking reduction was proposed. The findings revealed two components: smoking behavior change and continues smoking that were based on SWOT analysis and TOWs matrix. There were nine strategies for the excise department to consider for the adjustment of the next policy in terms of reducing the number of smokers. The practical and policy suggestions could help reduce the negative impact of the cigarette industry on public health and increase government revenue while addressing weaknesses and threats in the industry.

Keywords: tax increasing policy; tobacco consumption behavior; SWOT analysis; TOWS matrix; Asians

1. Introduction

The Asia region accounts for around 60% of combustible tobacco users worldwide, with a total of 743 million people as seen in **Figure 1**. Half of all those who smoke will die prematurely from smoking-related diseases. Smoking is a complex issue with wide-ranging impacts on general health and society in every aspect. Addressing this problem is not straightforward, as it requires measures and steps to be taken in various areas, including raising awareness in society to reduce smoking (Hussain et al., 2023), understanding the impacts of smoking, developing public policies to promote smoking cessation, and providing assistance to those who want to quit smoking. The highlights the social construct of smoking among youths in Southeast Asia, where cigarettes, cigars, and marijuana smoking are used interchangeably as part of a social activity domain. Lee et al. (2010) discuss how smoking is viewed in similar environments. Additionally, Lee et al. (2021) provide insights into the prevalence rates of tobacco consumption among males aged ≥15 years in Asia-Pacific countries. Yang et al. (2019) present a pooled analysis of cohorts in Asia to assess the impact of tobacco smoking on total and cause-specific mortality among adults aged ≥45 years in Asia.

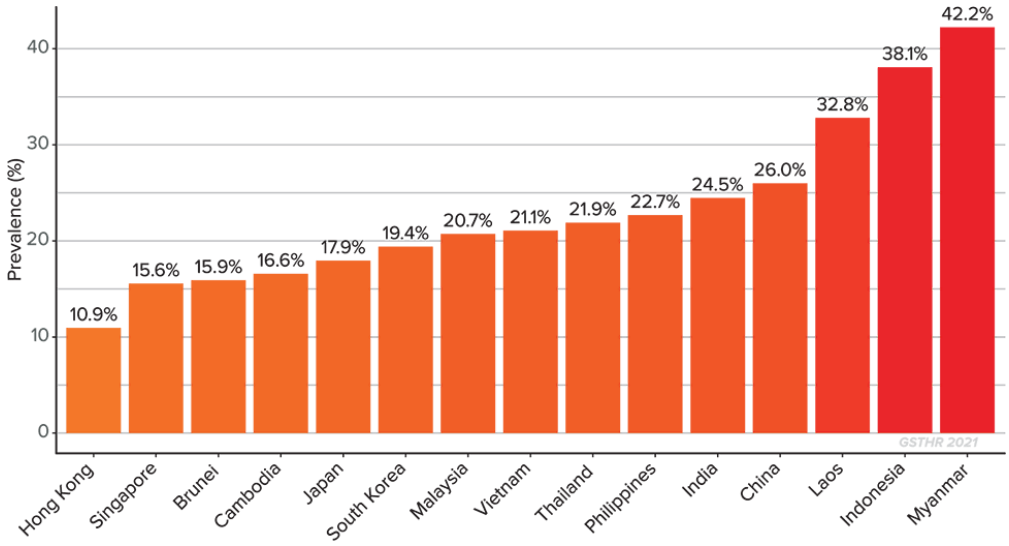

Figure 1. Current adult tobacco smoking in Asia, 2021.
Global State of Tobacco Harm Reduction (GSTHR) (WHO, 2019).

However, there are ongoing efforts and strategies to address the issue of smoking both at the national and global levels. While it may not be resolved immediately, it should be approached with sustained and long-term planning, intention, and effort. With determination and persistence, there may be opportunities to reduce the problem of smoking in the future. Moreover, to put an end to the tobacco epedemic, comprehensive tobacco-control policies should be implemented.

In Thailand, since 1990, the excise rate on tobacco has continued to increase every two to three years and has risen from 55% in 1990 to 90% in 2017. The organization that ran the campaign to quit smoking was satisfied with the outcome. Smoking is a leading cause of death. A report released in 2022 shows that 72,000 Thais die each year from smoking, with an economic cost of 220,000 million Baht (approximately 6600 million dollars) (Bangkokbiznews, 2022). One of the solutions was to increase tax on tobacco continuously. For example, the Philippines has successfully adjusted its cigarette tax system. The Philippine government has implemented a policy of increasing tax rates by 4% per year since 2012 (Thaipost, 2021). This imposes the same tax rate on cigarettes regardless of price group. Thus, the government has been able to increase its cigarette tax revenues while the smoking rate has decreased. However, it has, also led to an increase in contraband cigarettes. Moreover, it was found that higher tax rates on traditional cigarettes decreased the use of such cigarettes among adults and alternatively increased the use of e-cigarettes among adults. Similarly, higher e-cigarette tax rates are found to increase the use of traditional cigarettes and reduce the use of electronic cigarettes (Pesko et al., 2020). In addition, it was internationally accepted that tax increases are one of the most effective measures to control tobacco (Chaloupka et al., 2012; Levy et al., 2008; Sung et al., 2005) especially in developing countries (Jha and Chaloupka, 2000). Therefore, monitoring the impact of this tax increase on the change in smoking behavior is necessary.

According to Thailand's smoking rate from 2000 to 2020 (**Figure 2** attached), the WHO projects that by 2025 the smoking prevalence rate in Thailand will be approximately 39% for men and 3% for women. However, the smoking prevalence

rate in Thailand has been declining in recent years. From 2011 to 2025, the average annual reduction rate for smokers aged 15 and above is 2.8%, with a decrease from 20.3% to 17.5%. It is projected that there will be approximately 10.5 million smokers in Thailand in the year 2025 (Macrotrends, 2020). The global resolution is that each country should reduce smoking prevalence to 30% by the year 2025 (WHO, 2019).

