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Interdisciplinary Research Review

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Editorial Note

The Interdisciplinary Research Review (IRR) was established with academic cooperation by The Royal Society of Thailand Committee of Interdisciplinary Research and Development, Rajabhat University (Western Group), and Rajamangala University of Technology Rattanakosin. This Issue, Volume 19 Number 4 (July – August 2024). This issue contains of four interesting articles in multidisciplinary fields: (1) Explore readiness to enter the elderly informal workforce, (2) Enhancing Struggling Undergraduate Students' English Reading Proficiency through Local and Global Online Learning Resources , (3) The Philosophy of Sufficiency Economy (PSE): Choice, Survival, and Happiness for All in a Time of Crisis , (4) School Administration Model in Driving the Sustainable Development Goals (SDGs), (5) The Concept of Repairing the Man-made Ozone Hole, (6) TRENDS IN WRITING RESEARCH: EXPLORING TEACHERS' WRITING PRACTICES AND ITS IMPLICATIONS TO POLICY IMPROVEMENT, (7) Employability Skills of Senior High School Tech-Voc Students: A Measure of Industry Preparedness, (8) ISO 20400 guidance standard for sustainable procurement: a search for challenges and recommended strategies for successful implementation

The Editorial Board of the IRR encourages anyone to submit articles for evaluation and review. The processes of submission, review and publication of articles are described on the journal's website, https://www.tci-thaijo.org/index.php/jtir. The Editorial Board and Committees of the IRR sincerely thank all peer reviewers who have sacrificed their time to help us produce a better journal, and also wish to thank all teachers, researchers and other academicians for submitting their valuable research to this journal. Finally, we thank readers of our journal who help to spread the knowledge and benefits gained to others. With your feedback and suggestions, we will strive to improve the quality and relevance of the IRR.

Yongyudh Vajaradul
Editor
Interdisciplinary Research Review

Explore readiness to enter the elderly informal workforce

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Abstract

The research aims to study informal workers' social and economic conditions and the preparation of informal workers to enter elderly workers. This research was conducted by documented studies on informal workers, elderly workers, readiness to enter elderly informal workers, adult education, and lifelong learning and surveys of informal workers. The research sample consisted of 400 informal workers aged 45-59 working in the service, contract, and trading sectors, with approximately 67 from each region: Northern, Southern, Eastern, Northeastern, Western, and Central areas. The research instruments used in this collection are document analysis and a survey of the socioeconomic status of informal workers and readiness of informal workers to enter elderly workers, consisting of checklist questions, a 5-level rating scale questionnaire, and open-ended questions. The research findings were the preparation of informal workers to enter the elderly workforce. The results of the informal preparation revealed that overall, the informal workers have moderate preparation for entering the elderly workforce (3.28). They did the minimal physical activity (2.61). Financial preparation is at a high level by dealing with debt before entering the elderly (3.88). Learning needs after 60 years is 31.60%. They accept self-study through various forms of media (30.80%) but have never received training on preparing for retirement (82.60%). In conclusion, to increase their readiness to enter the elderly informal workforce, Thai informal workers need more education support and preparation regarding their physical and financial well-being.

1. Introduction

The elderly are rapidly increasing, making up most of the world's population. The rate of increase in the number of elderly people is very rapid, especially in East Asia, Southeast Asia, Latin America and the Caribbean [1]. It is estimated that in the year 2100, 61% of the world's population will be elderly. In 2022, Thailand will enter an aged society, which in developing countries is the first country in the world to become a completely aged society. Thailand is expected to become a super-aged society by 2031 [2-3].

Due to changes in the structure of the Thai population, the trend of the elderly is increasing, as opposed to the steady decline in the working-age population [4]. The National Economic and Social Development Council (NESDB) reports the population projections for Thailand 2010-2040 that the working-age population (15-59 years) is likely to decrease by 65% in 2020 and 56% in 2040. The overall labour force participation rate will reduce by approximately 5 per cent between 2020 and 2060 [5].

Although 2020 was affected by the coronavirus disease (COVID-19) pandemic, which had a population growth rate of 0.12% per year. Still, the working-age population ratio to the elderly population was 1.8 workers per 1 elderly person. The working-age population will probably be less than the elderly [6].

The elderly are at risk of poverty, lose economic security, and cannot get out of poverty [7]. Thai aging population is struggling with the cost of living. They have a retirement income below the poverty line [8-9]. Kasikorn Research Center reports that after COVID-19, 80% of the elderly population has a median to low annual income. Thai seniors with an

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average annual revenue of moderate or above account for less than 20% of the total annual income [3]. The elderly population and their families face the problem of expenses when entering old age.

Meanwhile, the dependence rate of the elderly on the working-age population is increasing yearly. According to data from the United Nations since 2015, the dependence rate of the elderly will reach 14 per cent by 2025. This will increase to 22 per cent and 31 per cent by 2035. This means families or those caring for the elderly will have to spend more. In the meantime, the elderly without family care must rely on state welfare [3].

Poverty among the elderly is not caused by income problems alone but also by their health, education, and opportunities to participate in the labour market, including access to social welfare [7]. Currently, according to statistics on the Thai elderly, approximately two-thirds do not have savings. Moreover, Thailand does not have a savings system covering all working age [10]. Welfare for the elderly in Thailand is still limited [11].

As the cost of living has increased by at least 5% per year. The elderly have to spend mainly on health expenses due to physical deterioration and illness from disease [3]. In addition, family characteristics change when the elderly live with their children who have never left the family or when the elderly raise their grandchildren alone, which is called skipped generation family [12]. Most older people do not have any savings for retirement [13].

The world has entered an aging society where the elderly can be a force to help drive society's economy well - giving the elderly the opportunity to use their potential and abilities to benefit society by transferring their knowledge, abilities, skills and experience. This aligns with the concept of productive aging, which benefits the elderly and society. Employment of the elderly, with or without compensation, improves their physical, mental, social, spiritual, and self-esteem, resulting in self-care and self-reliance, reducing the burden on society. The elderly can lead a good and quality life, creating understanding and reducing prejudice from society [14].

Personal development when in retirement may not be in time. The government plans to promote the pre-elderly group with an emphasis on savings. In order to support the working

elderly, the government announced adjusting the environment to meet the conditions of the elderly, designing flexible working places with an emphasis on enhancing new skills for elderly workers, incentivising the hiring of the elderly and encouraging local administrative organisations and corporate activities for Corporate Social Responsibility (CSR) in the public sector to create jobs for the elderly who are informal workers. Furthermore, the health plan for older workers is integrated [15].

Patcharee Sukchoke [16], who studied the preparation for preretirement planning of employees born between 1980 and 2000, found a relationship between the adequacy of income and the level of preparation for life planning before retirement age. The respondents who had sufficient and saved money had a moderate level of preparation for life planning before entering retirement. 65.9 percent. In comparison, sufficient samples with no savings and insufficient borrowing are at a low level of preparation for life planning before retirement, accounting for 50 per cent. Overall, it can be concluded that sufficiency of income is related to the level of preparation for life planning before retirement at the statistical significance level of 0.05.

The majority of Thailand's population is informal workers. Informal workers are self-employed or non-government workers without a formal employment contract, including self-employed people or those who work temporarily. They may be business owners, but most of their businesses are small business operations and household businesses. Informal workers have a low income and uncertain incomes to sustain themselves. They do not receive protection or social security. There is no occupational safety insurance and no severance pay after termination. There are no pension savings and no retirement benefits. Furthermore, no security to live when you reach old age is a risk for informal workers [17-19]. The Office for National Statistics [20] reported that 20.4 million are informal workers, or 53.8 per cent, who are unprotected workers, which means no social security from work.

Thailand will face a population crisis in the Era of Low Fertility and Longevity [21-22]. The Sasin Graduate Institute of Business Administration of Chulalongkorn University announces that the elderly are valuable human resources for the country as they are more

experienced and have quality skills [23]. Therefore, the Thai elderly are in poverty with low incomes, limited savings and inadequate government pensions for care and living [24].

Moreover, they don't gain more knowledge for future work. This means Thai citizens and the government cannot wait until people reach old age; they need to prepare this group of people, especially informal workers, who are the majority of the future Thai. As a result, workers in the informal sector have to work after they are 60 years old. Based on the above problems, there should be guidelines for preparing for retirement: work planning for people of current working age who will be elderly shortly.

Research to study informal workers' social, economic, and educational readiness to enter the elderly workforce is essential for developing suitable preparation and guidelines.

2. Methodology

1. Documentary research is the collection of information on academic documents, scholarly articles, journals, publications, electronic media, and research reports that relate the core concepts and theories to the elderly, the potential of older adults, the elderly workforce, the preparation for the elderly workforce and the informal workers. These literature reviews years of publication are up to date and are not older than five years: 2017-2022.

2. Survey research explores informal workers' problems and social and economic conditions. And preparation of informal workers entering elderly workers.

2.1 Participants
Research population
Informal workers who work to earn subsistence income do not work for pleasure, hobby or volunteer work from all over Thailand.

Sample group
Informal workers between the ages of 45 and 59 who work in service, contract, and trading work groups in a state of urgent development include the service sector occupational group, public transportation, and food business [25]. According to the 2020 informal sector labour survey, there are 4,724,500 informal workers in service and product sales [20]. The sample size was

determined using Taro Yamane's formula at a confidence level of 95%, equal to 400 people.

