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Factors affecting air quality management in Bangkok

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Abstract

The purposes of this mixed-methods research were as follows: (1) to study the factors affecting efficient air quality management in Bangkok; and (2) to suggest the efficient air quality management in Bangkok. For quantitative research, the samples were 400 people living in Bangkok selected by using Stratified Sampling. The data collection tool was a questionnaire. Factor analysis and Orthogonal Rotation method: Equamax were used for data analysis. For qualitative research, the key informants were 20 specialists obtained by purposive sampling. Data were collected using semi-structured interview guide and in-depth interview. Data were analyzed following the concept of Saldana [1].

The results of the study were: (1) factor analysis shows Bartlett's Test of Sphericity (0.000) and KMO (0.970). Twelve factors were extracted. The element of Standard Strategic Management have the highest level of Eigen values at 36.194; and (2) several methods of air quality management are available with their own strengths and weaknesses. Each method is suitable for different air pollution cycle and contextual use in different areas. It is recommended that air quality management methods be chosen depending on the main mission to protect the health and well-being of the people. All works should be integrated in all aspects and in depth. A strategic plan should be developed to cover every cycle of air pollution.

Keywords: air quality management (AQM), strategic management, organizational structure, leadership

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1. Introduction

Nowadays, the air pollution situation in Thailand is still beyond the standard defined by the World Health Organization with a particle size of no more than 10 microns (PM10) and a particle size smaller than 2.5 microns (PM2.5). In 2013, Bangkok had the second highest pollution concentration of the country. In addition, Thailand was found having the problems with ozone and volatile organic compounds (VOCs) which exceeded the standard over the past 10 years [2]. Volatile organic compounds (VOCs) or benzene in the atmosphere still remain high. All of which is a result of inadequate dust control measures from the construction, the increase in the number of vehicles and traffic jams, modification of new vehicle standards and open air burning control [3].

Air quality management in Thailand starts with complex, multi-level government agencies that hold different enforcement laws. So, the laws cannot be enforced easily. Even if the government spent a lot of money to solve this problem, the results did not justify the allotted budget. Though they established an interim committee, there was still a lack of coordination between departments. Since air quality management involves a cycle of pollution ranging from emission to accumulation in the ecosystem, it requires the enforcement of law and complex government agencies [4]. The leadership factors and organizational culture affect the organization, group, and individual. As a result, these elements should be studied to find the solutions to improve the operation of the organization to be more effective [5]. Decision-making in solving environmental problems leads to a large group of stakeholders who differ in their virtue of power, righteousness, and urgency [6].

Long-term environmental problems have become a serious problem due to improper management. This has a direct impact on the quality of life of people who suffer from toxic pollution. This becomes an urgent problem that needs to be resolved quickly.

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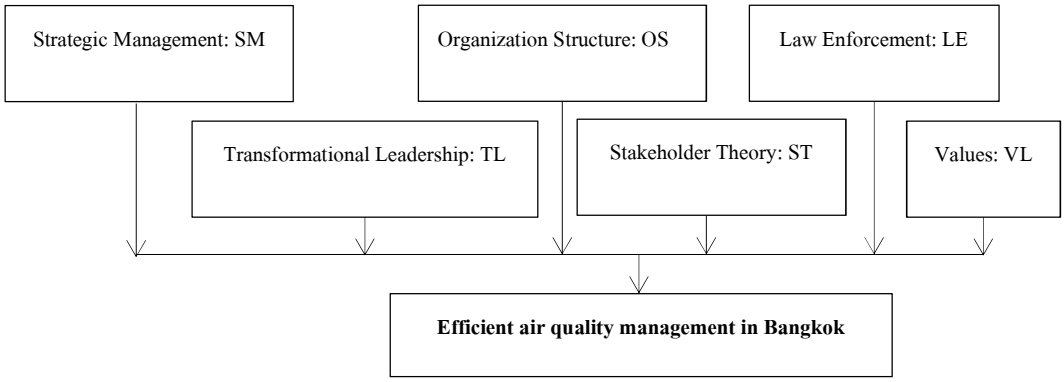

Diagram 1 Conceptual framework

Strategic management is the integration of multiple management boundaries and is analyzed, defined and applied to solve problems and create a competitive advantage [7]. Strategic management is divided into prescriptive and descriptive [8]. Bititci *et al.* [9] studied strategic management using resources as the base of the organization. In particular, it related to how the organization competed. Jasper *et al.* [10] conducted a research which confirmed that strategic management concept had a relationship with a public health organization and nursing management.