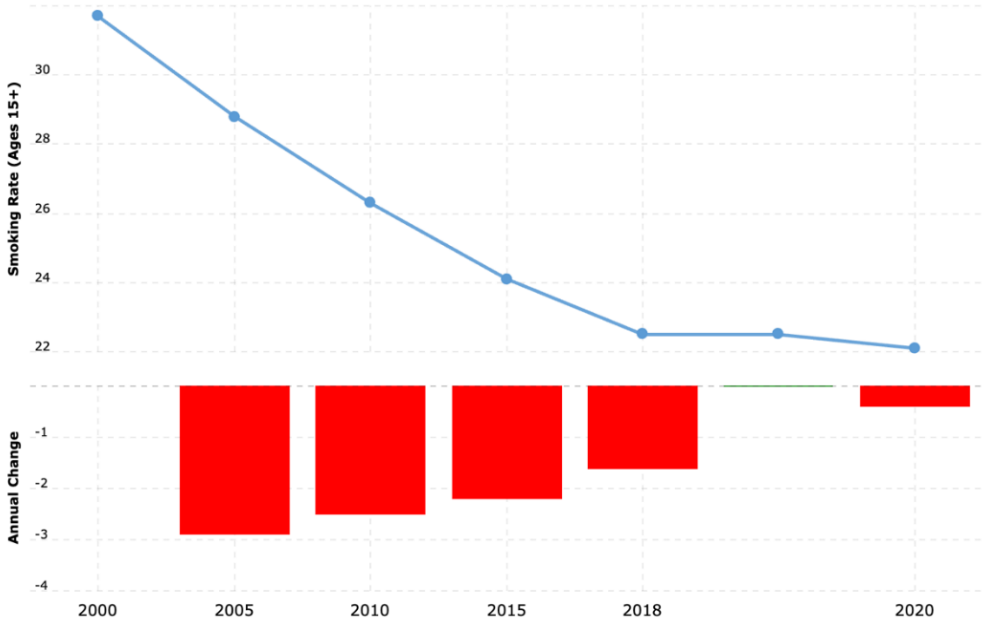

Figure 2. Thailand smoking rate 2000 to 2020 (Macrotrends, 2020).

Taxation of cigarettes results in fewer children starting to smoke, and in more adults quitting, as well as providing substantial revenue for critical health and tobacco prevention programs. Thus, raising taxes on cigarettes results in a win-win situation for all parties involved. When the price of cigarettes is increased by 10%, adult' consumption of cigarettes decreases by approximately 4% and youth consumption decreases by approximately 7% (Tauras et al., 2001). This is an influential factor for policymakers and law enforcement. It is also possible that tobacco prices will be affected by external factors such as changes in the income of smokers or the accessibility of electronic cigarettes (Hiscock et al., 2020). Controls must be implemented in order to address the prevalence of tobacco smoking. In terms of tobacco control, tobacco tax increases are the most effective method for reducing the prevalence of tobacco smoking (Ekpu and Brown, 2015; Farley et al., 2015; Hiscock et al., 2020), beginning tobacco smoking, tobacco consumption (Amato et al., 2015) and smoking level inequalities (Bader et al., 2011; Brown et al., 2014; Hill et al., 2014; Lorenc et al., 2013). The government also benefits from the increase in revenue.

Therefore, it was crucial to study the impact of tax policies and strategies on tobacco consumption to reduce the smoking behavior of Thai people. This research aims to examine tax increasing policy in the analysis of smoking reduction guideline. Based on the search query, it is apparent that the tax increasing policy is an important factor in reducing smoking behavior in Thailand. A cross-sectional telephone survey conducted in Thailand reported that in response to an increase in cigarette excise tax, nearly half of the daily smokers reduced their smoking behavior (Aungkulanon et al.,

2019). Additionally, excise tax increase has been used as a policy tool for reducing smoking prevalence in Thailand (Department of Disease Control, Ministry of Public Health, 2018). The study of the pattern of tax increasing policy is crucial for examining smoking reduction guidelines. Therefore, it is important to continue studying the impact of tax increasing policy on smoking behavior, as well as other policies that can help reduce tobacco use in Thailand (Chitanondh and Kengganpanich, 2015). This will be of substantial benefit to the Excise Department, the Ministry of Finance, the Ministry of Public Health, their roles and responsibilities, and those involved in bringing information and setting measures to solve problems efficiently and sustainably. Assuring that the Ministry of Public Health is aware of health trends and key factors that may cause a major crisis in the future.

In light of the aforementioned circumstances, several countries, including those in Asia, have implemented policies aimed at reducing the number of smokers through an increase of tobacco taxes. Consequently, this study seeks to analyze smoker behavior and evaluate the policy of tax increment in order to present an appropriate application model based on the SWOT analysis and TOWS matrix strategy.

2. Literature review

Excise, as a component of indirect taxation systems, is a complex economic concept. It is imposed on commodities that satisfy specific demands of customers (Elamonovich, 2022). The increase in cigarette taxes and prices in Brazil has significantly impacted tobacco consumption, as reported in a national survey, by encouraging smoking cessation. It also prevents the transition from new experimenters to become regular smokers. The Brazilian survey indicates a decline in the number of smokers due to the declining purchasing power of young people and the lower population. The research results also showed that those who smoked fewer than 20 cigarettes a day and those who did not smoke within half an hour of waking tended to respond positively to tobacco taxation (Divino et al., 2021). Besides, the escalation of tax rates has led to the proliferation of the black market, where illicit cigarettes are sold to economically disadvantaged young individuals with limited education and purchasing capacity. They were classified as one of the groups affected by the policy of increasing tobacco taxes (Gigliotti et al., 2014). Brazil's increased cigarette tax policy has been shown a failure based on the data.

In addition, Bader et al. (2011) studied the effects of taxes and tobacco prices on the consumption behavior of populations at risk, including gender, age, income, peer influence, and family structure. Educational status younger youth or first-time smokers have a relatively low response to the price increase. Unlike older youth or regular smokers, their daily routines respond to high prices. Smoking addiction was also found to be linked to socioeconomic status. It has been found that the ratio of smokers in high-income countries is higher than that of smokers in low-income countries and those with low socioeconomic status and low education. Consequently, medical resources are more readily available.

