INTERNATIONAL JOURNAL OF eBUSINESS AND eGOVERNMENT STUDIES
Vol: 15 **No:** 2 **Year:** 2023 **ISSN:** 2146-0744 (Online) (**pp.** 133-148) **Doi:** 10.34109/ijebeg.2023150207
Received: 19.06.2023| **Accepted:** 17.10.2023 | **Published Online:** 18.11.2023

-RESEARCH ARTICLE-

EFFECTIVE APPROACHES TO REDUCING AIR POLLUTION IN THE INDUSTRIAL SECTOR

Sunvaris Uywattana*

Faculty of Business Administration,
King Mongkut's University of Technology North Bangkok
Email: sunuyw@gmail.com

Sakrapee Worawattanaparinya

Associate Professor Dr., Faculty of Business Administration,
King Mongkut's University of Technology North Bangkok
Email: sakrapee.w@fba.kmutnb.ac.th

Thanin Silpjaru

Professor Dr., Faculty of Business Administration,
King Mongkut's University of Technology North Bangkok
Email: thanin.s@fba.kmutnb.ac.th

─Abstract─

The present study examined various strategies that prove effective in mitigating air pollution within the industrial sector. The results of the study suggest that the establishment of alliances is the primary strategy, followed by the management of knowledge, monitoring and evaluation, participation, and the selection of appropriate technologies. The study additionally revealed that there is no statistically significant disparity in the level of importance attributed to various approaches between small and medium-sized enterprises (SMEs) and large enterprises. Industrial businesses should integrate effective knowledge management systems, establish strategic alliances, embrace environmentally friendly technologies, and closely monitor initiatives aimed at reducing air pollution. Policymakers ought to formulate inclusive policies aimed at reducing air pollution, allocate resources towards research initiatives, and promote collaboration among regions.

Keywords: Air Pollution, Building Alliances, Knowledge Management, Monitoring and Evaluation, Participation, Structural Equation Model, Technology Selection.

Citation (APA): Uywattana, S., Worawattanaparinya, S., Silpjaru, T. (2023). Effective Approaches to Reducing Air Pollution in the Industrial Sector. *International Journal of eBusiness and eGovernment Studies, 15*(2), 133-148. doi: 10.34109/ijebeg.2023150207

Vol: 15 **No:** 2 **Year:** 2023 **ISSN:** 2146-0744 (Online) (**pp.** 133-148) **Doi:** 10.34109/ijebeg.2023150207

INTRODUCTION

Air pollution is a widespread issue that impacts individuals across various age groups and socioeconomic statuses. The World Health Organisation (WHO) states that air pollution is a significant issue in low- and middle-income countries, affecting 98% of the global population residing in areas with substandard air quality. The causes of this phenomenon can be attributed to several factors, such as the swift process of urbanisation, industrialization, and reliance on obsolete technologies. According to recent data from the World Health Organisation (WHO), air pollution is accountable for over 7 million premature deaths annually. It ranks as the fourth most significant cause of mortality globally, following smoking, alcohol consumption, and high blood pressure. Children are highly susceptible to the impacts of air pollution. Air pollution increases the susceptibility of their developing lungs to harmful pollutants. Air pollution is responsible for an estimated annual death toll of 600,000 children under the age of 5.

The 2020 report by the World Health Organisation (WHO) indicates that approximately 4.2 million individuals globally succumb to air pollution annually. These deaths outnumber accidental fatalities by a factor of three, with 88 percent of them concentrated in low- and middle-income nations, particularly in Asia and the Western Pacific regions. In 2019, a significant majority (90%) of the global population resided in regions characterised by inadequate air quality, surpassing the air pollution thresholds set forth by the World Health Organisation.

The air pollution crisis in India has significant implications for human health. One of the most polluted cities globally, New Delhi, the capital of India, regularly surpasses safe thresholds for air quality levels. Researchers have observed an increased prevalence of respiratory illnesses, such as asthma and bronchitis, among the population of the city.

The primary governmental body responsible for pollution control in Thailand is the Pollution Control Department of the Ministry of Natural Resources and Environment. The department employs air quality monitoring stations to measure pollutants and evaluate air pollution levels through the Air Quality Index (AQI). The AQI takes into account six types of air pollutants, which include dust particles smaller than 2.5 microns (PM2.5), dust particles smaller than 10 microns (PM10), ozone (O3), nitrogen dioxide (NO2), carbon monoxide (CO), and sulphur dioxide (SO2), all of which contribute to air pollution.

Typically, an Air Quality Index (AQI) reading above 100 indicates that air pollution has exceeded the standard level, indicating a relatively high or very high concentration of pollutants. Thailand has consistently exceeded air pollution standards from 2017 to 2022, as depicted in figures 1 and 2.