The informal worker sample is 400 people, divided into the Northern, Southern, Eastern, Northeastern, Western, and Central regions in similar numbers. There are approximately 66-67 people per region.

2.2 Data collection and analysis
Instrument for data collection

1. The document analysis tool is a researcher checklist that ensures sources are valid, correct, relevant to the topic, and up to date.

2. Social and Economy Condition Survey of informal workers and the readiness of informal workers to enter elderly workers, consisting of a checklist, a 5-level rating scale and an open-ended question.

The survey is divided into 5 parts, consisting of 1) a questionnaire on personal factors, basic information and social and economic conditions of informal workers. 2) Questionnaire about occupational characteristics of informal workers. 3) Questionnaire on future job characteristics of informal workers towards elderly occupational workers. 4) Questionnaire on preparation of informal workers to the elderly workforce 5) Recommendations regarding preparation for entering the elderly informal workforce. Overall, the Index of Item Objective Congruence (IOC) of the survey is a value of 0.85.

The survey results can help determine readiness to enter the elderly workforce in different regions. A mean value and standard deviation are used to compare informal workers from five regions, and a t-test is used for paired sample regions. Both processes are calculated by the SPSS program.

Data collection
The researcher submitted the research project documents requesting permission to collect research data and questionnaires for the samples through the regional coordinators, who carried out both document paper and electronic paper. The data collection coordinators returned the questionnaire within 1 month to the researcher via email. The researcher checked for completeness on their own.

The Scale
1. Questionnaires 1-3 are a checklist form analysed by separating data according to the studied variables to determine the percentage value. There is using descriptive statistics to

determine the conditions for deciding the results of the data analysis by setting an acceptable percentage threshold that can be defined as appropriate. In this research, the threshold is set at 80 percent.

2. Questionnaire 4: The questionnaire regarding the preparation of informal workers to enter elderly workers is a 5-level rating scale. Data analysis was statistically analysed according to the specified criteria. The average score (Mean) was used to display the majority of the readiness of informal workers to enter

elderly workers. A mean of 3.50 and above were the accepted criteria in this research.

3. Results

The research objective is to study informal workers' social and economic conditions in order to prepare them to work as elderly workers. The research findings indicate their readiness to enter the elderly workforce and regional comparisons.

Table 1 Comparison Results "Readiness of Informal Workers to enter Elderly Workers" classified by regions

Region	n Number of informal workers	Mean	Standard division	Level of readiness to enter elderly workers
Northern	67	2.813	0.557	Moderate level
Central	67	3.540	0.586	High level
Southern	67	3.578	0.664	High level
Eastern	67	3.876	0.585	High level
Western	66	2.805	0.540	Moderate level
Northeastern	66	3.081	0.615	Moderate level
Overall	400	3.283	0.716	Moderate level

Table 1 shows that respondents' informal workers in the Central, Southern and Eastern regions are highly " ready to enter elderly workers". Meanwhile, those informal workers from other areas, the North, the West and the

Northeast regions, have a moderate level of "readiness to enter elderly workers.". The comparison showed that different regions had different readiness levels of informal workers to become elderly workers.

Table 2 The difference between the means "Readiness of informal workers to enter elderly workers" with different regions

Region	Mean	Northern	Central	Southern	Eastern	Western	Northeastern
Northern	2.813	-	-0.72692*	-0.76562*	-1.06302*	0.00789	-0.26801
Central	3.540		-	-0.0387	-0.3361	0.73481*	0.45891*
Southern	3.578			-	-0.2974	0.77351*	0.49761*
Eastern	3.876				-	1.07091*	0.79501*
Western	2.805					-	-0.2759
Northeastern	3.081						-

*Statistically significant at the .05

Table 2 shows the result of the pair comparison with different regions. First, the informal workers living in the Northern region have a different "readiness of informal workers to enter elderly workers" than the Central, Southern, and Eastern regions, which is statistically significant at .05. In addition, the results of the Pair Comparison showed that the informal workers living in the Central, Southern and Eastern region have a different "readiness of informal workers to enter elderly

workers" than the Western, North-eastern regions which statistically significant at .05.

The survey also found that informal workers are prepared in three main areas: physical health, finance, and learning. Informal workers have the highest health preparedness in all aspects. They are emphasising their eating habits, which are drinking water (3.89) and eating fruits and vegetables (3.67). Moreover, they realise and start to avoid risky health behaviours from drinking alcoholic beverages

and smoking cigarettes (3.57). However, Exercise is the least prepared in all aspects (2.61).

Informal workers are financially prepared to a large extent. They try to manage their debts before they reach old age (3.88) and reduce extravagant and unnecessary spending (3.69) but have moderate savings or investments in financial institutions (2.79). Informal workers have financial preparedness at the second level after health. They try to deal with debt and reduce unnecessary spending, but they still do not manage their savings.

Informal workers are prepared for learning by accepting the change to a large extent. They understand age differences or the generation gap (3.64), so they learn the current situation in order to keep up with the changes in other people and events in the country (3.63). In addition, they attempt to understand themselves and correct their shortcomings (3.59). However, they do not learn from another country by travelling to learn new things (2.70). Informal workers accept the changes in age differences, family relationships, and social conditions; they adjust, accept, and learn.

In addition, from inquiries about the nature of work that informal workers expect to do in the future at the age of 60 years or above, it was found that informal workers are still working in the same way because they are proficient in the profession (35.80%). Informal workers want to learn to work in retirement, even if they are 60 years old. They will not stop working; they must continually work (34.80%). Even though they work the same way, they want to gain knowledge and new information related to vocational skills training in the same jobs (31.60%). After 6 p.m. onwards, every day is a convenient time to learn to empower informal workers (22.60%). Moreover, informal workers prefer self-learning through various forms of media (30.8%). By the way, informal workers answered that they have never received training on preparing for retirement (82.60%).

3.1 Results and Discussion

According to the survey, it was found that informal workers are ready to enter aging workers differently in each region. This difference can be explained by area management policy, economy, education and health of people in each region. Moreover, it also mentions that the Central, the Southern and the Eastern regions have a high level of readiness to become elderly workers. On the other hand, the North, the West and the Northeast regions have a moderate level.

Starting with different job descriptions results in individuals continuing to work after retirement. The number of people entering aging workers has increased. Most of them have the job characteristics of being informal workers. In 2022, there were 4.74 million working seniors or 36.1% those who continue to work after retirement account for approximately 1 in 3 of the total workforces. With an increase of 0.2 million people from 2021, it is expected to be more in the following years. There are 4.10 million informal workers, or 86.4%, which are males (54.1%) rather than females (45.9%).

On the other hand, the formal workers are only 6.48 workers or 13.6 % [25]. According to a study by Pronnong Busaratrakul et al. [26], it was found that occupations without a pension system had the most significant impact on readiness for retirement. This includes informal workers. As the system strengthens, saving is disciplined and increases the return on savings. The presence and absence of a compulsory pension system or voluntary employer incentives make a huge difference in readiness for retirement, which may result in informal workers having to continue working after retirement.

Work trends in an aging society in which the working-age population is declining. The demand for jobs among the elderly after retirement, the informal workers and the informal elderly is increasing. The problem that hinders the employment of the formal elderly is regulation. Even Thai Regulations and Laws Despite policy changes and measures to promote and support elderly workers, at the social practice level, there are still prejudices in society that hinder the work of the elderly [27]. Informal work may be the answer for older adults working. During the COVID-19 pandemic, formal workers had to leave the workforce; they became informal workers, affecting the quality of working life when they reached retirement age [28].

Different regions have different readiness to enter aging workers. The readiness may depend on government policy. Most Thai elderly people live in different areas and different community contexts. Therefore, the preparation for becoming elderly is under the operation of

work between local administrative organisations, government agencies, the private sector, and the community sector [29-30]. In line with Mingkwan Kongjarecn and Gumpanat Boriboon [31], they stated that most elderly schools are established by local authorities and have different forms of care in each community area. It can be seen that local government organisations are an essential force in driving the work of caring for the elderly, including preparation. However, according to a study by Teera Sindecharak, Pornthip Netiparatanakul [32] found that the preparation in health, social and economic aspects of informal workers in Bangkok and other provinces were similar.

Informal workers living in different regions are different in their readiness to become aging workers. It showed that the Central, Southern, and Eastern regions have high readiness levels to enter elderly workers, but the Northern, Western, and Northeastern regions have moderate levels.

The Central region workers have a high level of preparation for entering aging [33]. It may be claimed that this results from people in the central region having higher educational opportunities than the national average. Moreover, people in the central area have the opportunity to receive the best public health services in the country. The central region is a health care and treatment centre that meets international standards. The elderly care system has been developed by promoting the development of technology and innovation to meet the needs and conducive to life, as well as the development of the model and quality of primary health care services and long-term care services for the elderly. In addition, the development produces a skilled workforce to support the industries and services of the future, which corresponds to Arparat Ingkapakorn and Nath Bhanthumnavin [34], who discovered that the main factor that drives central labourers to prepare for elderly workers was future orientation.

The preparation of workers for the elderly workforce of the Eastern and Southern regions is also high since these regions are the centre of the country's important industries. Eastern is the Eastern Economic Corridor (EEC), and the Southern is the Southern Economic Corridor (SEC).