Around the world, numerous studies have shown that increasing taxes on tobacco results in lower smoking rates, but there are some differences in countries studied. Siahpush et al. (2014) found that higher cigarette prices were associated with lower

smoking prevalence among low-income individuals in the United States. The study suggested that increasing cigarette taxes could be an effective strategy for reducing smoking rates among disadvantaged populations. Chaloupka et al. (2019) found that increasing tobacco taxes is an effective strategy for reducing smoking rates, especially among youth and low-income populations.

Contrary to the anticipated reduction in the consumption of excisable products, such as tobacco and energy drinks, due to the implementation of excise tax in the UAE (Hussain et al., 2023), consumers have exhibited brand loyalty by maintaining their preference for the same brands of excisable goods (DeCicca et al., 2021). This loyalty has resulted in the sustained consumption levels of these products despite the tax imposition. The study also found that higher taxes on tobacco products can lead to increased revenue for governments, which can be used to fund public health initiatives. It has been pointed out by Bader et al. (2011) that tax increases can have a significant impact on reducing and quitting smoking. It was depending on the tax rate.

An Australian and Victorian state study reported that a 10% tax increase on the selling price resulted in an increase of 7%–14% in smoking cessation rates. Additionally, in Mexico in 2005, the tax was increased to 110%, representing 45.5% of the selling price, resulting in a 6.4% decrease in cigarette consumption (Jimenez-Ruiz et al., 2008). California up to 25% per pack leading to short-term consumption reductions of 8%–10%, long-term 10%–13% (Keeler et al., 1996). Kengkanpanich et al. (2015) found that the slight increase in the Thai cigarette tax had a low effect on smoking cessation behavior. Thus, it is expected that in the future, measures to increase the cigarette tax at an increased rate will affect consumer behavior in a way to further reduce smoking.

Besides the reduction of smoking behavior, other behaviors were also changed, such as the replacement of expensive cigarettes with cheaper brands (Huang et al., 2004) and the replacement of factory-produced cigarettes with self-rolled cigarettes (Yang et al., 2007). Smoking volume and frequency, for example, from daily smoking behavior to non-daily smoking behavior, the number of cigarettes per day was reduced from ten to nine (Kengkanpanich et al., 2015).

Furthermore, a search for articles related to smoking behavior change and continued smoking found several relevant studies. One study found that cigarette smoking continues to be a major public health concern, particularly among young adults (Mathur et al., 2014) while “sin” goods (tobacco, alcohol etc.) were discussed as example of unhealthy taxable in perception of health risks among individuals (Arnabal, 2021). Another study provided an overview of smoking in terms of its health effects, prevalence, and patterns of use (West, 2017). A third study tested a model utility based on the Theory of Planned Behavior to predict smoking behavior (Zhao et al., 2022). A fourth study identified behavior change techniques used in tobacco cessation interventions (Moafa et al., 2021).

One potential way to expand the research related to smoking behavior change is by investigating the use of alternative tobacco products, such as nicotine-infused chewing gum or lozenges. A study by Steinberg et al. (2019) found that the use of nicotine gum was associated with reduced cigarette smoking and increased smoking cessation rates among young adults. Another study by Cooper et al. (2018) found that the use of e-cigarettes was associated with reduced cigarette smoking and increased

smoking cessation rates among individuals in substance abuse treatment. Therefore, the use of alternative tobacco products may be a promising approach for reducing cigarette smoking and promoting smoking behavior change. However, other studies suggest that taxing e-cigarettes as tobacco products may not be an effective strategy for reducing smoking behavior, as e-cigarettes have been found to be less harmful than traditional tobacco cigarettes (McAfee et al., 2016).

Overview of tax policies, it was one of strategies that had an impact on tobacco consumption behavior, which was classified into two patterns. First, favorable impact in term of brand loyalty, support for smoking cessation, individual (i.e., older youth or regular smokers, low-income in high-income countries), and smoking volume (i.e., daily smoking to non-daily smoking, reduction from 10 to 9 cigarettes per day). Besides, the excise tax rate had a major impact on consumer behaviors. Second, the detrimental impact of cigarette replacement (i.e., dark market, illegal cigars, lower-cost brands, self-rolled cigarettes, and e-cigarettes).

As a result of the prevailing perspectives, tax policies in Thailand have been actively implemented. How has this impacted the smoking behavior of Thai consumers, as provided by the Excise Department? To explore the effectiveness of the implemented policy based on findings from other countries, this study aims to investigate the success or failure of the policy in terms of individual information and smoker consumption behavior.

SWOT analysis and TOWS matrix techniques

SWOT Analysis is the focal point of internal and external analysis in strategic management. To analyze issues it was divided into categories as “Strength—S, Weakness—W, Opportunity—O, and Threat—T”. Strategic planning is the solid foundation for successful strategic management. The process of planning, implementing, evaluating, and monitoring the decisions that drive an organization toward achieving its goals (Karunarathne, 2021). Moreover, it is an excellent technique to encourage the model that continues onto the TOWS matrix. The TOWS Matrix is a strategic planning tool that stands for Threats, Opportunities, Weaknesses, and Strengths. It is used to analyze the external threats and opportunities facing an organization along with its internal weaknesses and strengths to develop strategies that leverage strengths to capitalize on opportunities and mitigate weaknesses to counteract threats.

During times of uncertainty, SWOT analyses are widely used to assess organizations’ internal and external environments. It has become a fundamental tool for organizations to evaluate their position in the market. In addition, when there is a considerable amount of uncertainty in a project, SWOT analysis is implemented to identify the project’s strengths, weaknesses, opportunities, and threats (Azimi et al., 2011; Akhavan et al., 2015; Rozmi et al., 2018; Wu, 2020). In order for management to achieve its goals, it is critical to consider both internal and external factors. Among the internal aspects, there are features an organization/project has control over, while the external aspects are factors outside an organization/project’s control (Bull et al., 2016; David et al., 2017; Shariatmadari et al., 2013). With a combination of four aspect analyses, SWOT analysis can be used to develop alternative options for a business.