Vol: 15 **No:** 2 **Year:** 2023 **ISSN:** 2146-0744 (Online) (**pp.** 133-148) **Doi:** 10.34109/ijebeg.2023150207

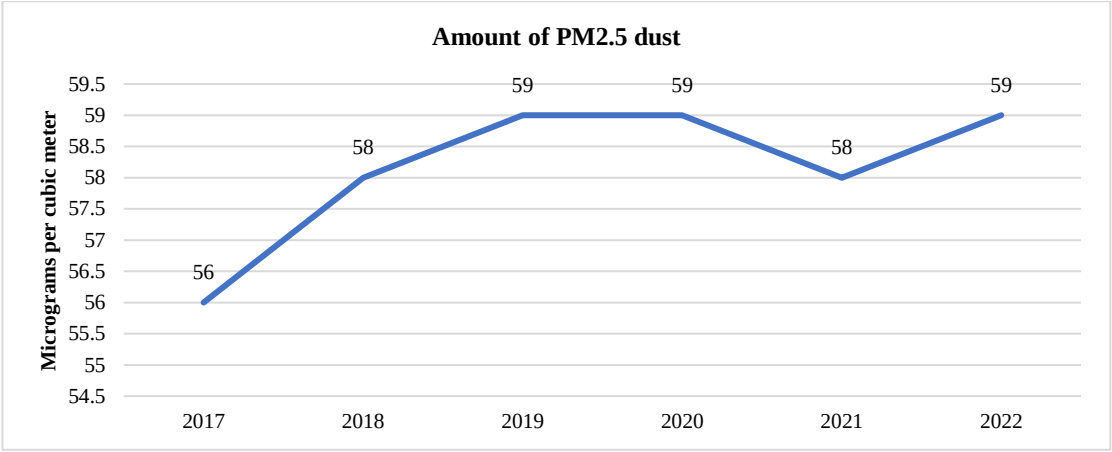

Figure 1. Amount of PM 2.5 dust (Pollution Control Department, 2022)

According to Figure 1, the standard level of PM 2.5 dust in Thailand is 50. However, from 2017 to 2022, the recorded values consistently exceeded this standard, with values of 56, 58, 59, 59, 58, and 59, respectively. The elevated levels of PM2.5 dust and the slightly above-standard 1-hour average ozone gas concentration have adverse effects on public health. The issue of PM2.5 exceeding the standard annually in Thailand is a significant concern due to its potential impact on the health of individuals in the region. Particularly vulnerable groups, including children, pregnant women, the elderly, and individuals with respiratory diseases such as asthma, are at higher risk. The HDC database of the Ministry of Public Health in 2022 identified that approximately 38.92% of individuals residing in air pollution-risk areas were at risk of health issues related to PM2.5. This corresponds to approximately 15 million individuals out of a total population of 38,909,204.

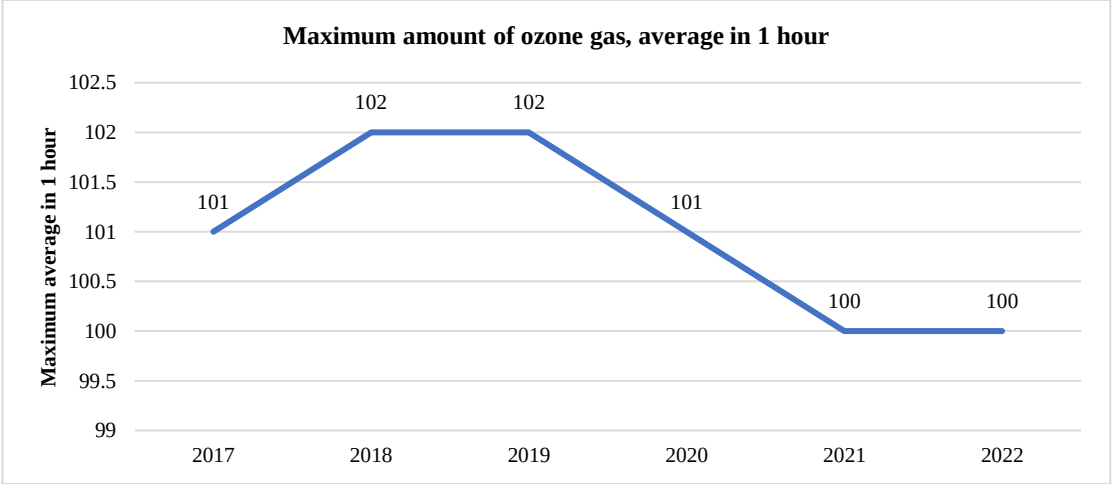

Figure 2. The Highest Average Ozone Gas Volume in 1-Hour (Pollution Control Department, 2022)

Vol: 15 **No:** 2 **Year:** 2023 **ISSN:** 2146-0744 (Online) (**pp.** 133-148) **Doi:** 10.34109/ijebeg.2023150207

Figure 2 indicates that Thailand exhibits the highest average 1-hour ozone gas concentration. The standard value from 2017 to 2022 is consistently around or slightly above 100, with values of 101, 102, 102, 101, 100, and 100, respectively. Based on the aforementioned origin and significance, The researcher aimed to investigate effective air pollution reduction management methods in the industrial business sector to assist the industry in efficiently managing air quality improvement.

RESEARCH OBJECTIVE

1. To study the structure and operating characteristics of industrial businesses.
2. To study the elements of effective air pollution reduction management approaches in the industrial business sector.
3. To develop a structural equation model for effective air pollution reduction management in the industrial business sector.