With the prospect of growing into a modern industrial hub in Southeast Asia, the province's key urban environment has been developed into a new, smart, liveable city. Contributing to balanced economic and social expansion, it accelerates the development of the potential of people of all ages, especially the elderly, by improving educational and public health services. Populations in the Eastern and Southern regions are likely to receive higher education similar to the national average and better health services. Healthy seniors are self-reliant and contribute to society, including being able to use technology appropriately [35-36]

The North entered an aging society entirely in 2019, faster than the national level. The proportion of the elderly population was 21.7 %, which is higher than the national proportion of seniors, 17.5%. The proportion of the elderly population in the north has increased, but the state's preparation to support the aging society is negligible. Although at the community level, there is an increasing awareness and role in welfare and care for the elderly, there is still a lack of understanding of the problem and preparation for long-term potential development [36-37]. However, providing welfare does not yet cover all areas [35]. In particular, a system for informal labour for elderly workers has not been prepared. Moreover, informal workers are viewed by others as workers who do not have skills for the elderly workforce [38].

Sitthicchai Chaikhan, et al. [39] and Taweeporn Yuenyong [40] found that the overall level of preparation for entering an aging society of the Northeast region was at a moderate level because the majority of the workforce was in the agricultural sector. 50.77% of the sector's labour force, and the majority of workers have primary school knowledge. Accounting for 56.48% [35]. Another reason is health problems, especially liver fluke disease and maternal and child nutrition [36].

Workers in Northeastern and Western regions are not ready to enter into elderly workers because of budget. Chuangchai Chooppava and Wipa Chuppawa [41] said that age and monthly income were related to the quality of life of informal workers, and 90% were not prepared to become elderly workers because of finances [42]. The Center for

Economic and Business Forecasting of the University of the Thai Chamber of Commerce discovered Thai workers in 2022 who had incomes less than 15,000 baht per month, with 52% being informal workers; moreover, 31.4% of these workers are from the Northeastern region [43]. Furthermore, 46.9% of Northeastern low-income have debt [44]. In addition, the Office of the Permanent Secretary, Ministry of Labour [45] found that informal workers in the Western region need more income to cover expenses and have long working hours of up to 8.50 hours per day.

The survey also found that informal workers are prepared in three main areas: physical health and finance. The Bank of Thailand also reported strategies to support informal workers, which are to "Increase income, develop skills, build financial immunity" [46]. This is because informal workers still desire to work after retirement to have subsistence income. They want to work in their original profession, an occupation with aptitude or another profession that is not too heavy and does not affect health. Therefore, there must be preparation for physical health, too [38]. However, it was found that informal workers were not fully prepared for the economy, which includes financial planning, saving, and financial bookkeeping.

Furthermore, they did not prepare for a second job [32]. In addition, changes in the economy, careers, aging society, and technology require workers to develop new skills to keep up with changes in advanced technology, including artificial intelligence. Therefore, workers must learn to re-skill, up-skill and lifelong learning in order to keep up with the changes that occur [47].

Informal workers prioritise financial preparation over physical health because if they are wealthy, able to pursue a career, earn money, and are not burdened with debt, they will be able to prepare for other aspects and enter a quality aging society [48]. However, informal workers have low and unstable incomes, no welfare protection, low savings, and debt problems [49]. Therefore, informal workers want to continue working after retirement. Most informal workers wish to have income for subsistence so that they do not burden others after retirement.

Consistent with Maslow's Hierarchy of Needs, informal workers also have hierarchical needs. The needs below must be fulfilled before

humans can focus on the next stage of their needs. Physiological Needs are the needs for making a living that must be fulfilled before entering the Safety and Security Needs stage, which is financial stability and health safety [50].

As for health, middle- to high-income informal workers choose to purchase private health insurance for themselves [51] and plan for their families to be caregivers for retirement [38]. Most middle-aged informal workers do not consider exercise because they have job missions, which causes fatigue after daily work [52]. As a result, they do not have self-care or health check-ups, exercise regularly enough, and engage in risky behaviours [53]. The state already provides free health services for the elderly age.

Informal workers learn on their own through various forms of media. Accessing information from digital technology and social media networks promotes informal working to understand formal and formal learning. Moreover, it is convenient and accessible to users [54]. The use of digital platforms increases flexibility in the operation of learning for informal workers. There are restrictions on the use of technology or access to technology [51, 55].

4. Conclusion

In conclusion, the preparation of informal workers in each region is different. Informal workers are prepared to become elderly, emphasising physical health and consumption behaviour modification, but exercise is minimal. Secondly, it is financial preparation by trying to fix old debt and not creating new debt but not prioritising savings. In terms of learning, informal workers are interested in learning to develop themselves to be able to continue working in the same jobs after the age of 60 by self-learning through electronic media. Informal workers have never received the knowledge to prepare for entering the aging workforce.

Overall, most workers have primary school knowledge. Moreover, Thai education lacks a connection between teaching and practical skills, which may result in a lack of professional skills in the future. Therefore, knowledge and educational skills should be developed for informal workers. In addition, it found that if people are economically prepared, they have

sufficient income. It may lead to others' preparation.

Educating about preparing informal workers who want to work after 60 years old may help them solve other problems they face, such as financial and health problems, and gain up-to-date knowledge and technology. However, learning these takes more time, so informal workers need to know before getting older or recovering age.

4.1 Recommendations

1. The government should announce an educational policy to prepare the elderly workforce of informal workers, who will be the leading workers in the near future. Informal workers should be trained earlier for working after 60, including financial, exercise, mental, and technology plans.

2. Government plans schemes for informal labour entering the elderly at an earlier age, including saving, secondary jobs and curiosity to learn.

3. To promote vocational education and community participation education to inform informal workers' preparedness for active ageing. It may improve informal workers' physical health and mental health. Moreover, reducing societal inequality causes an appreciation of informal and Elderly workers. Both society and the elderly are in line with the 20-year national strategy of creating opportunities and social equality.

4. Mainly, informal employees are less educated workers, so they must educate informal workers to gain more knowledge related to their jobs and future work.

5. It should provide education on various forms of savings in line with the interest and earning capacity of individuals. Furthermore, it promotes health through continuous health education, regular physical activity, and reduction of risk behaviours.

6. Reskill and upskill informal workers through public sector training through digital platforms.

4.2 Recommendations for Future Studies

1. A way or method of spreading knowledge directly to improve the quality of the informal workforce in all regions, primarily Northeastern and Western.

2. Preparedness of other groups of informal workers, especially the economically disadvantaged or less educated.

3. Comparison of the readiness to enter elderly informal workers and formal workers in order to find solutions for all labourers in Thailand.

4. Study the roles of the community in promoting active informal ageing so elderly persons can survive and participate in social activities.

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Enhancing Struggling Undergraduate Students' English Reading Proficiency through Local and Global Online Learning Resources

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Abstract

This study reports the success of an innovative English reading course for non-English majors at a university. Teaching English to students majoring in subjects other than English is increasingly important these days in many countries (including Taiwan), where English has little local currency but which aim to become fully competitive in a globalized world where English dominates as the language of commerce and international affairs. However, the best way to prepare today's graduates in general for this challenge is far less reported and researched than the teaching of English to English majors. The dedicated co-taught reading course developed at HungKuang synthesizes several features that have been separately shown to be successful, including a reading circle approach to foster interest, encouragement of extensive reading out of class to promote learning through reading, and a blended approach to support reading both in class and online. To maximize input, the researcher exploited a Chinese medium version of the local CoolEnglish eLearning resource to serve as a scaffolding platform to complement an American Lexile-based approach to extensive reading via the global English medium Scholastic eLearning platform. The latter assists in grading input so that it is comprehensible. Test and questionnaire results from 52 students showed a significant increase in reading proficiency, especially among those who were relatively lower in proficiency at the start. There were high levels of student approval of the course. In particular, greater Lexile improvement was associated with the use of more English-related websites and a greater degree of positive attitude to the instruction.

1. Introduction

Around the world, in many countries where English is little used in everyday life, there is nevertheless an ever greater interest in promoting English language learning. English is rightly seen as a world lingua franca of great value in a country's economic, commercial and general international life. Taiwan, along with other countries of the non-English speaking world with strong emerging economies such as Saudi Arabia and Thailand [23], is one such country, where the government believes that producing university graduates with good English ability is one of the keys to the country taking its merited place in the world.

While such countries often make great efforts to develop English teaching at school level, for instance by making it obligatory in the curriculum from an early age, the effective teaching of English to non-majors in English at university level often remains undiscussed and neglected. In Taiwan there is some reliance on a 'stick' approach to achieve the desired outcome: in order to graduate from many universities, students have to pass a recognised English test at a certain level [1]. This follows Ministry encouragement rather than imposition, and results in a variety of tests and levels being used. Often the test is either the locally recognised GEPT or the international TOEIC test. The level required varies but typically is not greater than B2 in the international CEFR

scale which runs from A1 through A2, B1, B2, C1 to C2 at the top. For a person to communicate with proficient English speakers with success, a minimum of B2 is needed (similar to IELTS 5) [2]. At the university of this study, the TOEIC test of English reading and listening proficiency with a score of at least 350 is required (= low B2). However, universities generally set in place some weaker alternatives (e.g. taking an extra course) for those who were unable to pass the English test, the test requirement is in practice often circumvented.