Organizational structure is a form of power, relations, and responsibility (Thompson) and it is a relation of organizational roles and abstract structures [5]. Organizational structure consists of formalization, complexity, and centralization [11, 12]. Bateman *et al.* [13] defines organizational structure as a responsibility for gathering and coordinating human resources, finance, physical environment, data and various resources needed to achieve the goal. In another sense, it is a process that defines the rules and regulations in the organization's operations. Robbins and Judge *et al.* [14] gives the meaning of the organizational structure as a way to create a division of work, grouping and coordinating**.**

Leadership refers to the process of influencing various activities of the group to reach the goal [15]. Transformational Leadership is the ability to change the vision, strategy, and culture of the organization. It also promotes the creation of new products and technologies, namely: (1) the use of shared values vision, (2) the building of relationships, and (3) the development of mutual understanding and sharing [16]. Sharma *et al.* [17] states that leadership is the skills and knowledge which are processed by the leader himself and influences the attributes of the leader. Leadership is the relationship between the chosen leader and those who choose to follow [18]. Sometimes the relationship is one-to-one. Sometimes it is one to many. It is the art of stimulating the co-workers to work with the effort.

Rokeach [19] defines values as a pathway for mode of conduct or a desirable end-state of existence. Values consist of individualism, collaborative and competitive values [20]. Balliet *et al.* [21] say that values are the way in which a person weighs the benefits of oneself and the interests of others to creates mutual dependence. In other meanings, values are the facts that individuals with different goals are motivated to collaborate in a cooperative approach [22].

Stakeholders are 'Who and What Really Counts' [23] and the ones that can impact the achievement of organizational objectives or those who are affected by the objectives and operations of the organization [24]. Operations of the organization is also regulated by the power, legitimacy, and urgency of stakeholders [6]. Carroll and Archie [25] states that the organization has 4 main responsibilities, i.e., the financial aspect to take care of the wealth of the stakeholders, the legal aspect to act legally and to oversee legal issues, the ethical aspect to create awareness that the organization is a part of the society and the decision making aspect to participate in the charitable donations to the society. Donaldson *et al.* [26] summarizes the 4 main assumptions of the stakeholder theory as follows: (1) the stakeholder theory is unarguably descriptive, (2) the stakeholder theory is also instrumental, (3) fundamental basis is normative and (4) the stakeholder theory is managerial.

Conser *et al.* [27] stated that law enforcement is the process of public intervention by the chosen parent and it is the responsibility of management department. Officials or authorized representatives will exercise the power to enforce the law in accordance with the set policy. It consists of (1) social control concept which is the social function necessary to create security and stability within society through the law enforcement which is a form of deviant behavior control in the society and (2) due process of law which is a fair process in the justice process. Trojanowicz *et al.* [28] explains that "the first police is the people" concept is based on 2 sociological theories, namely: (1) Normative Sponsorship – this theory assumes that all people are well-off and pleased to cooperate with others to help benefit the society and (2) Critical Social – this theory focuses on

why people are gathering together to modify and overcome social, economic and political barriers.

Conceptual Framework

Air quality problems in Bangkok are complicated because of the dysfunctions in bureaus and rigid bureaucracy [29]. This problem needs the clear solutions for efficient air quality management and also requires a lot of public participation. Although many economic and legal tools are utilized, there are still limitations, redundancy, gap and lack of enforcement. Therefore, the number of elements of the problem and the dynamic relationship between the problems are the key points to solve this problem. Due to the fact that the ability to make decisions is related to the level of difficulty and the degree of extension of the problem in the future [30], the researcher designed this research framework as shown in Diagram 1.

2. Research objectives

This research aims (1) to study the factors of the efficient air quality management in Bangkok and; (2) to suggest the efficient air quality management in Bangkok.

3. Materials and methods

From the literature review of the efficient air quality management in Bangkok, the research hypotheses are as follows:

Strategic Management (SM), Organizational Structure (OS), Transformational Leadership (TL), Law Enforcement (LE), Stakeholder Management (ST), and Values (VL) have an effect on the efficient air quality management in Bangkok.

This research used a mixed method, starting with quantitative research which is non-experimental research and used survey research strategy to study the factors of efficient air quality management in Bangkok.

3.1 Population and sample

The samples in this research were 400 people who live in Bangkok following the requirement of Hair *et al.* [31]. Stratified sampling technique which comprises of clustered sampling and proportion stratified random sampling was used. The cluster sampling was conducted by selecting 10 most polluted districts in Bangkok as reported by the Pollution Control Department. The proportion stratified random sampling was used to assign the number of samples in the 10 selected districts. The number of people live in each district was calculated as a percentage of the total people in the 10 selected districts and then the number of the samples in each district was obtained as a proportion of the total samples of 400.