Such techniques can clearly clarify how strengths and weaknesses can be matched with opportunities and threats (Lee and Ko, 2000; Valentin, 2001: Wang, 2007). The TOWS matrix can be summarized as (Benzaghta et al., 2021):

SO: Strategy refers to taking advantage of opportunities, ST: Strategy refers to avoiding threats, WO: Strategy refers to introducing new opportunities by reduction of weaknesses, and WT: Strategy refers to avoid threats by minimizing weaknesses.

Accordingly, the authors considered SWOT analysis and TOWS matrices in addition to the input data from quantitative analysis to create a proposal for the Thai Excise Department and Tobacco Authority of Thailand.

As a result of the above, it was a pressing concern to implement this case as it affects the behavior of smokers as conceptual framework below **Figure 3**:

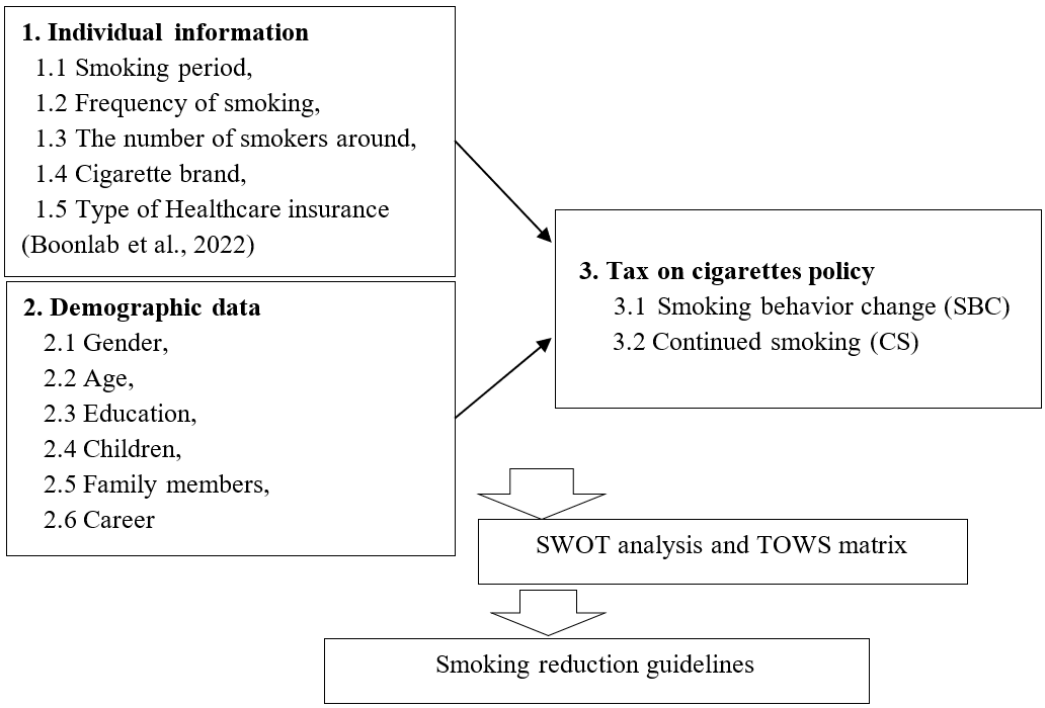

Figure 3. Conceptual framework.

The study tested the following hypotheses:

H1: At the 5% significance level, there is a difference in the average of smoking behavior change (SBC) of population in the different individual characteristic.

H2: At the 5% significance level, there is a difference in the average of continued smoking (CS) of population in the different individual characteristic.

H3: At the 5% significance level, there is a difference in the average of smoking behavior change (SBC) of population in the different demographic data.

H4: At the 5% significance level, there is a difference in the average of continued smoking (CS) of population in the different demographic data.

3. Materials and methods

3.1. Participants

In this case, data was collected from 763 respondents who had been smoking in

Pathum Thani Province, Thailand, with an additional 15% to account for missing data. Krejcie and Morgan (1970) calculated a sample size of 663 with a 5% confidence level at 99% by. The respondents returned 738, with 3% missing. The stratified sampling technique was used to collect the data.

3.2. Research tool

The questionnaire was designed based on the conceptual framework that comprised demographic data, individual information, and increase tax on cigarette policy (ITCP). ITCP was determined with a 5-point Likert Scale (strongly agree, agree, neutral, disagree, strongly disagree) to investigate smokers' perception as Appendix. The questionnaire's internal consistency reliability (Cronbach's Alpha) (Cronbach, 1951) was found to be between 0.62 and 0.70, with a total of 0.67, based on a test-retest reliability study involving 30 respondents. The ethical clearance of this study was granted by the Institutional Review Board (IRB) COA No.11 RMUTT_REC No. Full 11/63.

3.3. Data collection technique

The aim of this study was to investigate the perceptions of smokers regarding the tobacco tax increase policy and its impact on smoking reduction guidelines using a questionnaire-based approach and SWOT analysis technique. Data was collected between January and April 2021 through a self-administered survey. The questionnaire underwent reliability and validity testing, as determined by inter-observer consistency (IOC) with three academic experts in the field.

3.4. Statistical analysis

Descriptive and inferential statistics (frequency, percentage, mean, standard deviation, Exploratory factor analysis (EFA), and one-way ANOVA): These statistical techniques are commonly used in research studies to analyze data and test hypotheses. They can provide insights into the distribution of variables and help to identify significant differences across groups.

SWOT analysis: This strategic planning tool is used to identify the Strengths, Weaknesses, Opportunities, and Threats of a project or organization. It can help the study to identify key factors that may impact the success of a smoking reduction program (de Andrade et al., 2018).

TOWS matrix: This tool helps to identify strategic options based on the analysis of external opportunities and threats and internal strengths and weaknesses. It can be used to develop evidence-based recommendations for smoking reduction guidelines.