On the other hand, the 'carrot' approach is relatively lacking. There is less apparent concern with what are the effective types of English teaching to encourage non-English majors at the tertiary level, or how to make students self-motivated to improve, especially in contexts (such as Taiwan) where non-English majors are predominantly taught through the national language (Mandarin). Yet it is widely agreed that reliance purely on the 'stick' (e.g. required English tests) to improve standards is insufficient [3]. The present paper, therefore, is devoted to an intervention undertaken at one university in Taiwan to provide a well-conceived, modern, and motivating English reading course to assist in achieving the wider national goals for graduate levels of English proficiency. This situation is not unique to Taiwan. Hence it is hoped that the study will be informative for tertiary level English teachers in many EFL contexts.

2. Literature review

Since the course involved is a reading course, this review briefly provides the rationale for relevant aspects of the teaching of EFL reading.

The role of reading in the teaching and learning of English as a foreign language remains a core issue. From the literature, it can be understood that it has two sides. On the one hand, reading is widely seen as a key route by which, as a consequence, the language as a whole is acquired [4]. On the other hand, numerous subskills are recognised as prerequisites, i.e. as needing to have been acquired by learners in order to read in the first place [5].

The former is a very old idea exemplified, for example, by the famous 19th century archaeologist Schliemann who reputedly

learned many languages by not just reading but learning by heart entire books in the language [6]. It was Krashen [4], however, who in modern times located it within his famous hypotheses about successful language learning. The input hypothesis proposes that what is needed for language acquisition is large amounts of comprehensible input. That input can come either from exposure to speaking or, more often in the case of learners who live in contexts where English is not widely spoken, like Taiwan, through extensive reading out of class. The input however must be neither too easy nor too difficult for the learner: it should afford some opportunity for encountering new language, yet remain understandable. This idea continues relevant [7] although there is debate over its details [8].

In the Taiwanese context, Yang et al. [9] recently explored the effects of reading at a level slightly above the reader's current reading proficiency level (Krashen's i+1) versus slightly below (Krashen's i-1) [4]. The results showed that comprehension was better at the latter level. It was the former that exhibited better reading motivation and reading self-efficacy, i.e. self-perception of reading ability. However, this study did not assess how much actual learning/acquisition had occurred in either case. Other studies around the world have abundantly shown that language learning, especially vocabulary, occurs from reading, although typically the effect of the difficulty of the text relative to the reader's knowledge is not a factor considered [10]. Nevertheless, there seems to be a consensus that reading material around or just above the reader's current ability is needed both for learning to occur and for motivation to read extensively out of class to be maintained.

By contrast, other studies have emphasised prerequisite knowledge, i.e. what needs to be known before meaningful reading, especially authentic texts, can begin. Some relevant information, such as the broad rhetorical structure of a traditional story, may be transferable from what is already known in L1. However, basic knowledge of the target language writing system and grammar is required, along with at least the first 1000 most frequent English vocabulary words, which are often emphasised [11]. Indeed, for viable reading of non-specialist authentic English texts, a vocabulary of at least 5000-word families has been suggested as necessary [12].

Milton and Alexiou [13], however, find a more modest estimate of the 3500 most frequent words as equivalent to B2 CEFR level.

The present study concerns a reading course for students entering mostly with at best A2 proficiency (on the CEFR international scale). The aim is to improve their English as much as possible to enable them to read and understand the kind of authentic written English they might ultimately encounter in their later employment e.g. as nurses (minimum requirement B2). However, for most takers of the course, it is not a feasible goal to achieve that much improvement in a one-year course of two contact hours per week. Hence the emphasis needed to be partly on equipping them and encouraging them to continue self-learning through reading throughout their later years in the university.

The central rationale of the course then was that, apart from practising English reading itself in traditional classes, it should implement the two key aspects of reading highlighted in the literature review. In both of these, a key decision was to employ online digital technology to benefit from the individualisation of learning and extent of availability for self-practice that online delivery affords. Other agencies in the region are also moving to supplement reading courses with online resources in various ways. Guo [14], for example, reports the use of online reading management in courses for non-English majors, but without apparent attention to individual matching of texts to readers. Yang [15] has explored the training of learners in self-use of reading strategies out of class, to deal with their reading difficulties. That included especially interpersonal strategies involving peer contact via online chat and discussion. Yang [16] again in a tertiary-level English reading context, compared blended learning with classroom-only learning and found the former more effective, again in part due to greater peer interaction online. Such studies are relevant to us because they concern tertiary-level students like ours, who often struggle with weak English. We have not however found a study like the present one which systematically involves two kinds of online resources: one is local and designed to help with the prerequisite knowledge for reading; the other is global and designed to facilitate the consequential learning benefits of reading.

In order to work on the prerequisite language improvement in the present study, a Chinese version of the website CoolEnglish was utilized, for its wealth of colourful and entertaining games and activities, focused mainly on basic English vocabulary and grammar. This site is locally made in Taiwan at the National Taiwan Normal University and has been adopted by the Ministry of Education. To work on the use of extensive reading as itself an aid to consequent proficiency improvement, the Taiwan Learning Zone of the global Scholastic website (in English) was chosen. This was implemented in the second term, after the students' general proficiency had, hopefully, been boosted closer to a suitable level by the work of the first term. The Chinese CoolEnglish platform, in fact, contains three Scholastic modules to support full use of the Scholastic site. The key feature of the full Scholastic site for the present study was its wealth of reading texts (including whole books) of all levels, and system of matching texts to student ability which is essential for learning to occur (see Method).

3. Research questions

Following on the above, over the period of the intervention with the new course (Sept 2021 to June 2022), the research questions target our main comparisons: between two online resources, between attitudes and performance, and between more and less struggling students:

RQ1 What are the effects of local and global online learning resources on college students' English reading proficiency?

RQ2 What are college students' learning attitudes (in four categories in a survey) concerning use of local and global online resources to improve their reading proficiency?

RQ3 Do either of the above differ between students with different background characteristics, especially between those who are initially weak (struggling) and those who are not?

4. Method

4.1 The reading course and interventions

Takers of the reading course experienced an instructional regime as follows. In the first term, all lessons were with the

teacher/researcher and were based on an English textbook with a strong cross-cultural focus (containing both reading texts and language practice materials). This was implemented in Literature Circle mode as follows. Students were divided into four groups at the beginning of the term, and each group member had to choose a unique Literature Circle role, e.g. illustrator, connector, word finder, discussion director. In order to enhance learner autonomy and motivation, the class then agreed on a topic, e.g. My Childhood Diary, Flowers, Easter, Food, Leisure and Art, Survival English, etc. Next, they looked for reading material. They then did homework and made a presentation based on the topic they selected from the handbook, as the basis for their mid and final report.

CoolEnglish (Chinese medium) and Scholastic (in English), which are the new features focussed on in this study, were introduced in the second term. Since a pilot study had shown that students got nervous with an English learning platform compared to a Chinese one, CoolEnglish was registered and introduced by the course teacher one week prior to the orientation week of Scholastic. This was helpful due to the fact that CoolEnglish incorporates some Scholastic features in its learning resources: Bookflix with English animated e-books, English Scholastic Trueflix, and the English Scholastic watch and learn library. Therefore, this helped the class to become familiar with the Scholastic learning platform initially through Chinese. Both learning platforms served in and out of class as sources of learning materials. Both allowed individual differences to be accommodated and supported self-paced adaptive learning. CoolEnglish did so with its wide range of resources to choose from, while Scholastic allows students to choose the book they like at their proficiency level, and work on their reading at their own pace.

CoolEnglish is a Chinese eLearning platform with grammar, song and game-based activities, i.e. language practice. Scholastic contains short reading texts and books in diverse genres such as fiction, science, geography, etc. Each is followed by a short quiz, not only to assess compatibility of the story's Lexile level with the student but also to serve as a record to track students' progress.

Training was necessary for the use of the Scholastic reading program [18] (but not CoolEnglish), and this was mostly provided by a Scholastic employee (TS) who is the representative advisor to assist school teachers or students to become familiar with the Scholastic eLearning platform. She was scheduled to teach a class once a month while the principle researcher continued with the usual textbook material, at the same time, working closely with the TS to involve the Scholastic and CoolEnglish eLearning platforms in homework assignments, and midterm as well as final term assessments.

In lessons taught by the Co-teacher (TS) in the second term, computer labs were reserved to facilitate TS instruction and students' computer-based learning. TS chose a story for the class based on their Lexile pretest general result, so the text would not be too difficult nor too easy for the class in general. TS first went through the key vocabulary of the story and then read it aloud to the class followed by explanation or illustration of the content. TS synchronized her computer screen so every student could see clearly and read the story. Interactive activities were also designed to engage the class with the reading aloud to ensure their attention and comprehension as a result. A short quiz was given after the storytelling. Crucially, in order to help students to fully take advantage of the Lexile proficiency measurement, TS also explained to each group of students how to use their personal Lexiles that they learned from Scholastic to choose books that fit their own proficiency level in the bookstore or online shopping list.