3.2 Research tools

This research used the questionnaire which has 80 questions as a tool. The validity of the questions was tested with the experts giving the Index of Item Objective Congruence (IOC) of 0.9375. The reliability test of the entire tool with 30 try out samples had Cronbach's Alpha Coefficients of .985.

3.3 Data collection

The data were collected by survey method using a questionnaire on the factors of efficient air quality management in Bangkok. Each question uses a 5-point rating scale, 1 as strongly disagree and 5 as strongly agree.

3.4 Statistics used in data analysis

Descriptive statistics and exploratory factors analysis were used to analyze data to find the factors of efficient air quality management in Bangkok.

Regarding qualitative research, the aim of this method is to study the efficient air quality management in Bangkok using in-depth interviews with semi-structured interview guide with 20 experts who work in managerial positions in government agencies, those with academic experience in teaching or research, and experts in private organizations or non-profit organizations. Data then were analyzed based on Saldana [1] concept and were used to describe the efficient model of air quality management in Bangkok according to the Sequential Explanatory Design [32].

4. Results and discussion

4.1 Quantitative research results

The results of the analysis by descriptive statistics from 400 samples found that the majority of them were 211 females or 52.8%. The 149 respondents or 37.3% were 18-25 years old. Most of the samples or 240 respondents (60.0%) had a bachelor degree. 115 samples were employees of private firms, accounting for 28.8%. 173 respondents (43.3%) have monthly revenue of 10,001-20,000 Baht. The top three variables with highest value were Ambush (Proc 5); the average was 3.99, followed by Ethics (Leg 4 = 3.96) and Awareness (Leg 3 = 3.94) respectively.

The result of hypotheses testing by Bartlett's Test of Sphericity at 0.05 significance level gave sig. = 0.000. Therefore the main hypothesis (H0) was rejected and the hypothesis (H1) was accepted. The variance percentage of each variable and commonality was tested with KMO of 0.970 indicating that all variables are sufficiently correlated and could be used for factor analysis.

For factor extraction, the researcher used the Common Factor Analysis (CFA) to extract 12 factors with Eigen values > 1. Factors 1-12 had a total percentage of Variance of 68.591% as shown in Table 1.

For factor rotation, the researcher used the Orthogonal Rotation with sub-method, Equamax method, to test the Multivariate Normal distribution with the Goodness-of-fit Test of .000. There was a significant at the Degree of Freedom (df) level 2266, and Chi-Square 4319.586. The factors that undergo the factor rotation will have a factor loading > 0.3.

Table 1 Total variance explained

Component		Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
		Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
dimension0	1 (SSM)	36.194	45.242	45.242	36.194	45.242	45.242	9.422	11.777	11.777
	2 (COF)	3.768	4.710	49.953	3.768	4.710	49.953	8.864	11.079	22.857
	3 (PSL)	2.488	3.110	53.063	2.488	3.110	53.063	6.476	8.095	30.951
	4 (IDI)	2.063	2.578	55.641	2.063	2.578	55.641	6.094	7.617	38.568
	5 (LEA)	1.662	2.078	57.719	1.662	2.078	57.719	4.025	5.032	43.600
	6 (ETW)	1.562	1.953	59.671	1.562	1.953	59.671	3.989	4.986	48.587
	7 (CIN)	1.376	1.721	61.392	1.376	1.721	61.392	3.763	4.704	53.291
	8 (URL)	1.288	1.609	63.001	1.288	1.609	63.001	3.609	4.512	57.802
	9 (DCT)	1.268	1.585	64.586	1.268	1.585	64.586	3.147	3.933	61.736
	10 (IMI)	1.152	1.441	66.027	1.152	1.441	66.027	2.067	2.584	64.320
	11 (INS)	1.046	1.308	67.335	1.046	1.308	67.335	1.817	2.271	66.591
	12 (SLE)	1.005	1.257	68.591	1.005	1.257	68.591	1.600	2.000	68.591

Extraction Method: Principal Component Analysis.