4. Results

Of the respondents 69.40% were male, 28.70%, were female, and 1.80% identified as other. Forty-three point one percent (43.10%) of respondent had a bachelor's degree, and 29.90% had earned a vocational certificate. Regarding children, 72.70% had no children, 11.2% had one child, and 10.90% had two children. For family size, 37.20% had four smoking members in the family, 24.10% had three members, and 14.10% had five smoking members in the family. Considering

employment, 31.40% were employed, 26.50% were students, and 23.80% were unemployed. Looking at length of time for smoking: 70.30% had smoked for 0–5 years, 14.70% had smoked 11–15 years, and 12.0% had smoked 6–10 years. When asked about quitting smoking, 57.10% had never quit smoking, and 35.80% had quit one or two times. Looking at income of survey participants, income was less than 150 USD (1 USD = 33.30 BAHT) 39.30%, less than 450 USD 51%. The frequency of quitting smoking was never 49.20% and once 20.00%. Amount of smokers in a family was 1–3 persons at 65.70% and others smoke around 89.80%. Cigarette brand smokers used LM 33.10% and SMS 23% while smokers have social security scheme 42.80%, pay themselves/none 21.20% and universal coverage scheme 20.30% as **Table 1**.

Table 1. Individual information results (Appendix).

Statements	**Percentage**	**Statements**	**Percentage**
Gender		**Career**	
Male	69.4	General employment	31.4
Female	28.7	Student	26.5
		Unemployed	23.8
Others	1.8	Trading/personal business	10.2
		Others	8.1
Age		**Smoking period**	
Under 20	11.2	0–5 years	70.30
20–30	60.8		
31–40	16.9	6–10 years	12.0
41–50	5.7		
51–60	4.4	11–15 years	14.70
61 up	1.0	16 up	3.0
Education		**The number of smokers around**	
Primary School	4.4	None	5.0
Vocational certificate	32.9		
Diploma	19.2	1–3	65.7
Bachelor's degree	43.1	4–6	14.1
Higher than Bachelor's degree	0.5	7 up	15.1
Children		**Cigarette brand**	
None	72.7	LM	33.1
1–2	22.1	SMS	23.0
		Camel	7.2
3–4	4.2	Krong Thip	6.5
		Marboro	16.3
5 up	1.2	Falling Rain	3.8
		Others	10.1

Table 1. (*Continued*).

Statements	Percentage	Statements	Percentage
Family members		**Type of healthcare insurance**	
1–2	11.7	Government-funded healthcare	4.5
3–4	61.3	Social security	42.8
5–6	23.2	Gold card (30-baht card for the elderly)	20.3
7 up	3.7	No benefits/pay out of pocket	32.4
Income (USD)		**Ever quit smoking**	
Less than 150	39.3	Never	57.1
151–300	30.5	Used to quit 1–2 times	35.8
301–450	20.5	3 up	7.1
451 up	9.7		
Family members smoke			
None	0.3		
1–2	11.7		
3–4	61.3		
5–6	23.2		
7 up	3.5		

EFA was used to analyze the dependent variable, the increased tax on cigarettes policy (ITCP). There are 15 statements for which smokers' opinions are requested in **Table 1**.

There are two latent factors named, smoking behavior change (SBC) and continues smoking (CS). SBC comprised 8 statements at 0.51–0.91 for factor loading whilst there are 6 statements on CS at 0.60–0.83 factor loading.

First, "Results in immediate smoking cessation" at 2.89 average has the most influence on SBC with factor loading value 0.91 followed by "make a progressive decision to stop in the future" at 3.19 average and "reduce the amount of smoking" at 2.97 with a factor loading value 0.78 respectively. Second, "Continues smoking" is the most influence on CS at a 3.12 average with a factor loading of 0.83, followed by "if the price rises, they will be able to purchase" at a 3.23 average with 0.82 for factor loading respectively.

The results exhibit a comparison of demographic (age, level of education, career, smoking period, amount of smokers around, and healthcare insurance system) and increase tax on cigarette policy (ITCP) that comprises two factors (SBC and CS). Level of education, career, smoking period, number of smokers around, and healthcare insurance system are five of the factors (which have different values for each smoker) that have significant effects on smoking behavior change (SBC) at 0.05 and 0.01. There is no significant effect of age on SBC, but it has a significant effect on continuing smoking (CS) at 0.01. In addition, as demonstrated in **Table 2**, level of education, career, and healthcare insurance are three of the factors explaining smokers' varying education between vocational certificates, diplomas, and bachelor's degrees at 0.01 on the SBC. Moreover, general employment has significantly different from unemployment, individual business, public officer, and student at 0.01 on SBC. On

the other hand, the Social Security Scheme has significant differences to state enterprise officer, universal coverage scheme, pay themselves/none, and health insurance at 0.01 while the universal coverage scheme has significantly different to pay themselves/none at 0.05 on SBC.

Table 2. Exploratory factor statistics of increase tax on cigarette policy (Appendix).

Variables and Items	Mean (S.D.)	Factor Loading	Eigenvalue	Variance explained %
ITCP_1 Results in immediate smoking cessation	2.89 (1.32)	0.91		
ITCP_2 Make a progressive decision to stop smoking in the future	3.19 (1.09)	0.78		
ITCP_3 Work harder to earn money to buy cigarettes	2.61 (1.32)	0.69		
ITCP_4 Promote the prevention and treatment of smokers and nonsmokers, as well as those who are impacted by smoking	3.16 (1.06)	0.66	9.05	% of variance = 60.34 Cumulative% = 60.34
ITCP_5 Change to cheaper brand	3.12 (1.23)	0.65		
ITCP_6 Switching to rolling oneself	2.63 (1.35)	0.61		
ITCP_7 Reduce the amount of smoking	2.97 (1.27)	0.78		
ITCP_8 Switch to e-cigarettes or foreign cigarettes with similar pricing	3.39 (1.98)	0.51		
Smoking behavior change (SBC)				
ITCP_9 Smokers are not treated fairly	3.13 (1.09)	0.80		
ITCP_10 The government's approach is not aimed at reducing smoking rates	3.20 (1.04)	0.60		
ITCP_11 Create economic and social sustainability	3.04 (1.05)	0.64	1.15	% of variance = 7.70 Cumulative% = 68.04
ITCP_12 Signals that the smoking cessation effort has failed	3.23 (1.07)	0.71		
ITCP_13 Continue smoking	3.12 (1.08)	0.83		
ITCP_14 If the price rises, they will be able to purchase	3.23 (1.05)	0.82		
Continues smoking (CS)				
KMO = 0.93, Chi-Square = 9261.30, df = 105, Sig = 0.00.				