Figure 1 shows the overall procedure. In a nutshell, the course teacher (researcher) followed the Literature Circle framework to encourage in and out of class reading, using CoolEnglish for language support in the second term. TS targeted students' reading progress monitored through lexiles on Scholastic and reminded those who struggled and did not use Scholastic as frequently as others. She also awarded prizes to those who achieved the top score for reading the most books at or above their level, or the highest total of words read. Both the course teacher and TS, therefore, sought not only to promote reading and

language proficiency at the time, but also to nurture students' love for reading via CoolEnglish and Scholastic learning platform

resources as a basis for continuing motivation and learning through reading after the course finished.
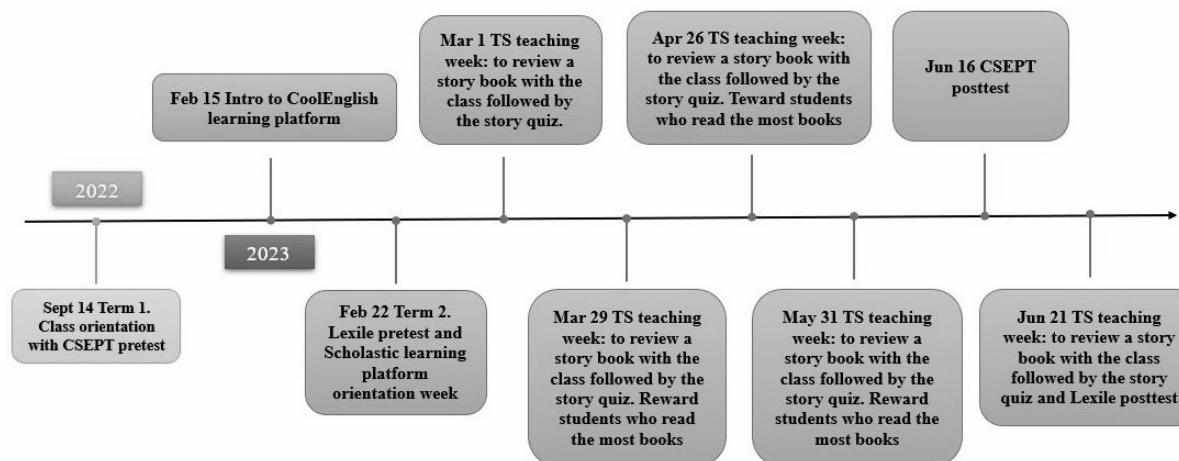

Figure 1. Co-teaching schedule

4.2 Participants

The class of participants contained 52 L1 Chinese sophomore non-English-majors, studying nursing at HungKuang University in central Taiwan. 90% were female; English proficiency (initially maximum 85, measured by CSEPT) corresponded predominantly to A1 in the CEFR scale (beginner) (CSEPT, 2016).

4.3 Instruments

4.3.1   CSEPT

This refers to the College Student English Proficiency Test [19], which, like GEPT, is professionally made in Taiwan for students who would like to prepare for more challenging international tests, i.e., TOEIC, TOEFL or IELTS. Only the reading part was administered to test vocabulary, grammar and reading comprehension. The pre- and post-tests were equally difficult and were administered at the start and end of the whole two term intervention. This was the main measure of how far the students' English reading proficiency progressed over that period.

4.3.2   Lexiles

These are a measure designed by Metametrics Inc. [17] and implemented in the Scholastic site to place students and reading material on the

same scale, thus facilitating students and teachers in choosing suitable reading material for student ability, which was important in the second term of the present intervention. For the students, it involves a reading test and therefore also provides a further measure of their reading proficiency level, which was applied at the start and end of the second term of the intervention. For books and other reading material, it relies on simple text measures such as word and sentence length to provide a difficulty (or readability) value. The full details of how the two types of Lexiles are arrived at and equated between books and students are a trade secret. Although the whole Lexile system has attracted some criticism [20], it was used in the present study due to its simplicity of use and ready availability associated with reading material on the Scholastic website.

4.3.3. Student questionnaires

Two parallel questionnaires were used in the second term to elicit background participant information, and attitudes to (a) the full Scholastic website (26 April) and (b) the CoolEnglish website (5 May). This allowed a comparison to be made between the sites. Each questionnaire included 50 website-related statements, responded to on a five-point agreement scale (all previously expert-

approved and piloted). Five concerned the role of the collaborative teaching accompanying the use of the sites, e.g., 'After the collaborative teaching of the company and teachers, I can find my favorite books or topics on the digital learning website'. The rest concerned three aspects of the website itself. Visual design (9 items) was represented by items such as 'The digital learning website has a moderately sized font and is easy to read'. Interface usability and friendliness (14) was represented by items like 'The names or symbols of the menus, buttons and icons of the e-learning website are easy to understand. Satisfaction with the language learning content (22) was represented by items like 'My learning ability is enhanced through the e-learning website'.

All but three items were positively worded (i.e., greater agreement indicated stronger approval); responses to those three items were reversed for later handling and presentation so that in the account below higher scores always indicate greater positive endorsement of the sites. Internal reliability of each item subset was very high in all cases (Cronbach alphas >.9).

4.3.4 Student e-portfolios

These were records made by each student as a reading log to record their weekly learning progress on CoolEnglish and Scholastic with details, i.e., whether they used animated films, grammar exercises, English songs, puzzle word games, etc. They also recorded books read, specified with Lexile level and use of the post-reading quiz practice. Aside from providing usage information to the researcher, this learning log served to remind students how much they had achieved and helped them to monitor their own reading each week and maintain regular progress.

4.3.5 Qualitative data

This came from some open response items in the questionnaires and from informal interviews held with each student group during term time, i.e., at a time arranged by the teacher and TS during class time. Since CoolEnglish was in a language more familiar to the students and served as a general basic English remedial learning platform for the class, the interviews focused more on Scholastic, with its specialist lexile and reading facilities, seeking to investigate the best design for online learning where students' learning motivation and

proficiency will be updated as a result. The focus was on finding out whether Scholastic was user friendly and inviting platform for them. After those interviews, we summarised the feedback (reported below) which was also provided to the Scholastic staff for them to evaluate it and consider whether these reading opinions were worth taking into consideration for improvement of the platform.

5.   Results and Discussion

5.1 RQ1: Increase in proficiency

The CSEPT result is shown in Table 1.

Table 1. CSEPT change result

n=47	Mean	SD	Change	Wilcoxon z	p
CSEPT Pre-test	61.17	17.47	+5.42	-2.07	.038
CSEPT Post-test	66.59	16.02			

Scores were not normally distributed (Kolmogorov-Smirnov test with Lilliefors correction p<.05). Therefore, the Wilcoxon test was used rather than the paired t-test. Helping to answer RQ1, this result shows that there was a significant improvement in English reading and related skills, as measured by the test. On average the scores increased by a little over 5 points. Since the students were learning English only in this reading course during the period of the study, this then reflects the effect of the instruction associated with our intervention. However, it represents only a small movement in CEFR proficiency terms and does not indicate an increase to B1, let alone B2 level.

Student personal lexiles were measured before and after the second term. This data is normally distributed (Kolmogorov-Smirnov test with Lilliefors correction) so the one sample t-test was used to see if the increase differed significantly from zero (Table 2).

Table 2. Student lexile change result

n=52	Mean change	SD	One sample t	p
Lexile change	11.42	162.4	0.507	.614

Although the average change is positive (mean 11.42), showing a small increase, the variation in changes was very high: the SD is huge and reflects the fact that some participants obtained initial personal Lexiles smaller than 0. The greatest increase was 284 but the greatest fall was -525. Therefore, the overall increase is not significantly different from zero. Possibly if Lexile change had been measured over the whole two terms, like CSEPT, a more substantial increase would have been detected.

Still, this seems to support the finding of an earlier study [21] that personal Lexiles, as a measure of reading proficiency, do not increase in a simple way as time passes but are subject to factors other than the student's proficiency. Also, variation was great, which throws doubt on the accuracy of how personal Lexiles are calculated, or at least their reliability.

Furthermore, the correlation of Lexile change with CSEPT change was positive but low and not significant: ρ=.223, p=.123. This again shows that Lexile change is not a straightforward measure of reading proficiency.

5.2 RQ2. Student attitudes to the CoolEnglish and Scholastic sites

The quantitative questionnaire findings on attitude are summarised in Table 3.

Table 3. Difference between CoolEnglish and Scholastic sites in four aspects of student attitude (*n*=52; scale = 1-5).

Aspect of digital instruction	Site	Mean	SD	Diff. CE - SC	Wil-coxon z	p
Visual design	SC	4.31	.828	-.007	-.038	.970
	CE	4.30	.824			
Interface usability	SC	4.07	.713	.018	-.112	.910
	CE	4.09	.725			
Learning satisfaction	SC	4.32	.769	-.065	-.997	.319
	CE	4.25	.805			
Collaborative teaching	SC	4.34	.833	-.097	-.865	.387
	CE	4.24	.878			

The results are very similar for the two websites. First, all means on both were >4, and significantly above the midpoint of the scale (3), using the binomial test (*p*<.001). Indeed, the same is true for each of the 50 individual items in both questionnaires. This showed clear agreement that both sites were regarded as very good on all four aspects that were measured (visual design, interface usability, user learning satisfaction, and the associated collaborative teaching).