LITERATURE REVIEW

1. Participation

The process of participation, as defined by the Thammasat University Master of Public Administration Foundation (B.E. 2551), allows citizens or stakeholders to voice their opinions, share information and perspectives, and collaboratively determine suitable and mutually agreeable solutions and decisions for the project at hand. This encompasses activities ranging from project initiation to result monitoring and evaluation, with the aim of acquiring comprehension and consciousness and collectively adapting the project for the mutual benefit of all stakeholders.

Piradee (2011) categorised the levels of public participation. 1) Information dissemination level; 2) Public opinion receptiveness level. 3) The factors to consider in assessing community engagement are the extent of consultation; 4) the level of joint planning; 5) the degree of participatory action; 6) the level of involvement in monitoring, inspecting, and evaluating; and 7) the level of control by the community. The participatory process is ongoing and involves multiple phases, including information sharing, consultations, understanding, decision-making using various tools, and engaging diverse stakeholders.

However, it is crucial to engage in planning and designing participatory processes prior to their initiation. Participation, as defined by the Office of Natural Resources and Environmental Policy and Planning (B.E. 2549), refers to the engagement of citizens and stakeholders in expressing their perspectives, sharing information and opinions, and striving for mutually agreeable decision-making in projects. The Master of Public Administration Foundation at Thammasat University (B.E. 2551) provides guidelines for effectively organising a public participation process. These principles include: 1) commencing the process early; 2) initiating public participation from the beginning; 3) engaging all relevant stakeholders; 4) demonstrating sincerity; and 5) selecting suitable methods.

Vol: 15 **No:** 2 **Year:** 2023 **ISSN:** 2146-0744 (Online) (**pp.** 133-148) **Doi:** 10.34109/ijebeg.2023150207

The involvement of the public or stakeholders in air pollution management from industrial operations within the industrial business sector should be prioritised, with a particular emphasis on ensuring transparency. Provide the public with a platform for expressing their viewpoints.

2. Knowledge Management

According to Turban et al. (2004), knowledge refers to information that possesses significance, pertinence, and the potential for practical application. Nonaka and Takeuchi (1995) define knowledge management as the systematic utilisation of previous knowledge and experience to generate new knowledge, foster innovation, and ultimately gain a competitive edge. The knowledge management process comprises three stages: 1) Knowledge Identification; 2) Knowledge Acquisition; and 3) Knowledge Development and Creation Integration. Harrison and Leitch (2000) outlined five principles pertaining to organisational learning. 1) The organization communicates vision, policy, and strategy organization-wide to human resources to foster strategic thinking at all levels. 2) Reliable, open, and clear strategies derived from the organisation's vision facilitate the exploration of additional strategic options. 3) Engaging in discussions or communication regarding the organisation's vision or goals plays a crucial role in fostering organisational learning. 4) Employees must consistently enforce a comprehensive assessment of overlooked tasks and responsibilities. 5) Emphasising the creation of a supportive environment for learning and innovation is crucial.

On the other hand, Nonaka and Takeuchi (1995) proposed that knowledge-intensive strategies prioritise the acquisition and transformation of knowledge by leveraging the interplay between explicit knowledge (general knowledge) and tacit knowledge (specific knowledge). The industrial sector should prioritise knowledge management to effectively mitigate air pollution by establishing a clear definition of knowledge. Acquiring external knowledge, fostering its growth, generating new insights, and incorporating them into existing knowledge. According to Reynolds et al. (2002), the distinction between learning and training can be defined as follows: Learning involves the acquisition of new knowledge, skills, and abilities by individuals. In contrast, training programmes yield general outcomes that organisations utilise to facilitate learning. Nonaka and Takeuchi (1995) defined knowledge management as the managerial process of generating novel knowledge.

Utilising prior knowledge and experience in a systematic manner to foster innovation and gain a competitive edge. Personnel possess expertise and proficiency in their respective roles. Demonstrates strong adaptability to dynamic circumstances. The objective is to address multiple issues and enhance job satisfaction and well-being. Executives will possess the ability to make informed decisions and develop strategic plans based on

Vol: 15 **No:** 2 **Year:** 2023 **ISSN:** 2146-0744 (Online) (**pp.** 133-148) **Doi:** 10.34109/ijebeg.2023150207

rationality and specific criteria. Knowledge is the foundational basis for the development of products and services. Constructing products with a foundation of knowledge enhances the value of both products and services. Creating a competitive advantage. According to Marquardt and Reynolds (1996), organisations must possess strategies for the purpose of establishing and advancing the organisation as a learning organisation.

This can be accomplished using the following method: 1) Possessing a suitable framework, 2) Cultivating a culture of learning inside the organisation, 3) Escalating employment duties and obligations, 4) Conducting an environmental analysis, 5) All members of the organisation actively participate in the generation and dissemination of information. 6) Possessing the necessary technologies to facilitate learning, 7) Prioritising excellence, 8) Cultivating collaboration, and 9) Sharing a common vision. Industrial business operators should prioritise knowledge management as a means to mitigate air pollution. This involves fostering a conducive learning environment, providing learning opportunities, establishing a learning community, implementing appropriate organisational structures, cultivating a learning culture, enhancing job roles and responsibilities, analysing the environment, facilitating knowledge creation and transfer, utilising technology to support learning, and emphasising quality.