* Increase Tax on Cigarette Policy (ITCP).

Level of education, career, and healthcare insurance system are three of the factors (which have differing values for each smoker) that have significant effects on continuing smoking (CS) at 0.05 and 0.01. Through CS independent variable determined in **Table 3**, the diploma has significantly different from the vocational certificate and bachelor's degree at 0.01. General employment has significantly different for individual business and public officers at 0.01 while other variables have significantly different at 0.05 on CS in **Table 4**. Otherwise, due to healthcare insurance factors, universal coverage schemes, social security schemes, and healthcare insurance showed significant differences at 0.01. By contrast, the pay themselves/none and universal coverage scheme variables were significantly different at 0.05 on CS.

To propose smoking reduction guidelines, SWOT analysis, and TOWS matrix were used based on individual information and SBC and CS. The finding results were the input information, and it is in turn for the making a pattern of smoking reduction guidelines finally. According to **Table 3**, smoking reduction guidelines determined four strategies (i.e., SO, WO, ST, and WT). It is a proposal to encourage the planning of the Excise Department.

Table 3. Multiple comparisons of individual information to CS by LSD technique.

Level Education (I)	**Level Education (J)**	**Mean difference (I-J)**
Diploma	Vocational certificate	0.29**
	Bachelor's degree	0.25**
Career (I)	**Career (J)**	**Mean difference (I-J)**
General Employment	Individual business	0.32**
	Public officer	0.50**
Unemployment	Public officer	0.41*
Individual business	Others (lawyers, engineers, private companies)	0.57*
Public officer	Student	0.35*
	Others (lawyers, engineers, private companies)	0.75*
Housewife/butler	Others (lawyers, engineers, private companies)	0.76*
Healthcare Insurance (I)	**Healthcare Insurance (J)**	**Mean difference (I-J)**
Universal Coverage Scheme	Pay themselves/none	0.21*
Social Security Scheme	Universal Coverage Scheme	0.26**
	Health insurance	0.35**
Pay themselves/none	Health insurance	0.31**

** $p < 0.01$, * $p < 0.05$.

Table 4. Comparison of demographic and increase tax on cigarette policy (one-way ANOVA).

Factors		**SBC**	**CS**
Age	SS	9.47	20.68
	F	1.76	4.19**
Level of Education	SS	25.50	10.61
	F	7.23**	3.18*
Career	SS	24.66	16.17
	F	4.69**	3.29**
Smoking Period	SS	9.86	2.44
	F	3.93**	1.12
Amount of smokers around	SS	4.20	1.20
	F	4.88*	1.57
Healthcare Insurance system	SS	40.01	14.86
	F	11.75**	4.56**

** $p < 0.01$, * $p < 0.05$.

5. Discussion

H1: The level of education and career had a different significance to SBC at 0.01 while they were also present in LSD.

H2: Age, level of education, and career had a different significance to CS at 0.01 while level of education, and career were presented in LSD.

H3: The smoking period, number of smokers around, and healthcare insurance

system had a different significance to SBC at 0.01 while the healthcare insurance system only was presented in LSD.

H4: The healthcare insurance system had a significant difference to CS at 0.01 and was also presented in LSD.

It appears that the increased tax on cigarettes policy was categorized into 2 views including smoking behavior change (SBC) (Ekpu et al., 2015; Farley et al., 2015; Hiscock et al., 2020; Jimenez-Ruiz et al., 2008) and continued smoking (CS) (Kengkanpanich et al., 2015; Pesko et al., 2022) while each view had correlation to age, level of education, career in demographic (Bader et al., 2011), and smoking period, number of smokers around, and healthcare insurance system in individual information (Huang et al., 2004; Kengkanpanich et al., 2015; Yang et al., 2007). Furthermore, some of the statements were identified by LSD to point out there were significant differences in SBC and CS as a result of **Tables 2–4**. It may be explained why smokers did not change their behavior when the policy was implemented. In contrast perspective, achievement point is a positive sign for SBC active, especially on ITCP_1 makes you want to quit smoking immediately (ITCP_1), make a progressive decision to stop smoking in the future (ITCP_2), and reduce the amount of smoking (ITCP_7) (Chaloupka et al., 2012; Farley et al., 2015; Levy et al., 2008; Sung et al., 2005). It is an advantage that is in accordance with previous findings. It also encourages government organizations to report that they have done the correct management. Moreover, based on H1 and H3, it was the educational level and the coverage of healthcare insurance that significantly differed on SBC. It was an interesting statement that was referred to by Bader et al. (2011) and Hiscock et al. (2020). According to the researchers, individual data affects smoker behavior change in terms of reduction in cigarette smoking. So that resulted in the successful completion of the issue.

On the other hand, due to H2 and H4, Gigliotti et al. (2014) found Brazil's increased cigarette tax policy failed since it forced smokers to turn to the black market for illegal cigarettes, particularly young and low-educated consumers who lack purchasing power. Moreover, Kengkanpanich et al. (2015) also found a slow effect on smoking cessation behavior. The government should consider the smoking behavior of Thai smokers and take into account public and private organizations with an impact. These organizations include the Excise Department, Ministry of Finance, and Ministry of Public Health. On the other hand, the tax increase may not be sufficient to influence changing the smokers because the majority of the respondents have no children and also could be in reasonable health (based on 0–5 years of smoking mostly). Moreover, the adverse effects of tobacco taxation on continues smoking (CS), as indicated by hypotheses H2 and H4, suggest that CS is influenced by factors such as the healthcare insurance system, education, and career. This implies that tax policies may not have been successful in achieving their intended outcomes, despite Arnabal's (2021) proposal of using taxation as a method to address smoking cessation issues. The findings can be suggested that the effectiveness of tax policies in reducing smoking rates may be limited.

In response, the government could consider the following strategies: First, implementing targeted interventions tailored to specific demographic groups identified in the study, such as those influenced by healthcare insurance, education, and career, to address the underlying factors contributing to persistent smoking

behavior. Second, allocating resources towards public awareness campaigns to educate the population about the health risks of smoking and the advantages of quitting, aiming to shift attitudes and behaviors towards smoking. Lastly, enhancing accessibility to smoking cessation programs and resources, including counseling and nicotine replacement therapy, to support individuals in successfully quitting smoking.