Second, on the Wilcoxon test (Table 3), there were no significant differences between the websites in how they were rated on each of the four aspects. Again, this was also true for each individual item. Descriptively, the Scholastic site (SC) was marginally preferred on three of the four aspects, and CoolEnglish (CE) on the other. That last was interface usability, possibly due to that site being in Chinese, which made its menus and instructions easier to understand. However, the small size of the difference shows that the disadvantage of the SC site being in English had only the smallest of effects.

Third, there were significant differences between the four areas judged, but those differences were very much the same for both websites. Both sites were found to show overall significant differences among the four measures (SC: Friedman χ^2 = 36.50, p <.001; CE: Friedman χ^2 = 19.66, p<.001). In follow-up paired Wilcoxon tests with Bonferroni adjustment, the pairs that were different were almost identical in both sites.

In both sites, visual design was judged to be significantly better than interface usability (SC: Wilcoxon z = -4.06, p<.006; CE: Wilcoxon z = -3.29, p=.006). In both sites learning satisfaction was rated above interface usability (SC: Wilcoxon z = -4.15, p<.006; CR: Wilcoxon z = -3.11, p=.012). In addition, collaborative teaching was rated better than the interface usability, but not quite significantly in CE (SC: Wilcoxon z = -3.64, p<.006; CE: Wilcoxon z = -2.45, p=.084).

Thus, regardless of the site, interface usability emerges as, relatively, the feature that is least satisfactory, although its approval is still good (just above 4 on average on the 1-5 scale). It seems that, regardless of language, it remains hard for learner websites to achieve an ideal level of clarity in the menus, instructions, page architecture and input facilities that make up the interface.

In the open response data, mainly about SC, this picture was further illuminated. Generally, students expressed that they really loved the Scholastic stories and enjoyed the richness and breadth of the selection, including many animated and audiobooks. However, if there had been no orientation and coteaching sessions, they felt that it might be too hard to follow and understand how to use Scholastic.

One group of students asked TS to teach non-fiction books with a higher Lexile level because

the books being dealt with in class were too easy. This was clearly important for one student who mentioned that she used Scholastic to help boost her reading literacy and proficiency to prepare for the GEPT English proficiency test (a standard English Proficiency exam often taken in Taiwan).

Besides that, students also raised questions about the following aspects of the working of the site. 1. How to look for a different genre of story in the Literacy Pro library? How to choose fiction or non-fiction books? 2 Can the size of the font be enlarged in the follow-up quiz? The longer the vocabulary item, the more the font seems to be smaller and difficult to read. 3 It is really hard to use Scholastic by mobile phone because the screen is unstable and one has to sign in again and again! 4 The dictionary function is good but some students still need to resort to translation to understand the vocabulary. These then relate to interface usability and learning value, but could all have been dealt with by more comprehensive teaching about the use of SC.

5.3 RQ3. Effect of factors other than the instructional intervention itself, especially initial proficiency level, possibly affecting personal lexile change or CSEPT change

In this section, the results are provided concerning factors potentially affecting the change of student CSEPT scores or personal lexile scores. Due to the mostly non-normal nature of the data, non-parametric versions of correlation (Spearman ρ) and regression (Optimal scaling) were used. Furthermore, we consider results not only for the whole sample but also for the more 'struggling' students separately. Those were identified as students scoring less than 69 on the pretest CSEPT. That cutting point was decided by inspection of the score distribution which showed a natural division at that point. Above it was a tight cluster of 21 students scoring 70-85, and below it was a looser cluster of 28 scoring 33-68.

Personal lexiles and the reading part of CSEPT are both measures of reading ability so, first, five measured aspects of the reading that were done throughout the study were investigated to see if any of them related to improvement in either of those measures. They were:

number of texts read;

post-reading quizzes attempted as % of texts read;

average quiz score;

average lexile of texts whose quizzes were passed; and

wordcount of texts read whose quizzes were passed.

Some of those reflect the amount of reading input, others the difficulty of the input. According to Krashen [4], both those are crucial for learning to occur: learning is better with more input, but it must be just a little beyond the reader's competence (not too easy or too difficult). Therefore, some correlations with proficiency change were expected.

In fact, in an optimal scaling analysis, none of these correlated remotely with personal lexile change or indeed with CSEPT score change either for the group as a whole or the strugglers considered separately. Possibly the choice of reading texts, whether made by the teacher in class or the student at home, was at a level that was easy even for the weakest students. Mean accuracy on post-reading quizzes was as high as 69.15% (*SD* 17.69). For that reason, perhaps some students were not challenged and did not increase their reading ability depending on what texts were read, or how many. Furthermore, some students, in fact, recorded reading only texts that the Scholastic co-teacher taught in the class. That means, they did not use Scholastic out of class to read further texts on their own initiative, as was the researchers' intention.

For the group that initially had higher CSEPT scores, the average lexile of texts whose quizzes were passed correlated negatively with personal lexile change (ρ=-.583. p=.006). This suggests perhaps that they had a strategy of reading well below their proficiency level, at least initially, thus lowering the mean lexile of the texts read; this then enabled them later to read harder texts and appear to improve their personal lexile more. All that indicates perhaps the need for greater control of student reading quantity and choices, if a systematic beneficial effect on proficiency growth is to be established.

Next, the impact of background variables on the participants was investigated. First of interest among those is whether participants' initial CSEPT scores, as a measure of how far they are struggling with English, relate to how much they improve with the use of the chosen websites.

An interesting difference between Lexiles and CSEPT emerges. Correlations show that on Lexiles, those who had higher CSEPT scores initially increased more, and those with lower initial CSEPT scores increased less, although the relationship was not quite significant (ρ=.274, p<.057). CSEPT change however showed the opposite (ρ=-.422, p=.004). Those who scored higher on CSEPT initially increased less, and those who scored lower initially increased more, with high significance. This suggests that, relevant to answering RQ3, it was the students who were struggling the most that were helped in their proficiency the most by the interventions of the present study. Among those who scored below 69 on the pretest, the highest improvement was 35 CSEPT points. However, among those that scored high on the pretest (70 - 85) the best improvement was only 10 points. Initial CSEPT score however had no overall significant relationships with any of the attitudes to the focused websites reported above.

In addition, the impact of other self-reported background variables of the participants, not specific to reading, was investigated together (using Optimal Scaling):

    Gender

    Average time spent online per day

    Number of English learning-related websites used

    Average time spent per week on the internet, during the period of participation, in English learning-related websites

    Whether English learning-related websites were accessed at college

    Whether English learning-related websites were accessed at home

    Number of different English-related website functions used

    Overall approval of the websites as reflected in the two questionnaires

For the whole sample, CSEPT improvement was significantly greater only for students who reported greater average time online per day, in the Scholastic questionnaire (*beta* =.431, F=7.88, p=.002). Modal response for average time was over three hours, but that does not separate use for English from other uses. A similar result was found for the struggling group considered on its own (p=.036).

For the whole sample, the lexile improvement was significantly greater for students who reported using a greater number of English

related websites (mean=2.3, range 1-4; *beta*=.477, F=3.26, p=.050), and for those who approved more highly of the CoolEnglish provision (*beta*=.791, F=4.68, p=.008). A similar result was found for the strugglers separately with respect to approval (p=.020), but that group also exhibited a gender distinction (p=.028): females (n=25) showed significantly better lexile improvement than males (n=3). Although the number of males is very small, that could be because the content of the reading chosen in the TS classes suited females better and males did report dissatisfaction with the amount of fiction chosen for the class reading. That was remedied by TS after the interviews, by introducing class reading about the sport of wrestling. However, the overall implication is perhaps that it is never going to be possible to choose a reading text for a class that suits all students in level or genre. Attention has to be paid more to getting students to read individually out of class, making proper selections based not only on personal interest in the content, but also text lexile level. That may well not have happened fully in the present study.

Overall, then, it seems to be the general use of websites for learning English, including CE, that impacts more on proficiency than the amount of reading of self-selected English texts. This perhaps reflects that English learning websites deliver far more than just graded reading material and that the other types of activity (e.g., games and exercises) probably deliver English proficiency improvement much faster than learning through extensive reading, even when done at an appropriate level [22]. That is consistent with the view of Nation [11] that, at lower levels of language proficiency (such as that of the students in this study), it is more efficient to rely on direct teaching/learning of high-frequency vocabulary than to rely on the much slower process of vocabulary expansion incidentally through extensive reading.

6.   Conclusion

The study supported the fulfilment of our intention to provide a reading course that was both effective and motivating. Approval of the websites used was high, and reading proficiency increased, especially among

students who liked the websites more and used them more.

The increase in proficiency was however in absolute terms modest, not rising above CEFR A2 [19]. Furthermore, there were signs that the general English learning aspects of the websites (e.g., CoolEnglish exercises) were at least as effective as the reading texts in promoting English proficiency: possibly the struggling students were still at a level where they primarily needed direct teaching/learning of English to prepare for reading (more as provided by CoolEnglish) and could not yet rely greatly on exploiting the reading to indirectly learn more English (in Scholastic). Therefore, this may imply a limit to Krashen's [4] input hypothesis for students of our level. However, we believe that the greatest potential success of the course lies not in its immediate proficiency improvement. Rather, given the highly positive attitudes to the websites, it offers the likelihood that the students will indeed be motivated to continue using them and reading in English throughout their time at university, and indeed maybe in later life. If they can be persuaded to choose texts to read at an appropriate level, not just to suit their interest in the content, by that means they may eventually attain a level of overall English proficiency that exceeds the minimum that the Government expects (B2), and equips them better as global citizens.