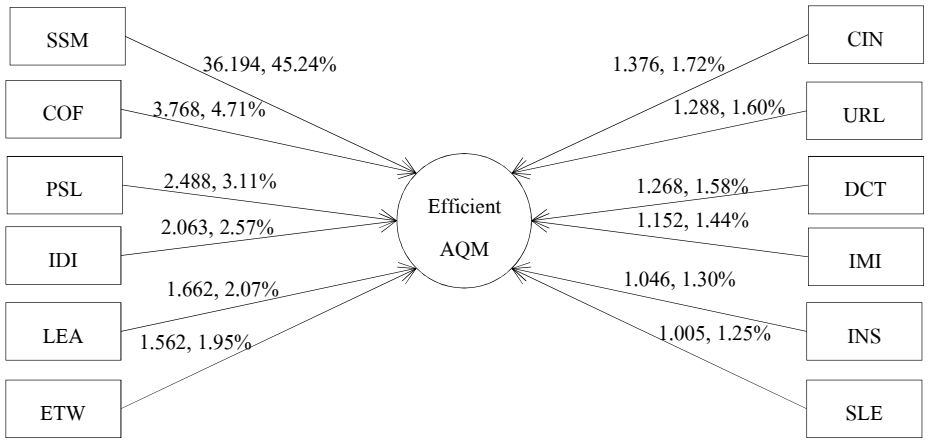

Diagram 2 Results of exploratory factor analysis

Regarding the reorganization of all factors, the researcher reorganized the analyzed results of the Exploratory Factor Analysis and created an efficient air quality management in Bangkok. Standard-strategic management: SSM had the highest Eigen values of 36.194; the percentage of Variance was 45.24%. The next below are Complexity-Formalization (COF) (3.768, 4.71%); Power of Stakeholder-Litigation (PSL) (2.488, 3.11%); Idealized Influence (IDI) (2.063, 2.57%); Legal Action (LEA) (1.662, 2.07%); Ethics in the Workplace (ETW) (1.562, 1.95%); Common Interest (CIN) (1.376, 1.72%); Urgency-Legitimacy (URL) (1.288, 1.60%); Decentralization (DCT) (1.268, 1.58%); Inspirational Motivation-Individual Consideration (IMI) (1.152, 1.44%); Intellectual Stimulation (INS) (1.046, 1.30%); and Scope of Authority Legal-Evidence (SLE) (1.005, 1.25%) as shown in Diagram 2.

4.2 Qualitative research results (in-depth interviews)

The results of quantitative research could be classified into 3 levels [I]: (1) Coding Level Work – Data from in-depth interview were coded, (2) Conceptual Level Work – Conceptual diagram was created and (3) Textual Level Work – Data were separated into text segments which were grouped, compared, interpreted, analyzed line by line in order to create a preliminary concept.

The results of qualitative Research confirmed that factors affecting efficient air quality management in Bangkok are consisted of 12 factors as found from the quantitative research i.e., SSM, COF, PSL, IDI, LEA, ETW, CIN, URL, DCT, IMI, INS and SLE. However, factors that have major effect on the AQM are SSM, COF, PSL, LEA, DCT and SLE. Consequently, the rest of the factors which are IDI, ETW, CIN, URL, IMI and INS have less effect on the AQM.

Table 2 Qualitative research results

Components	Important Issues Affecting Efficient AQM
Standard-Strategic Management (SSM)	- Standardization is the major key in AQM. Air Quality Indicator should be applied throughout the air pollution cycle. However, the central and local governments only concentrate on the source of pollution emission. - Political view is the assignment of authority for AQM to have a main responsible person in order to reduce a conflict of interest and maintain the balance of power. - AQM is a public service which aims for the protection and promotion of public health. Therefore, the bottom-up approach should be implemented to create trust among stakeholders.
Complexity-Formalization (COF)	- Decision making process for AQM should be a proactive approach. However, this must be under the scope of authority and legal evidence so that the law can be enforced. - Organization Performance depends on the equipment and performance of the expertise who should contribute to the specialization in AQM.
Power of Stakeholder-Litigation (PSL)	- Stakeholder in this case is the officials who make the decision to use the power for litigation. The officials could also consider legitimacy in order to promote compromise.
Idealized Influence (IDI)	- Trust creates the feeling of participation in the work place. - We should provide opportunities for workers to make decision in the action plan. As a result, several organizations responsible for AQM could bring the plan into operation more efficiently.
Legal Action (LEA)	- Legality empowers government agencies to be responsible for AQM. - Enforcement of measures in AQM is to protect and safeguard people from air pollutions.
Ethics in the Workplace (ETW)	- Probity and responsibility of authority assigned would result in proactive AQM.
Common Interest (CIN)	- Awareness of common interest affects participation which has indirect effects on cooperation of state department, private sector and the people. - Raising awareness would promote consciousness.
Urgency-Legitimacy (URL)	- Dependent stakeholders and demanding stakeholders are fair participants because of the urgency in air quality problem. - Significances and severity of the problem would affect the action plan set by the authority of the state.
Decentralization (DCT)	- Decentralization has direct effect on the budget because the budget has to be distributed to the local area. - Centralization would make decision process of state agencies respond to urgent problems better.
Inspirational Motivation-Individual Consideration (IMI)	- Good model of the organization leader and learning will result in experiencing a lesson and coordination of various organizations.
Intellectual Stimulation (INS)	- Understanding is the most important habit of the leaders. - Reasoning flexibility and adaptation influence the adjustment of the rules which will affect the action plan.
Scope of Authority Legal-Evidence (SLE)	- Evidence collected is the most important. Evidences are also standard in performance and an indicator of air quality. - Judicial administration is the collection and proof of evidence which will lead to prosecution and arrest.