In the context of Asian countries, particularly China, it is imperative for the government to consider these findings, especially given that China ranks fourth in terms of adult tobacco smoking prevalence in Asia. The Chinese government should prioritize public awareness to prevent illness and reduce the financial burden associated with treating smoking-related illnesses. It is evident that smoking behavior changes are influenced by factors such as education level, career, smoking period, amount of smokers around, and the healthcare insurance system. These factors underscore the importance of implementing feedback mechanisms in conjunction with policies aimed at increasing tobacco taxes. Research by Chan et al. (2023) and Guo and Quan (2020) has proposed raising tobacco taxes, highlighting the relatively low cost of cigarettes in China and the need for tax increases to align with inflation and income levels.

Furthermore, studies by Lin et al. (2019) and Wen et al. (2023) have demonstrated the effectiveness of comprehensive smoke-free policies in public places in influencing smoking behavior and promoting long-term trends in smoke-free behavior. Additionally, the impact of subnational smoke-free laws in China underscores the necessity for effective tobacco control programs to address the growing number of smoking-related deaths. The relationship between amount of smokers around and smoking period with smoking behavior change necessitates careful consideration by the Chinese government in its implementation through legislative measures.

Table 5. SWOT analysis and TOWS matrix of ITCP efficiency.

Internal Factors	**S—Strength**	**W—Weakness**
External factors	1. Legislative duties and legitimate 2. Generate income for the government 3. Generate income for the government	1. Lack of market data on import cigarettes update 2. The penalties for e-cigarettes are not serious. 3. Suppression of illegal cigarettes
O-Opportunity	**SO—Strength + Opportunity**	**WO—Weakness + Opportunity**
1. Want to quit smoking immediately. 2. Reduce the amount of smoking. 3. Make a progressive decision to stop smoking in the future. 4. Promote the prevention and treatment of smokers and nonsmokers, as well as those who are impacted by smoking. 5. Level of education, career, and healthcare insurance system.	Legitimate to promote the interests and prevention of smokers and nonsmokers (SO_1) Establish the price for certain cigarette brands (SO_2)	Improve and implement the penalties seriously for e-cigarettes (WO_1) Establish a team that is responsible for searching for updates (WO_2) To promote all types of cigarettes and how serious it is for the illegal ones (WO_3)
T—Threat	**ST—Strength + Threat**	**WT—Weakness + Threat**
1. Switch to e-cigarettes or import cigarettes with similar pricing. 2. Change to a cheaper brand as Tax evasion cigarettes. 3. Smokers are not treated fairly. 4. Continuing smoking. 5. Brand loyalty.	Tax evasion cigarettes and e-cigarettes should be banned (ST_1) Establish the price for certain well-known cigarette brands (ST_2)	Increase the penalty for illegal cigarettes (WT_1) Focus on eliminating illegal cigars and add a tax to import one (WT_2)

According to the TOWS matrix, the internal factors (i.e., strengths and weaknesses of ITCP) are identified first. Then the external factors (i.e., threat and opportunity) are identified. The following four types of strategies are to be formulated based on the TOWS matrix to encourage smoking reduction guidelines as **Table 5**.

1) SO_1: The opportunity of the Excise Department (tax increase cigarette) as those smokers want to quit smoking. Support can be derived from legitimacy in promoting interests and preventing smoking among smokers and nonsmokers, based on the level of education, career, and healthcare insurance coverage.
2) SO_2: The different educational, career, and healthcare insurance systems were pointed. It would be easier to increase the tax on cigarettes in the future if all the factors that have influenced it were taken into account.
3) WO_1: Promote the prevention and treatment of smokers and nonsmokers, as well as those who are impacted by smoking.
4) WO_2: In order to reduce smoking, strict laws should be applied to eliminate illegal cigarettes and the tax increase policy should be implemented in accordance with the smokers' agreement.
5) WO_3: With the trend of smokers quitting and realizing how dangerous it is, it has become possible to adjust promotion to all types of cigarettes. By enforcing strong laws, illegal activities can be further prohibited.
6) ST1: As smokers would continue to smoke due to threats like e-cigars, illegal cigars, and imported cigars with similar pricing, the tax increasing policy could fail. Tax evasion cigarettes and e-cigarettes may be the most effective means of dealing with these threats.
7) ST2: One such threat is the threat of brand loyalty. The Excise Department may be able to tackle these threats by increasing the prices of well-known cigarette brands.
8) WT_1: Using e-cigarettes or cigar imports with similar prices as a threat, the Excise Department could impose a penalty for lawbreakers.
9) WT_2: As smokers continue to smoke, the Excise Department should establish a team responsible for updating information regarding cigar imports.

The charts above present a SWOT analysis of internal and external factors related to the cigarette industry above. The strengths include legislative duties, legitimate pricing, and generating income for the government. Weaknesses include the lack of market data on imported cigarettes, weak penalties for e-cigarettes, and suppressing illegal cigarettes. Opportunities include the desire to quit smoking, reducing smoking, promoting prevention and treatment, and education, career, and healthcare insurance systems. Threats include switching to e-cigarettes or cheaper brands, unfair treatment of smokers, and brand loyalty as Ninomiya et al. (2013) referred a study analyzed the tobacco industry's response to alternative products and identified strengths such as a business model that tied consumers to their brand, as well as weaknesses such as limited product diversification.

Research has shown that increasing taxes on tobacco products can be an effective strategy for reducing smoking rates and promoting public health (Bader, 2011; Chaloupka et al., 2019; Siahpush et al., 2014). However, it is important to consider the potential impact of tax increases on different groups, such as low-income individuals, who may be more likely to continue smoking despite the increased costs. A study

found by Hsia et al. (2011) that low-income smokers are more likely to continue smoking and less likely to quit in response to tax increases compared to higher-income smokers. Another study found that while tax increases can reduce smoking rates overall, they can also lead to an increase in illicit trade and counterfeit tobacco products, which can be more affordable for low-income individuals (Kengkanpanich et al., 2015).