3. Alliance building

According to Spekman et al. (2000), a business partnership is a tight cooperative relationship. The two parties aim to accomplish their commercial objectives by collaborating with each other and involving other organisations. This is due to the inherent challenge of achieving success without collaboration from multiple parties. Alliance partners adhere to a shared operating concept that prohibits self-centred behaviour that could harm the other party. Each spouse relies on the other. However, it is important to recognise and comprehend that their survival is interconnected. For instance, both parties concur that expenses must not exceed a certain threshold. Time is a precious resource, and skill is scarce. Insufficient administrative time and limited resources make it impossible for organisations to fulfil their alliance goals without the collaboration of their partners.

To ensure the survival of their organisation amidst the detrimental impact of air pollution on people's quality of life, the industrial sector must actively seek out partners. Productive organisations can establish cooperative methods for exchanging and incorporating knowledge. Sukhawatthanakun (2023) defined an alliance in their 2023 study as a mutual agreement to enter a contract without explicitly stating a predetermined conclusion. Both parties must collaboratively determine and manage the joint venture, which is an alliance agreement that lacks explicit provisions for this purpose. It indicates that a component of forming an alliance is to effectively address situations of unpredictability. Furthermore, it is imperative for an organisation to engage in collaboration with other organisations to successfully attain its commercial objectives.

Vol: 15 **No:** 2 **Year:** 2023 **ISSN:** 2146-0744 (Online) (**pp.** 133-148) **Doi:** 10.34109/ijebeg.2023150207

Under certain circumstances, the alliance might be perceived as a means of evaluating or assessing. Innovation serves as a catalyst for organisations to explore untapped markets, adopt cutting-edge technologies, and expand their distribution networks, all while optimising resource utilisation. It is also comprehensible that one of the advantages of the partnership is its function as an educational instrument. An assessment of the strengths and shortcomings of the industrial sector's strategic partnership approach should be implemented. By adopting a partnership model, organisations can effectively address the organisational possibilities and challenges posed by air pollution, which significantly impacts people's quality of life. According to Sukhawatthanakun et al. (2023), business alliances play a crucial role in facilitating business expansion in the present era, particularly through collaborative efforts in generating innovative products. They provide financial assistance for device sharing, etc.

4. Technology Selection

As defined by Azar and Ciabuschi (2017), innovation refers to the introduction of novel ideas, practises, or inventions that have not been previously utilised. It can also involve the enhancement and adaptation of existing concepts to make them more contemporary and efficient. In the industrial business sector, there is a significant emphasis on leveraging technology to effectively manage and mitigate air pollution. Modern technology enables fast, accurate, and reliable access to information, facilitating the selection and analysis of data for knowledge acquisition. The objective is to effectively address air conditions by synthesising strategies for problem-solving, prevention, and reduction.

Technological innovation refers to the creation of novel technological advancements that should be capable of further development within the industrial business sector. The framework is utilised to manage educational work in the industrial business sector, aiming to minimise machinery maintenance costs and optimise equipment used in industrial production. It establishes a connection between the information technology strategic planning process and business strategic planning. Aligning the information technology strategy with the organisation's strategy is widely recognised as a crucial factor. Currently, there is a phenomenon known as Technological Disruption that influences the decision-making process regarding technology utilisation. Organisations must prioritise and establish guidelines for effectively adapting to changes (Poungsuwan et al., 2022).

5. Follow up and Evaluation

According to Deming (1986), the quality management cycle (PDCA) is not solely centred on planning. However, it is important to emphasise that operations are conducted in a systematic manner with the objective of achieving continuous improvement. Walter Shewhart, a renowned figure in the field of industrial statistics, initially created the PDCA circuit. It gained broader recognition when Deming introduced it as a process improvement tool. This cycle is therefore also known as the “Deming Cycle”. The structure of the quality service cycle

Vol: 15 **No:** 2 **Year:** 2023 **ISSN:** 2146-0744 (Online) (**pp.** 133-148) **Doi:** 10.34109/ijebeg.2023150207

consists of planning and implementing the plan. Inspection, follow-up, and correction: because air pollution has an impact on people's health, the industrial sector should pay close attention to tracking information on ozone gas levels.

RESEARCH METHODOLOGY

1. Synthesis of elements

Researchers have analysed concepts and theories related to effective air pollution reduction management approaches in the industrial business sector. The researcher condensed the guidelines for effective air pollution reduction management in the industrial business sector into five elements. Figure 3 illustrates Knowledge Management, Alliance Building, and Participation**.**