4.3 Emerging Factors

Moreover, the results of qualitative research revealed 4 more important factors as follows: (1) Code of Law – there should be and integration of laws which are being enforced by the central and local government, (2) Political View – the balance of power between various organizations and departments which are responsible for AQM should be compromised to reduce the conflict of interest, (3) Parallel Installation – the re-structuring of organizations should be done in parallel with law enforcement, privatization and (4) Bottom-up Approach – the management should focus on bottom-up approach to create trust from the people in the organization by using top-down approach as a framework for the mission to be completed.

The results of qualitative data analysis using theoretical classification and theoretical sampling describe the 12 components of quantitative research [33] which promote efficient AQM as shown in Table 2.

4.4 Discussion

Strategic Management is based on the strategic management theory framework of Mintzberg's *et al.* which can be separated into two groups: (1) Prescriptive strategic management and (2) Descriptive strategic management [8]. The government agencies focus on a top-down approach in managing air quality, set their strategies, and command & control. However, policies or measures issued by government agencies still need participation and networking or bottom-up approach. This also confirms the study of Furrer *et al.* which found that partners (36.6%) were the third most influential factor in strategic management [34].

SSM is a strategic management with standardized variables in the work involved since standard in the workplace is a starting point and a preamble of air quality management. This leads to planning, preparation of action plan, result control as well as the issuance of command and control measures. Standard in the workplace can also help improve compatibility, collaboration, security, and replication, or qualitative processes. In addition, a work standard can create pre-defined workflows to be more similar (Commoditization) [35].

Standard of work in Thai government agencies has many drawbacks, agreed upon by Bangkokians, which resulting in air quality management problem. The result also complies with the research of Li *et al.* [36] and Davis [37], which found that work standards affect outcome control, costs and revenues. This ultimately affects the work performance at the end because the most influential factor in strategic management is the ability of the organization (61.0%), followed by performance (46.3%) [34].

1) Organizational Structure, according to Weber [38] Mintzberg [11, 12], is divided into COF and DCT. Elsaid *et al.* [39] who investigated the problem of the Ministry of Environmental Affairs of Egypt found that the main problems of their organizations were unequal workload, unclear communication, lack of teamwork, and delayed decisions. The majority of organizational structure problems in air quality management are caused by inequality in power of each department. This coincides with the research of Mattes which stated that organizational performance depends on the balancing of formality and informality that cause an organization to have flexibilisation enough to adapt to a changing environment. Furthermore, decentralization is the link between national policies and proper application [40]. According to the Gulia *et al.* [41], they stated that the air quality management system is designed to be used in a monitoring network which each agency has to share air quality data with other agencies.

2) Law Enforcement is divided into PSL, LEA, and SLE. It can be seen that the order of element has changed by allowing PSL elements to influence other elements. This is because law enforcement and the law are not systematic and adverse selection [42], may lead to a due process of law because law enforcement cannot improve air quality. This needs more social control to refine social deviance [27]. The enforcement of air quality law requires a balance between the theory of legal process and the theory of social control.

3) Transformational Leadership is based on Bass's conceptual framework [16]. It is divided into IDI, IMI, and INS because when a system or organizational structure cannot make the organization more effective, transformational leadership is a key mechanism for organizational change. Leaders with Transformational Leadership will balance the short-term results of an organization with its long-term goals. In the long term, these leaders will be able to build a sustainable organization [43]. Moreover, transformational leadership is best suited for team building [44]. It can change the organizational culture, especially, extremely formal organization like government agencies [45].

4) Stakeholder Theory is based on the Mitchell *et al.* [6]. It is divided into PSL and URL. In line with the Parent and Deephouse [46] research, executives often perform using their power, followed by urgency and righteousness, respectively. In addition, executives can exercise their power when there is an urgent need because management position is confronted with all groups of stakeholders, both inside and outside. It makes executives need to manage air quality in one way or another to solve the problem and reach most of the stakeholders [47].

5) The value is based on the Rokeach model [19]. Value can be divided into ETW and CIN. ETC is known as practical values and destination values. Though both values have different functions, they have a relationship. Practical values define the way of life that one should practice or proceed with ethic as a center point. On the other hand, CIN is a destination value which determines the destination of life. There are two centers which are in the individual and the society. However, the values are determined by the decision-making elements according to the events

occurred and provide results that are in line with their work and social norms [48].