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Appendices

Cool English questionnaire items in descending order of agreement	Min	Max	Mean	SD
The names or symbols of the menus, buttons and icons of the e-learning website are easy to understand.	3	5	4.37	0.793
The overall interface of the e-learning website is well designed, so that I don't have to spend a lot of time learning how to use the functions inside.	3	5	4.37	0.817
The functions of digital learning meet my needs in learning English.	3	5	4.33	0.834
The eLearning website menu is well designed, allowing me to quickly find the learning features, courses, quizzes, etc. I want to use it.	3	5	4.33	0.810
The video on the digital learning website is clear and distinct.	3	5	4.33	0.834
The digital learning website has a soft background that does not interfere with learning.	3	5	4.33	0.834
The themes and content of the e-learning website are consistent and clear and easy to understand.	3	5	4.31	0.829
I think the digital learning site layout has a visual animation that guides me through the interface.	3	5	4.31	0.829
The digital learning website videos are related to the list of course content topics.	3	5	4.31	0.829
The layout of each page of the digital learning website is consistent and unified.	3	5	4.31	0.829
Each page of the digital learning website only teaches one unit, which is not easy to confuse.	3	5	4.31	0.829
The digital learning website allows me to practice with teaching materials an unlimited number of times.	3	5	4.31	0.829
For me, the how-to instructions of the digital learning site are clear and complete.	3	5	4.31	0.829
The digital learning site gives a good idea of where to click and roughly where to link.	3	5	4.31	0.829
A feedback function is provided on the e-learning website to help me get relevant supplementary materials quickly.	3	5	4.29	0.825
I think the overall visual color of the e-learning website is in harmony with the design style.	3	5	4.29	0.825
The title of each page of the digital learning website is clear and easy to understand and read.	3	5	4.29	0.825
One comes to use the digital learning website to learn and make English more handy in the workplace.	3	5	4.29	0.825
Difficulty levels are clearly listed on the digital learning website.	3	5	4.29	0.825
I will share with others about the lessons I learned with eLearning.	3	5	4.29	0.848
The teacher will invite professional teachers or foreign teachers to use computer-assisted teaching in the classroom for collaborative teaching from time to time, which is very helpful for my English learning.	2	5	4.27	0.888
The teacher regularly invites professional teachers to the classroom for collaborative teaching, and assists in tracking and reminding students of the learning status of the platform, which is helpful for my English learning.	2	5	4.27	0.888
Digital learning has helped me in learning English.	3	5	4.27	0.843
One can understand all the functions of eLearning.	3	5	4.27	0.819
I think the various quiz modes in the digital learning are easy to use.	3	5	4.27	0.819
The instructions for the practice questions on the digital learning website are clearly explained.	3	5	4.27	0.819
I am satisfied that the teaching materials of the digital learning site are rich and interesting.	3	5	4.27	0.819

Cool English questionnaire items in descending order of agreement	Min	Max	Mean	SD
I can enhance my English learning through e-learning and get high marks in course-related assessments.	3	5	4.27	0.814
Class teachers regularly invite professional teachers to cooperate with teaching and provide rewards from time to time, which is helpful for our English learning.	2	5	4.25	0.883
Through the digital learning website, I can make English more integrated into my life in learning English.	3	5	4.25	0.837
The course learning method through the digital learning website can apply the professional knowledge I have learned to develop my potential.	3	5	4.25	0.813
The mode of course learning through the e-learning website can increase my motivation for active learning.	3	5	4.25	0.837
My learning ability is enhanced through the e-learning website,	3	5	4.25	0.837
The feedback provided by digital learning is very helpful for learning English.	3	5	4.25	0.837
When I need listening practice in the future, I will use the digital learning website as a practice tool.	3	5	4.25	0.837
If I need to learn English by myself in the future, I will use the digital learning website as a tool for practice.	3	5	4.25	0.837
Through digital learning, I am more satisfied with my sense of achievement in English learning.	3	5	4.25	0.837
The digital learning website has a moderately sized font and is easy to read.	2	5	4.25	0.905
In the class, the professional teachers are specially invited to guide the learning platform and assist the students to log in on the spot. I am satisfied.	2	5	4.23	0.899
I think using digital learning is helpful for my professional English related learning.	3	5	4.23	0.854
The videos in digital learning are helpful for listening training.	3	5	4.21	0.848
When I need vocabulary practice in the future, I will use the digital learning website as a practice tool.	3	5	4.21	0.848
After the collaborative teaching of the company and teachers, I can find my favorite books or topics on the digital learning website.	2	5	4.19	0.930
The digital learning website, providing a platform for me to learn English actively, is an indispensable auxiliary teaching material after class.	3	5	4.19	0.841
I think the pros of digital learning sites outweigh the cons.	1	5	4.17	0.944
The videos in digital learning are helpful for oral training.	3	5	4.17	0.879
After meeting the functions of the digital learning website, the next time you enter this website, you don't need to explore how to use it.	1	5	4.12	1.041
The digital learning website design is so complicated that I don't know where to start. N	1	5	3.50	1.379
I can't understand some parts of the digital learning website, and I don't know what the function is. N	1	5	3.29	1.348
The function labels on the e-learning website are not clear, and I often click the wrong link. N	1	5	3.27	1.359

Scholastic questionnaire items in descending order of agreement	Min	Max	Mean	SD
The video on the digital learning website is clear and distinct.	3	5	4.37	0.841
The digital learning website has a soft background that does not interfere with learning.	3	5	4.37	0.841
After the collaborative teaching of the company and teachers, I can find my favorite books or topics on the digital learning website.	3	5	4.35	0.837
The teacher will invite professional teachers or foreign teachers to use computer-assisted teaching in the classroom for collaborative teaching from time to time, which is very helpful for my English learning.	3	5	4.35	0.861
Class teachers regularly invite professional teachers to cooperate with teaching and provide rewards from time to time, which is helpful for our English learning.	3	5	4.35	0.837
My learning ability is enhanced through the e-learning website,	3	5	4.35	0.764
When I need listening practice in the future, I will use the digital learning website as a practice tool.	3	5	4.35	0.789
If I need to learn English by myself in the future, I will use the digital learning website as a tool for practice.	3	5	4.35	0.764
The functions of digital learning meet my needs in learning English.	3	5	4.35	0.789
The digital learning website videos are related to the list of course content topics.	3	5	4.35	0.861
Through the digital learning website, I can make English more integrated into my life in learning English.	3	5	4.35	0.789
The teacher regularly invites professional teachers to the classroom for collaborative teaching, and assists in tracking and reminding students of the learning status of the platform, which is helpful for my English learning.	2	5	4.33	0.901
In the class, the professional teachers are specially invited to guide the learning platform and assist the students to log in on the spot. I am satisfied.	3	5	4.33	0.857
I think the pros of digital learning sites outweigh the cons.	2	5	4.33	0.857
The layout of each page of the digital learning website is consistent and unified.	3	5	4.33	0.857
The digital learning website allows me to practice with teaching materials an unlimited number of times.	3	5	4.33	0.810

Scholastic questionnaire items in descending order of agreement	Min	Max	Mean	SD
The course learning method through the digital learning website can apply the professional knowledge I have learned to develop my potential.	3	5	4.33	0.785
The videos in digital learning are helpful for listening training.	3	5	4.33	0.785
Through digital learning, I am more satisfied with my sense of achievement in English learning.	3	5	4.33	0.785
I think using digital learning is helpful for my professional English related learning.	3	5	4.33	0.785
I can enhance my English learning through e-learning and get high marks in course-related assessments.	3	5	4.33	0.810
The overall interface of the e-learning website is well designed, so that I don't have to spend a lot of time learning how to use the functions inside.	3	5	4.33	0.834
I think the overall visual color of the e-learning website is in harmony with the design style.	3	5	4.33	0.857
The title of each page of the digital learning website is clear and easy to understand and read.	3	5	4.33	0.857
I am satisfied that the teaching materials of the digital learning site are rich and interesting.	3	5	4.31	0.781
The feedback provided by digital learning is very helpful for learning English.	3	5	4.31	0.805
Difficulty levels are clearly listed on the digital learning website.	3	5	4.31	0.829
One comes to use the digital learning website to learn and make English more handy in the workplace.	3	5	4.31	0.805
Each page of the digital learning website only teaches one unit, which is not easy to confuse.	3	5	4.31	0.853
For me, the how-to instructions of the digital learning site are clear and complete.	3	5	4.31	0.829
The digital learning site gives a good idea of where to click and roughly where to link.	3	5	4.31	0.829
The mode of course learning through the e-learning website can increase my motivation for active learning.	3	5	4.29	0.800
The digital learning website, providing a platform for me to learn English actively, is an indispensable auxiliary teaching material after class.	3	5	4.29	0.776
The videos in digital learning are helpful for oral training.	3	5	4.29	0.776
The eLearning website menu is well designed, allowing me to quickly find the learning features, courses, quizzes, etc. I want to use.	3	5	4.29	0.848
Digital learning has helped me in learning English.	3	5	4.29	0.825
I will share with others about the lessons I learned with eLearning.	3	5	4.27	0.819
The names or symbols of the menus, buttons and icons of the e-learning website are easy to understand.	3	5	4.27	0.843
I think the digital learning site layout has a visual animation that guides me through the interface.	3	5	4.27	0.888
The themes and content of the e-learning website are consistent and clear and easy to understand.	3	5	4.27	0.866
I think the various quiz modes in the digital learning are easy to use.	3	5	4.25	0.837
When I need vocabulary practice in the future, I will use the digital learning website as a practice tool.	2	5	4.23	0.877
The instructions for the practice questions on the digital learning website are clearly explained.	3	5	4.23	0.831
One can understand all the functions of eLearning.	3	5	4.21	0.871
The digital learning website has a moderately sized font and is easy to read.	2	5	4.21	0.893
A feedback function is provided on the e-learning website to help me get relevant supplementary materials quickly.	2	5	4.15	0.916
After meeting the functions of the digital learning website, the next time you enter this website, you don't need to explore how to use it.	1	5	4.13	0.950
The digital learning website design is so complicated that I don't know where to start. N	1	5	3.48	1.229
I can't understand some parts of the digital learning website, and I don't know what the function is. N	1	5	3.42	1.304
The function labels on the e-learning website are not clear, and I often click the wrong link. N	1	5	3.29	1.348
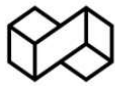
The Philosophy of Sufficiency Economy (PSE): Choice, Survival, and Happiness for All in a Time of Crisis