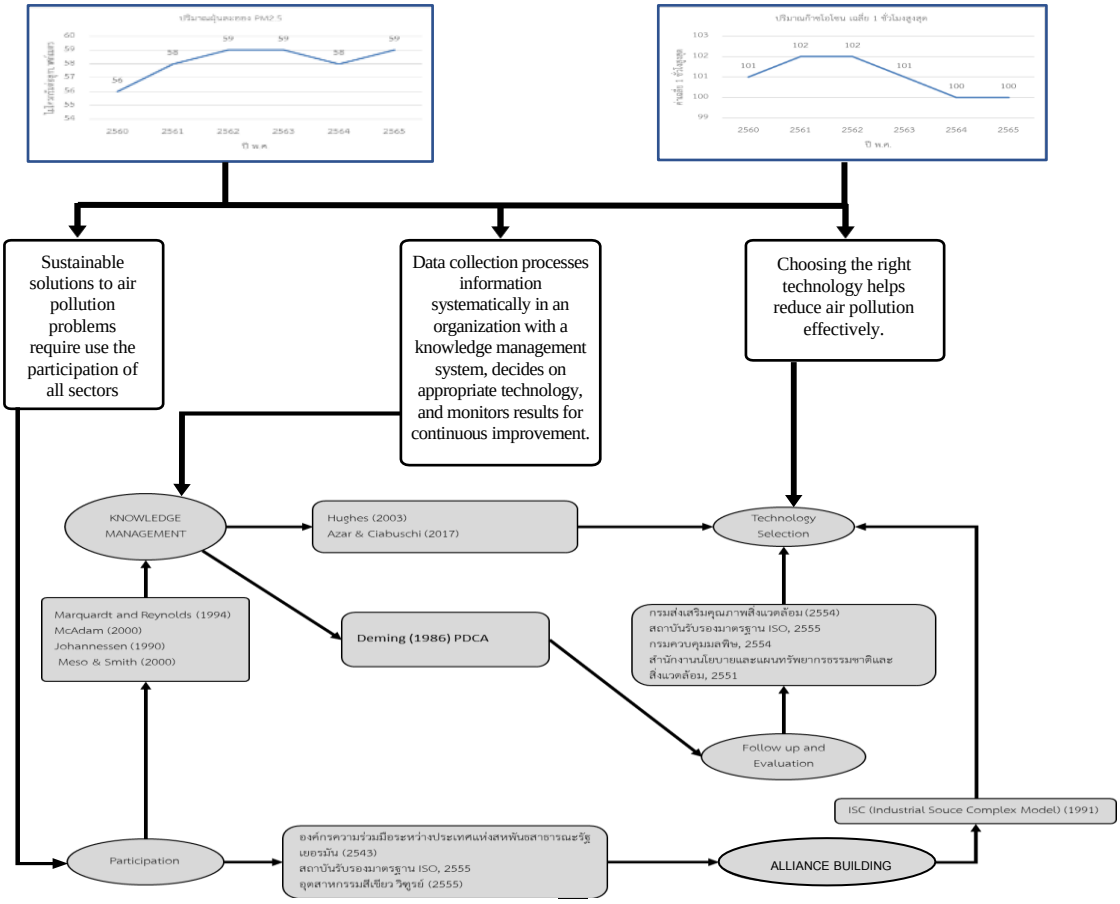

Figure 3. Effective Approaches to Reducing Air Pollution in The Industrial Sector.

Vol: 15 **No:** 2 **Year:** 2023 **ISSN:** 2146-0744 (Online) (**pp.** 133-148) **Doi:** 10.34109/ijebeg.2023150207

2. Population and sample groups

The population for this study consists of industrial business executives working in small and medium-sized industrial organisations with a significant number of industries. Specifically, there are 73,232 cases, according to the Department of Industrial Works (2004). Factor analysis or structural equation models determine that a sample size of 500 is optimal (Thanin, 2020). The Multi-Stage Sampling method (Thanin, 2020) is employed, which involves Cluster Sampling steps. This entails dividing industrial businesses into two categories based on size: medium and small industrial businesses and large industrial businesses. Utilising the lottery method for probability sampling to get data from various groups.

3. Research tools

The study tool utilised is a Rating Scale questionnaire, incorporating criteria that assign evaluation weights across 5 levels based on the Likert Method (Thanin, 2020). The researcher presented the preliminary questionnaire, along with the assessment form, to domain experts who possess expertise and experience in the relevant field of study. The researcher evaluated the quality of the tools by examining the consistency between the questions and the research objectives (Index of Item-Objective Congruence: IOC) using a sample of five individuals' questionnaires. The results of assessing the index for coherence between the questions and the research objectives indicate a range of 0.60–1.00, with the desired value being 0.50 or higher.

The researcher employed a questionnaire to assess the discriminatory power (Discrimination) of the checklist questions, rating scale questions with Standard Deviation (S.D.), and rating scale questions by analysing the Correlation. The researcher conducted this assessment on a sample of 30 individuals who shared similar characteristics to the target population of the study and determine the reliability of the questionnaire by calculating the confidence value. The discriminatory power value ranged from 0.49 to 1.35, while the entire questionnaire had a reliability value of 0.99. Values above 0.9 are considered to indicate a high level of confidence. Therefore, we used the tool to collect data by requesting assistance from the sample group to answer the questionnaires.

RESULTS

Data analysis employed both descriptive statistics and statistical methods utilising the SPSS programme. When doing various statistical analyses and constructing structural equation models with the AMOS programme, there are four criteria that are employed to assess the consistency of the model, which are referred to as the criteria for evaluating the data-model fit. 1) The chi-square probability value exceeds 0.05; 2) The Relative chi-square value is below 2.00; 3) The goodness of fit index value exceeds 0.90; and 4) The root mean square value of the approximation error is below 0.08 (Thanin, 2020).