5. Conclusions

Based on the discussion of research findings, it is evident that strategic management (SM), organizational structure (OS), and law enforcement (LE) are the main factors in air quality management in Bangkok. There are supplementary factors such as transformational leadership (TL), stakeholder theory (ST) and values (VL) which are the driving force of dynamic air quality management and also result in more efficient air quality management.

From the in-depth interviews, it is found that Bangkok is still using the Urban Air Quality Management System of Steinar et al. which was a theme of the World Bank since 1997 [4]. The system is used for controlling emissions that focuses on cost and return. Thus, the strategy to reduce emission from the source may be based on cost-effectiveness analysis, which represents the least cost to achieve the stated air quality targets. While the Urban Air Quality Management System: UAQM of Sivertsen focuses on the dispersion of pollution [49]. It is suitable for the preparation of risk management plans. Air quality management in local areas in many countries uses different plans. For example, in the United States, they used Non-attainment Areas (Naas) plan but it was found unsuccessful because pollution levels still exceeded the threshold. This prompted the local administration to develop new regulations and approach which were finally developed into the State Implementation Plan (SIP) to reduce pollution level to meet the defined standards (Green and Cummins). In Europe, they used the AQMA plan by empowering each local authority and providing support by the environmental institute. This plan was reviewed in 2000, 2003 and 2009, respectively, to make the plan more effective [50]. The European region used Driving Force-Pressure-State-Impact-Response (DPSIR) plan from the European Environmental Agency [51]. This was more flexible to investigate the environmental indicators according to the framework and helped understand the complexity, linkage, and response between causes and their impact on the environment [52].

However, research by Kura *et al.* found that sustainable management models of air quality should include (1) identification of major pollutants and sources, (2) establishment of surveillance network to monitor the air quality, (3) Preparation of a pollution emission database, (4) Prioritization of pollution sources, (5) Control strategies and (6) Development of Decision support systems [53].

Air quality management has many forms. Each form has different strengths and weaknesses. It is suitable for each stage in pollution cycle differently and suitable for contextual use in each area differently. It is recommended that air quality management methods should be chosen considering the final outcome which aims to promote the health and well-being of the people living in those areas. In conclusion, the researcher would like to suggest that if the primary mission of agencies involved in air quality management is to protect health and life of people, it should be integrated in all aspects and in depth. A strategic plan should be developed to cover every step of air pollution cycle. The reformation of organization must be gradually proceeded and must be done in parallel with both organizational structure changes and legislative amendments. It is necessary to involve participation from all sectors in order to succeed in air quality management and transform organization structure into a professional one which depends on academic institutions that support academic data, as well as the issuance of any measures to manage air quality. Waste reduction should also be promoted. Some waste materials can be recycled and used to reduce pollutant emission [54]. Moreover, public relations should be practiced to make people know and aware of their duties and responsibilities as citizens. This helps people to change their behavior and learn how they could help support the government agencies in various areas. Finally, budgeting is also important because air quality management needs highly specialized technology and skilled personnel. Therefore, collaboration with educational institutions is the best alternative to reduce expenditure.

6. Suggestions

6.1 Comprehensive understanding of pollution sources is the first step to the development of the strategy to control emission of pollutions. So, accurate collection of pollution sources data is a part of air quality management. Understanding the source of pollution in the first place makes it better understand the goals and policies of air quality management in order to understand the stakeholders at all levels and review of the past goals as well.

6.2 The ultimate goal of urban air quality management planning is to make sure that air pollution does not affect the public health or remains in the lowest acceptable criteria.

6.3 The air quality management strategy must be consistent with the air quality supervision which is acceptable and adequate for people in Bangkok to travel in the city by applying different control measures such as the stringent emission standards, fuel quality improvement, the use of effective engine technology, vehicle inspection and maintenance, vehicle and traffic management, and the effective control of road and public transportation system.

6.4 Strategic planning for air quality management is based on the changing of concentrations of pollutants such as regulation that relies on investigation of pollutants as a criterion. Therefore, the use of the method needs to take into account the suitability of the Bangkok context. It should be improved and revised to fit the situation.

6.5 Air quality management is stringent of air quality standards, including pollutant indication criteria. This brings about the need for real-time information for supervising, surveillance networks and public participation.

6.6 People's participation including responses to complaints from people and stakeholders must be set as a target for air quality management in Bangkok. Promoting public participation, therefore, need to rely on public relations and effective public dissemination of air quality information, publicizing through mobile phones, billboards on the streets and distributing the information through the mass media.

References

[1] Saldaña J. **The Coding Manual for Qualitative Researchers**. (2nd ed.). Thousand Oaks, CA: Sage; 2009.