In addition, providing targeted support for low-income individuals, such as subsidies for smoking cessation products or reduced-cost healthcare services, can help reduce the financial burden of quitting smoking. To mitigate this potential impact, policymakers can use the revenue generated from tobacco taxes to fund programs and initiatives aimed at promoting smoking cessation, prevention, and treatment (Moafa et al., 2021; McAfee et al., 2016). These programs can include education and awareness campaigns, access to healthcare services, and support for smoking cessation products (Cooper et al., 2018; Steinberg et al., 2019).

The strengths were mentioned, such as legislative duties, legitimate pricing, and generating income for the government, are consistent with some of the factors that have contributed to the success of the tobacco industry in the past. One article notes that the U.S. cigarette market has become increasingly concentrated over time, with established firms using coordinated pricing strategies to maintain their market share (Levy et al., 2019) while De Salvador-Guillouët et al. (2015) discusses how the tobacco industry has responded to the rise of alternative nicotine delivery systems, such as e-cigarettes, by leveraging their existing distribution networks and marketing expertise. However, the weaknesses and threats mentioned in the text highlight some of the challenges that the tobacco industry faces in today's environment. For instance, the lack of market data on imported cigarettes and weak penalties for e-cigarettes may make it difficult for regulators to effectively monitor and enforce tobacco control policies. Similarly, the rise of e-cigarettes and other alternative nicotine delivery systems may pose a threat to traditional cigarette sales, particularly among younger consumers who are more likely to experiment with new products (Frue, 2018).

In accordance with the TOWS matrix model, China is justified in adopting the strategy SO1 (Legitimacy to promote the interests and prevention of smoker and nonsmokers). This strategic choice is supported by the findings of Wen et al. (2023), who highlighted the positive impact of comprehensive smoke-free regulations in public spaces on smoking behavior and the promotion of long-term trends towards smoke-free environments. Therefore, the necessity for increasing tobacco taxes, as advocated by Chan et al. (2023) and Guo and Quan (2020), presents a significant opportunity to reduce smoking behavior among the Chinese population.

6. Conclusion and suggestion

According to empirical data from the perspective of smokers, the pattern of tax increasing policy to reduce smoking behavior was examined based on smoking behavior change and continued smoking. A SWOT analysis and TOWS matrix were used to analyze the smoking reduction guidelines. So that Asian countries' excise department can provide further support for their campaign, including the proposed strategies.

In order to decrease smoker consumption behavior through tax policies, the utilization of excise tax strategies has proven to be effective. This strategy has been enhanced by insights related to factors such as education level, career, duration of smoking, amount of smokers around, and the healthcare insurance system. Additionally, the strengths, weaknesses, opportunities, and threats (SWOT) analysis from the TOWS matrix have been identified as valuable strategies for designing campaigns based on individual criteria.

The truth about how to make the reformed tobacco tax work best for the public. The Ministry of Finance in any country should consider the principles outlined of the tobacco control convention, which has a reasonable tax structure. It will allow the government to collect more taxes and reduce the number of smokers. On the other hand, a career change is necessary for tobacco farmers in order to be helped by the government. This will cost only a fraction of the tax increase that would be collected under a scientifically sound tax structure. Nevertheless, if the Cabinet remains concerned about the impact on the tobacco industry as proposed by the Excise Department, the tax will be revised. Assure that the government will not obtain any additional tax revenue. Additionally, the society will suffer as a result of an increase in the number of smokers.

Practical and policy suggestions based on this analysis include:

1) Strengthen penalties for e-cigarettes and increase the penalty for illegal cigarettes to reduce their usage.
2) Establish and implement a team responsible for searching for updates on market data for imported cigarettes to address the lack of information.
3) Promote all types of cigarettes and educate people about the dangers of illegal ones.
4) Ban tax evasion cigarettes and e-cigarettes to reduce their usage.
5) Increase the price of well-known cigarette brands to encourage people to quit smoking.
6) Focus on eliminating illegal cigars and add a tax to imported ones.

In summary, the practical and policy suggestions presented could effectively, mitigate the adverse effects of the cigarette industry on public health, increase government revenue, and address weaknesses and threats within the industry.

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Appendix

Instructions: The questionnaire is divided into two parts as follows:

Part 1: General information about the respondent.

1) Gender: Male; Female; Others—please specify
2) Age; xxx years old
3) Highest education level: Lower than a Bachelor degree—please specify; Bachelor degree; Higher than Bachelor degree—please specify
4) Status: Single; Marriage; Divorced/Widowed/Seperated
5) Number of children
6) Number of family member including yourself
7) Career
8) Monthly income: xxx Baht
9) How long have you been smoking? xxx years.
10) Have you ever quit smoking?
11) If yes, how many times?
12) Do people around you smoke? Please specify.
13) What brand of cigarettes do you usually smoke?
14) Your healthcare coverage: Government-funded healthcare; Social security; Gold card (30-baht card for the elderly); No benefits/Pay out of pocket

Part 2: Perception of the cigarette tax policy.

Table A1. Strongly agree (5), agree (4), neutral (3), disagree (2), strongly disagree (1).

Statements	Rating scale				
	1	2	3	4	5
1) Results in immediate smoking cessation					
2) Make a progressive decision to stop smoking in the future.					
3) Encourages individuals to work harder to earn more money to buy cigarettes					
4) Smokers are not treated fairly					
5) The government's approach is not aimed at reducing smoking rates.					
6) Promote the prevention and treatment of smokers and nonsmokers, as well as those who are impacted by smoking.					
7) Create economic and social sustainability.					
8) Addresses issues directly related to public health, including the health of smokers, non-smokers, and tobacco manufacturers.					
9) Signals that the smoking cessation effort has failed.					
10) No change in smoking behavior.					
11) If the price rises, they will be able to purchase					
12) Switching to cheaper brands or buying cigarettes from neighboring countries to avoid taxes.					
13) Rolling your own cigarettes instead of buying factory-made ones.					
14) Reduce the amount of smoking					
15) Switching to e-cigarettes or foreign cigarettes with similar prices.					