Vol: 15 **No:** 2 **Year:** 2023 **ISSN:** 2146-0744 (Online) (**pp.** 133-148) **Doi:** 10.34109/ijebeg.2023150207

The study identified the relative significance of various components in efficient air pollution reduction management strategies within the industrial business sector.

1) The examination of Alliance Building components yielded a mean value of 4.26. Upon evaluating each item, it was discovered that there was a proposal to seek visits to external organisations that had achieved success in implementing air pollution reduction measures. Intended for use as a prototype for the organisation's operational procedures. The mean value was 4.53 (S.D. = 0.64).

2) The analysis of the components of Knowledge Management yielded a mean value of 4.24. Upon evaluating each item, we determined that stakeholders rate its ability to impart knowledge on air pollution control at 4.38.

3) The analysis of the components of follow-up and Evaluation yielded an average score of 4.21. Upon careful examination of each item, it was discovered that engaging in collaborative brainstorming sessions with business partners to jointly develop marketing plans. The mean value of engaging in collaborative brainstorming sessions with business partners to jointly develop marketing plans is 4.39.

4) The examination of Technology Selection components yielded a mean value of 4.02. Upon evaluation, it was discovered that pollution abatement equipment had been installed. Appropriate solutions for the problem include a dust trapping chamber (setting chamber), a cyclone, a bag filter system, and an electrostatic precipitator. The average value for the electrostatic precipitator, water spray system (spray chamber), medium surface trap system (packed scrubber), and Venturi scrubber system (Venturi scrubber) was 4.26.

5) The study of participation components reveals an average score of 4.08. Upon examination of each item, we discovered that we implemented initiatives to include employees and communities residing near the facility, who are impacted by air pollution, in thoughtful deliberations. The provision of regular problem management recommendations has an average rating of 4.33.

Subsequently, the researcher endeavoured to enhance the model. By evaluating the Modification Indices values based on the guidelines provided by Arbuckle (2019) while considering the results acquired from pre-existing software programmes and theoretical principles, to systematically remove individual unsuitable observational factors. Next, continue with the new processing. Continue this process until you obtain a model that satisfies all four statistical values according to the specified criteria:

The chi-square probability value (CMIN-ρ) is equal to 0.054, greater than 0.05. The chi-square correlation value (CMIN/DF) is equal to 1.131, is less than 2.00. The Goodness of Fit Index (GFI) is equal to 0.950. is greater than 0.90, and the root mean square error approximation (RMSEA) index value of 0.016 is less than 0.08. Therefore, the structural equation model is deemed to be comprehensive and coherent with the empirical data.

Vol: 15 **No:** 2 **Year:** 2023 **ISSN:** 2146-0744 (Online) (**pp.** 133-148) **Doi:** 10.34109/ijebeg.2023150207

Table 1. Observed Variables for the Components Comprising Effective Approaches to Reducing Air Pollution in the Industrial Sector.

PATICIPATION	
P3	Investment decisions regarding air pollution management, there will be a meeting of many responsible parties to choose the best option.
P4	A joint committee was established which consists of organization representatives and community representatives to consider solving air pollution problems.
P7	Integrate work between relevant agencies in all sectors to solve air pollution problems.
P9	Become a member of the Environmental Fund.
P19	Cooperate with every sector, oppose or discourage organizations that do not give importance to air pollution management services.
P20	Join in pushing for strict and appropriate legislation to preserve the air environment.
KNOWLEDGE MANAGEMENT	
K1	Create an online database system to provide personnel with access to knowledge sources about air pollution at all times.
K2	Always update knowledge to be up to date. This makes it possible to effectively use it to solve air pollution problems.
K6	Simulate the situation when air pollution occurs to practice air pollution management guidelines.
K8	Provide basic knowledge on air pollution prevention to communities near the factory.
K15	Provide knowledge on air pollution management to stakeholders.
K17	Organize a forum or dialogue to receive various opinions regarding air pollution management.
ALLIANCE	
A2	Ask for advice on air pollution management from government organizations to comply with relevant laws.

Vol: 15 **No:** 2 **Year:** 2023 **ISSN:** 2146-0744 (Online) (**pp.** 133-148) **Doi:** 10.34109/ijebeg.2023150207

A8	Recruit new personnel by considering personnel with work or experience in reducing air pollution.
A14	Introducing environmentally friendly product design (Eco-Design), setting a new production standard that will consider the environment from the beginning of design to the network.
A18	Join in investing in capital, labour, and machinery in managing air pollution together with stakeholders.
A19	Send a team of experts in air pollution control to help immediately when air pollution occurs in and around the location.
TECHNOLOGY SELECTION	
T2	Consider using clean energy as well, such as solar energy.
T8	Aware of the use of a smart air pollution detector (Aurassure Infra) that works with a sensor system accurate in monitoring air quality.
T13	Develop an odour eliminator that uses “Wet Scrubber Odor Treatment System” also known as “Wet air treatment system”
T17	Install a dust measurement device through the AQI (Air Tricorder) sensor system.
T18	Develop innovative masks to prevent PM 2.5 dust and encourage employees to use them.
FOLLOWUP AND EVALUATION	
F2	Control air pollution management operations to strictly follow the plan.
F5	Appoint a responsible person (MR) to evaluate air pollution management results.
F6	Contest works and innovations in air pollution management within the organization and awards every year.
F11	Adjust the criteria for monitoring and evaluating according to the changing situation for appropriateness and fairness.
F14	Measure the amount of soot in the air exhausted from the factory so that it does not exceed the standard criteria.