[2] Pollution Control Department, Ministry of Natural Resources and Environment. **Summary of Thailand's Pollution Situation 2013**; 2014. Available from http://infofile.pcd.go.th/mgt/report2556.pdf?CFID=932666&CFTOKEN=20557683

[3] Thaipublica. **Pollution Control Department summarizes the situation "Air-Water-Waste" year '12 What is the symptom of each area! Monitoring the situation**; 2013. Available from http://thaipublica.org/2013/01/the-pollution-situation-2012/

[4] Steinar L, Grønskei KE, Hannegraaf MC, Jansen H, Kuik OJ, Oosterhuis FH, Olsthoorn XA, Jitendra JS, Tanvi N, Carter JB. **Urban air quality management strategy in Asia guidebook**. The World Bank Press; 1997.

[5] Robbins SP, Judge TA. **Organizational Behavior**. (15th ed.). Upper Saddle, NJ: Pearson Prentice Hall; 2013.

[6] Mitchell RK, Agle BR, Wood DJ. Toward a theory of stakeholder identification and salience: Defining the principle of who and what really counts. **The Academy of Management Review**. 1997; **22 (4)**: 853-886.

[7] Rothaermel FT. **Strategic management**. (1st ed.). McGraw-Hill/Irwin; 2013.

[8] Mintzberg H, Ahlstrand B, Lampel J. **Strategy safari: The complete guide through the wilds of strategic management**. (2nd ed.). Harlow: FT/Prentice Hall; 2009.

[9] Bititci U, Ackermann F, Ates A. *et al.* Managerial processes: An operations management perspective towards dynamic capabilities. **Production Planning & Control**. 2011; **22 (2)**: 157-173.

[10] Jasper M, Crossan F. What is strategic management? **Journal of Nursing Management**. 2012; **20 (7)**: 838-846.

[11] Mintzberg H. **The structuring of organizations: A synthesis of the research**. Englewood Cliffs, N.J.: Prentice Hall; 1979.

[12] Mintzberg H. **Structure in fives: Designing effective organizations**. Englewood Cliffs, New Jersey: Prentice-Hall; 1993.

[13] Bateman TS, Snell SA. **Management: Competing in the New Era. Boston**: McGraw-Hill Irwin; 2002.

[14] Robbins SP, Judge TA. **Organizational behavior**. (15th ed.). Upper Saddle, NJ: Pearson Prentice Hall; 2013.

[15] Stogdill RM. **Handbook of leadership: A survey of theory and research**. New York: Free Press; 1974.

[16] Bass BM. **Leadership and performance beyond expectations**. New York, N.Y.: Free Press; 1985.

[17] Sharma MK, Jain S. Leadership management: Principles, models and theories. **Global Journal of Management and Business Studies**. 2013; **3 (3)**: 309-318.

[18] Kouzes JM, Posner BZ. **Five practices of exemplary leadership**. San Francisco: Jossey-Bass; 2003.

[19] Rokeach, M. **Beliefs, attitudes, and values: A theory of organization and change**. San Francisco: Jossey-Bass; 1968.

[20] Deutsch M. The effects of motivational orientation upon trust and suspicion. **Human Relations**. 1960; **13 (2)**: 123-139.

[21] Balliet D, Parks C, Joireman J. Social value orientation and cooperation in social dilemmas: A meta-analysis. **Group Processes & Intergroup Relations**. 2009; **12 (4)**: 533-547.

[22] Bogaert S, Boone C, Declerck C. Social value orientation and cooperation in social dilemmas: A review and conceptual model. **British Journal of Social Psychology**. 2008; **47 (3)**: 453-480.

[23] Freeman ER. The politics of stakeholder theory. **Business Ethics Quarterly**, 1994; **4 (4)**: 409-421.

[24] Freeman ER, Reed DL. Stockholders and stakeholders: A new perspective on corporate governance. **California Management Review**, 1983; **25 (3)**: 88-106.

[25] Carroll AB. **Business and society: Ethics and stakeholder management**. (2nd ed.). Cincinnati, O.H.: South-West Publishing; 1993.

[26] Donaldson T, Preston LE. The stakeholder theory of the corporation: Concepts, evidence, and implications. **The Academy of Management Review.** 1995; **20 (1)**: 65-91.

[27] Conser JA, Paynich R, Gingerich TE. **Law Enforcement in the United States**. (3rd ed.). Wall Street Burlington, M.A.: Jones & Bartlett Learning; 2013.

[28] Trojanowicz RC., Bucqueroux B. **Community policing: How to get started**. Cincinnati: Anderson Publishing Co.; 1994.

[29] Lane JE. **Public administration & public management: The principal-agent perspective**. New York: Routledge; 2005.

[30] Graf HG. **Prognosen und szenarien in der wirtschaftspraxis**. Munchen: Carl Hanser Verlag; 1999.

[31] Hair Jr. JF, Anderson RE, Tatham RL, Black WC. **Multivariate data analysis: with readings**. (4th ed.). Upper Saddle River, NJ: Prentice Hall; 1995.

[32] Creswell JW. **Research design: Qualitative, quantitative, and mixed methods approaches**. (4th ed.). Thousand Oaks, CA: Sage; 2014.

[33] Corbin J, Strauss A. **Basics of qualitative research: Techniques and procedures for developing grounded theory**. (4th ed.). Thousand Oaks, CA: Sage; 2015.

[34] Furrer O, Thomas H, Goussevskaia A. The structure and evolution of the strategic management field: A content analysis of 26 years of strategic management research. **International Journal of Management Reviews.** 2008; **10 (1)**: 1-23.

[35] Blind K. **The economics of standards: theory, evidence, policy.** Cheltenham: Edward Elgar; 2004.

[36] Li C, Mukherjee A, Su Q, Xie M. Optimal design of a distribution-free quality control scheme for cost-efficient monitoring of unknown location. **International Journal of Production Research**. 2016; **54 (24)**: 7259-7273.

[37] Davis PT. **Process standardization is key.** COBIT Focus, (January 25, 2016), Business Source Complete, EBSCOhost; 2016.

[38] Weber M. **The theory of social and economic organization**. Translated by A.M. Henderson and Talcott Parsons. London: Collier Macmillan Publishers; 1947.

[39] Elsaid NM, Okasha AE, Abdelghaly AA. Defining and solving the organizational structure problems to improve the performance of Ministry of State for Environmental Affairs–Egypt. **International Journal of Scientific and Research Publications**. 2013; **3 (10)**: 273-283.

[40] Vezbergaite L. Decentralisation policies, subnational autonomy and federal executive power: A comparison of Brazil and Mexico. **Croatian & Comparative Public Administration**. 2016; **16 (1)**: 55-76.

[41] Gulia S, Nagendra SMS, Khare M, Khanna I. Urban air quality management: A review. **Atmospheric Pollution Research**. 2015; **6 (2)**: 286-304.

[42] Hung NT. **Urban air quality modelling and management in Hanoil, Vietnam**. [dissertation]. National Environmental Research Institute, Aarhus University; 2010.

[43] Kotter JP. **Leading change**. Boston: Harvard Business Press; 1996.

[44] Carter MZ, Armenakis AA, Feild HS, Mossholder KW. Transformational leadership, relationship quality, and employee performance during continuous incremental organizational change. **Journal of Organizational Behavior.** 2012; **34 (7)**: 942-958.

[45] Jati MKK, Hassan S, Harman MH, Abdul Jabar S, Abdul Majid MA. **Transformational leadership and organizational culture: A case of MAHB**. International Accounting and Business Conference 2015, IABC 2015, Procedia Economics and Finance. 2015; **31**: 425-435.

[46] Parent MM, Deephouse DL. A case study of stakeholder identification and prioritization by managers. **Journal of Business Ethics.** 2007; **75 (1)**: 1-23.

[47] Mousiolis DT, Zaridis AD. Entrepreneurship and SME's Organizational Structure. Elements of a Successful Business.Procedia in 2nd International Conference on Strategic Innovative Marketing. **Social and Behavioral Sciences.** 2014; **148 (25)**: 463-467.

[48] Messick DM, McClintock CG. Motivational bases of choice in experimental games. **Journal of Experimental Social Psychology.** 1968; **4 (1)**: 1-25.

[49] Sivertsen B. **How the Scandinavian Air Pollution Research Institutes can improve air quality in growing urban spheres in the developing countries**. Proceeding Presented at Danish Development Research Network Workshop on Urban Environmental Management and Air Quality in Less Developed Countries Copenhagen, 30 November 2007; 2007.

[50] Longhurst JWS, Lindley SJ, Watson AFR, Conlan DE. The introduction of local air quality management in the United Kingdom: A review and theoretical framework. **Atmospheric Environment**. 1996; **30 (23)**: 3975-3985.

[51] European Environment Agency. **Criteria for EUROAIRNET the EEA air quality monitoring and information network**. Technical Report No. 12. Copenhagen: EEA; 1999.

[52] Bach H. **Methodology and process for indicator development**. Vietnam: DEA; 2005.

[53] Kura B, Verma S, Ajdari E, Iyer A. Growing Public Health concerns from Poor Urban Air Quality: Strategies for Sustainable Urban Living. **Computational Water, Energy, and Environmental Engineering**. 2013; **2**: 1-9.

[54] Usahanunth N, Pochanart P. CO_2-emission assessment of the concrete added crushed PET bottles waste. **Journal of Thai Interdisciplinary Research.** 2017; **12**: 9-15.