Vol: 15 **No:** 2 **Year:** 2023 **ISSN:** 2146-0744 (Online) (**pp.** 133-148) **Doi:** 10.34109/ijebeg.2023150207

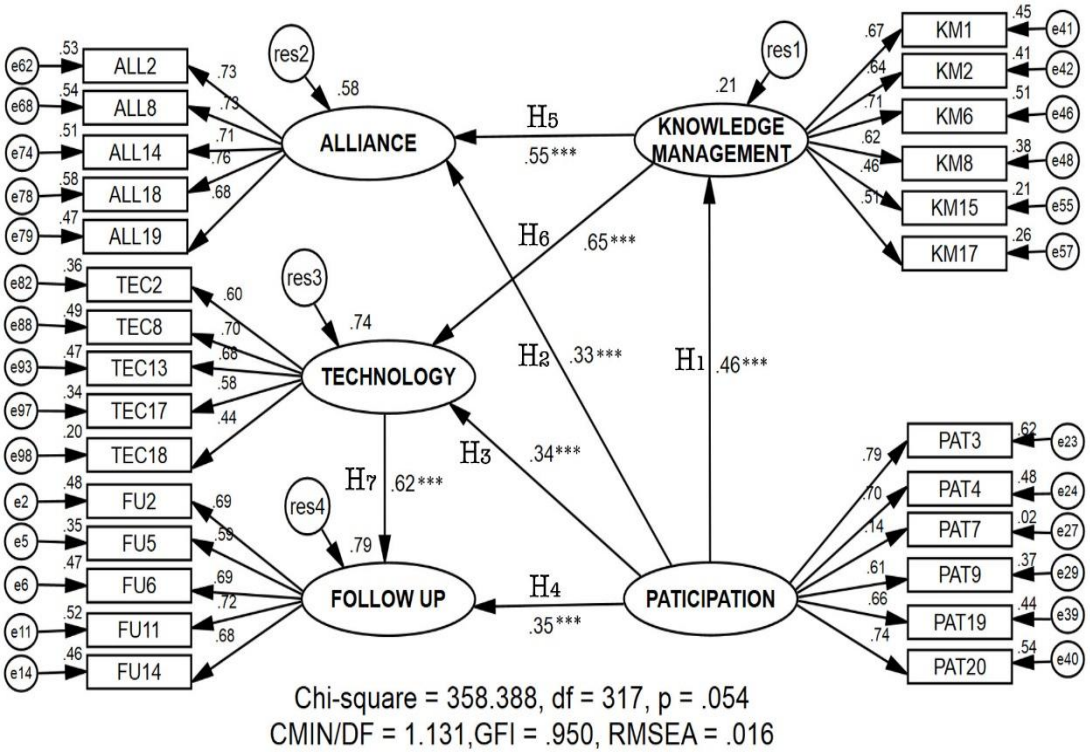

Figure 4. Structural Equation Model for Effective Air Pollution Reduction Management in the Industrial Business Sector in Standardized Estimate Mode After Model Improvement.

From the structural equation model, approaches to intelligent marketing management in the industrial business sector after improving the model, it was found that:

1) Direct influence between participation elements (Participation), forwarding the components of Follow Up and Evaluation has a Standardized Regression Weight value equal to 0.35.

2) Indirect influence between participation elements (Participation), forwarded to the technology selection component (Technology Selection) with a Standardized Regression Weight value equal to 0.34, and then forwarded to the Follow Up and Evaluation component, Standardized Regression Weight value equal to 0.62, which together have a weight value of 0.21 (0.34 x 0.62 =0.21).

3) Indirect influence between participation elements (Participation), forwarded to the Knowledge Management with a Standardized Regression Weight value equal to 0.46, and then forwarded to the Technology Selection component with a Standardized Regression Weight value equal to 0.65, then forward to the Follow up and Evaluation, the Standardized Regression Weight value is equal to 0.62, which together add up to a weight value of 0.19 (0.46 x 0.65 x 0.62 = 0.19).

Vol: 15 **No:** 2 **Year:** 2023 **ISSN:** 2146-0744 (Online) (**pp.** 133-148) **Doi:** 10.34109/ijebeg.2023150207

DISCUSSION AND CONCLUSION

The issue of air pollution is a long-lasting environmental problem that necessitates collaborative endeavours from policymakers, industrial enterprises, and society at large. Through the implementation of efficient strategies to reduce air pollution, we can greatly enhance the quality of the air, safeguard public health, and foster a sustainable future. The strategies defined in this paper offer a valuable foundation for policymakers and industrial enterprises to proactively tackle and resolve this key environmental concern.

RECOMMENDATIONS

After conducting a thorough assessment of the literature and analysis, the following recommendations are suggested for policymakers and industrial firms to implement efficient strategies for reducing air pollution:

1 Policymakers:

1. Establish and execute all-encompassing policies and laws that support the use of clean technology, incentivize the reduction of emissions, and ensure compliance with environmental requirements.
2. Allocate resources towards the advancement of research and development for cutting-edge air pollution control technologies and facilitate the implementation of these technologies by industrial enterprises.
3. Engage in partnerships with regional and international organisations to tackle cross-border air pollution problems and foster regional collaboration for the management of air quality.

2 Industrial Businesses:

1. Implement comprehensive knowledge management systems to improve comprehension of air pollution matters and create efficient ways for mitigation.
2. Establish alliances and collaborations with pertinent stakeholders to exchange knowledge, resources, and experience in order to enhance air pollution mitigation endeavours.
3. Allocate resources towards implementing cleaner production processes, employing modern pollution control technology, and utilising renewable energy sources in order to reduce emissions.
4. Establish comprehensive monitoring and evaluation mechanisms to closely monitor progress, evaluate efficacy, and make requisite modifications to plans aimed at reducing air pollution.
5. Promote active engagement of employees, communities, and government agencies in efforts aimed at reducing air pollution, while emphasising the importance of openness and responsibility.

REFERENCES

Arbuckle, J. L. (2019). *Amos 26 User Guide*. Amos Development Corporation. https://www.ibm.com/docs/en/SSLVMB_26.0.0/pdf/amos/IBM_SPSS_Amos_User_Guide.pdf

Azar, G., & Ciabuschi, F. (2017). Organizational innovation, technological innovation, and export performance: The effects of innovation radicalness and extensiveness. *International business review, 26*(2), 324-336. doi: https://doi.org/10.1016/j.ibusrev.2016.09.002

Deming, W. E. (1986). *Out of the Crisis*. MIT Press. Retrieved from https://mitpress.mit.edu/9780262541152/out-of-the-crisis

Department of Industrial Works. (2004). Air pollution. Retrieved from https://www.diw.go.th

Harrison, R. T., & Leitch, C. M. (2000). Learning and organization in the knowledge-based information economy: Initial findings from a participatory action research case study. *British Journal of Management, 11*(2), 103-119. doi: https://doi.org/10.1111/1467-8551.00154

Marquardt, M.J. (1996). Building the Learning Organization: A Systems Approach to Quantum Improvement and Global Success. New York: McGraw-Hill.

Nonaka, I., & Takeuchi, H. (1995). *Knowledge Creating Company*. New York: Oxford University Press. Retrieved from https://global.oup.com/academic/product/the-knowledge-creating-company-9780195092691

Piradee, L. (2011). *Factors Affecting Participation in Environmental Management in Pollution Control Areas: Case Study of Map Chalud Community, Mueang District, Rayong Province* (Doctoral dissertation, Faculty of Social and Environmental Development National Institute of Development Administration). Retrieved from http://library1.nida.ac.th/termpaper6/sd/2554/19732.pdf

Pollution Control Department. (2022). *The amount of PM 2.5 dust, and the amount of ozone gas, highest average for 1 hour*. Air Pollution. Retrieved from https://www.pcd.go.th/wp-content/uploads/2022/11/pcdnew-2022-11-01_07-34-54_842781.pdf

Poungsuwan, C., Sanrach, R., & Silpcharu, T. (2022). Guidelines to handle technology disruption for the adaptation of Thai financial institutions. *International Journal of Business Excellence*. doi: https://doi.org/10.1504/IJBEX.2022.10047809

Reynolds, J., Caley, L., & Mason, R. (2002). *How do people learn?* London: CIPD.

Spekman, R. E., Isabella, L. A., & MacAvoy, T. C. (2000). *Alliance Competence: Maximizing the Value of You Partnerships*. New York: Wiley. Retrieved from https://www.wiley.com/en-gb/Alliance+Competence%3A+Maximizing+the+Value+of+Your+Partnerships-p-9780471330639

Sukhawatthanakun, K. (2023). Effective long-term relationship management strategies to enhance value co-creation among business partners. *Journal for International Business and Entrepreneurship Development, 15*(2), 263-294. doi: https://doi.org/10.1504/JIBED.2023.132878

Vol: 15 **No:** 2 **Year:** 2023 **ISSN:** 2146-0744 (Online) (**pp.** 133-148) **Doi:** 10.34109/ijebeg.2023150207

Sukhawatthanakun, K., Roopsing, T., & Silpcharu, T. (2023). Guidelines for procurement management efficiency in industrial business sectors. *International Journal of Procurement Management, 18*(2), 170-187. doi: https://doi.org/10.1504/IJPM.2023.133129

Thanin, S. (2020). *Research and statistical data analysis with SPSS and AMOS* (18th ed.). Bangkok: General Partnership. Business R&D.

Turban, E., McLean, E., & Wetherbe, J. (2004). *Information Technology for Management: Transforming Organization in The Digital Economy* (4th ed.). John Wiley & Sons.

WHO. (2020). *What is the Environment in the Context of Health?* World Health Organization. Retrieved from http://www.who.int