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Abstract

The problems of economic shrinkage caused interruptions in household incomes and consumption growth, while the coronavirus spread increased the unemployment rate and household debt risen which exacerbated the poverty situation. This study specifically aims to honor His Majesty King Rama 9, as well as has overall aimed to explore the essences of the Philosophy Sufficiency Economy Philosophy (PSE) emphasizing the effects and benefits arising from the application of PSE and pointing out how the PSE becomes another choice of the people for their survival and gaining happiness. This documentary research uses narrative reviews together with content analysis method and cross-study synthesis for research result interpretation. Results showed that PSE is a particular approach for sustainable development aligned with the principles and objectives of SDGs; seeking to eradicate poverty and reduce inequality as a means to achieve sustainable development. The PSE has certainly close and strong bonding with various sectors such as entrepreneurs, Intellectual Properties Owner, community, local wisdom, and particularly green Innovation. Applications of PSE have significantly proven for poverty eradication and food security which can to lead to sustainable economic growth and sustainable consumption and production. The philosophy greatly attaches to human development at all levels particularly strengthening the community's capacity to ensure a balanced way of life and resilience. Once people become realizing and recognizing the significances of PSE, therefore, when we live in any crisis, we should live with self-sufficiency, protection, and rationality, this is one another potential choice and a means of survival and a way of happiness for people at all levels.

1. Introduction

In a human society in a globalized world, there will be existed of battles between tribes, between religious or international groups, war is severe destruction of peace. Hundreds of millions of people have been killed in world wars two times in the last century tens of millions of people died each time. It is estimated that all kinds of wars have killed about 200 million people over the past hundred years, but those who have been killed from poverty and injustice in a society called Silent Violence. Now there is a global crisis, both economic crises. The social crisis, the real environmental crisis, is a crisis of coexistence.

The coexistence crisis is caused by a conflict between the body and the mind. Physically, human beings have come into a unified connection, but the heart is not yet one, still thinking about the unique benefits a particular group might call it. "Globalization without Global Consciousness." The lack of consciousness of unity causes a coexistence crisis, namely the lack of peace and happiness. [1] By the way, what human beings in society should keep in mind for a happy survival in society is either used in the profession to live peacefully, which is one of the human kinds most important activities. This inevitably means that human beings must have a career or professional ethic because, in that work, human

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beings must have a society consisting of many people. Since in the field of work, working alone is difficult, it is desirable to frame humans for practice and peaceful collaboration. [2]

When considering the Millennium Development Goals (MDGs), has aimed to accelerate the well-being of people, particularly in less developed countries, due to human well-being being considered key to achieving all other aspects of development. The ultimate goals of MDGs are to eradicate extreme poorness, attain standard primary education, empower women and promote gender equality, improve maternal and child health, battle against HIV/AIDS, tuberculosis and other diseases, and establish environmental sustainability. Empirically, environmental sustainability has received much attention on global stage since the Brundtland Report was published. It indicated obviously that disruption of natural resources and deterioration of environment are distinct and figure out dangers, and striving for economic development at the expense of the environment and resources is regarded as unsustainable. By the way, environmental and natural resource protection and conservation are essential for development.

Thailand as well, His Majesty King Rama 9 had compassionately delivered to the Thai people margins of thought, strategic planning and implement which absolutely become the most powerful and meaningful response to the threats that Thailand has been facing. [3] Absolutely, the answer is self-sufficiency of people at all levels; national, provincial, community, and family. This concept is enshrined in "The Philosophy of Sufficiency Economy (PSE)" and reflects similar efforts globally to break the cycle of affliction and exploitation that results from the domination of globalization. It is a philosophy of living a balanced life and shows the way of life for individuals, households, communities, organizations, and the nation. Because it is a developmental factor that starts with humans, it makes benefits for humans. Certainly, when a man has developed will affect development in other areas more significantly. It can be said that all levels of success in development must begin with the potential and self-reliance of the existing capital balance. [4] The major component is earning income for living, having

stable career development, creating a culture of harmony, and caring for one another. The power of group mobilization in a community is considered a creative way and beneficial to the collective local resources, therefore, forests and the environment are critically planned to be sustainable production bases. Eventually, the PSE approach is contributing to our nation in socioeconomic development and prosperity, particularly in building unity and peace in Thai society. For many years in the past decade, Thailand has adopted the Philosophy of Sufficiency Economy as the framework of thought and practice for social, economic, and environmental development in the most sectors throughout the country. So far as we know that the economic growth of the country certainly requires a deep economic study for understanding the behavior of individuals, households, and organizations [5] when they utilize limited resources, which have different way of approaches, to achieve desired destinations. Individuals and organizations are foreseen to perform rationally, have different and appropriate demands, limited resources to reach the target, decisive preferences, and the capability of making a decision.

The Philosophy of Sufficiency Economy due to royal initiatives has made an exclusive contribution to the people and the nation as well as it has been making the international community know and see the actual benefits of the royal projects that he has pushed for the best interests of the Thai people. In the meantime, PSE has been able to teach us now to be contented with what we have, don't be aspire for more, and have moderation in our approach. This is a fantastic means that will be able to wall off globalization negative effect. Capitalism and materialism can trap people in stressful conditions. On the other hand, if people feel satisfied with what they have at all times, they would plan and think about giving something to others as a part of their merit making. As a consequence, the author has strongly believed that the Philosophy of Sufficiency Economy is a choice of nurture that has come to the people, for the people, and by the people, so it will be a proper time to reveal the significance of Sufficiency Economy Philosophy as well as to drive it to become another choice of the people for their survival and gaining happiness.

2. Research Objectives

This study is essentially intended to honour His Majesty King Bhumibol Adulyadej and to explore and disseminate the significances of Sufficiency Economy Philosophy (PSE) focusing on the patterns and methods of PSE applications in all regions of the country, effects and benefits arising from the application of PSE, factors contributing to the effective application of PSE including issues that some groups and communities still do not fully understand which requires knowledge and clarification to effectively drive the Sufficiency Economy Philosophy to become another choice of the people for their survival and gaining happiness.

3. Research Methods

This study used narrative/descriptive reviews and content analysis approaches, which have four main principles and steps: [6]

(1) Summarize the study results of each document, and project.

(2) Find the key points from the study and then make a summary of each piece of the document and each project to classify them and group them into categories.

(3) Analyze, interpret, and find the meanings to obtain preliminary findings of each category

(4) cross-study synthesis of the findings of each category to create a broader picture as well as analyze, interpret, and give new meanings or expand the meaning further (interpretations of interpretations)

3.1. Targeted Documents

This documentary research uses documents as the study source, aiming to extract information from the appropriate techniques for handling and analyzing data, according to scientific principles. [7] The targeted documents used for systematic reviews as part of the study contain agendas and minutes of meetings, manuals, background papers, press releases, program proposals, institutional reports, survey data, research reports, and publications. To collect the targeted documents, criteria were established to determine which documents are included in this study. It is important to note that we decided to focus on documents written in Thai and English as they are easily accessible. However, these research reports could probably provide a role model for both Thai and foreign people. For a systematic analysis, therefore, we referred to both the Thai-Journal Citation Index (TCI) and International Database including SCOPUS, ScienceDirect, SciFinder, Social Science Research Network, and Web of Knowledge as a starting point to identify relevant journals. With a deliberate search across each issue until 2018, we found 19 research reports.

3.2 Documentary Analysis

Documentary analysis is a highly normal typology in its studies. This methodology has made it possible to increase the depth of theoretical understanding of specific topics, through the use of documents from different sources, such as articles, journals, meeting reports, PSE practical guides, dissertations, and theses. The documents have been analyzed and synthesized to seek relevant aspects in the most varied contexts that reflect the study objectives. Documentary analysis, as a result, is proposed as a means of producing or re-elaborating pieces of knowledge, and of creating new ways of understanding phenomena, interpreting facts, summarizing information, determining tendencies, and as far as possible making inferences. Investigation in documentary analysis requires an assessment of the context of the documents' yield of their kinds of literature, nature, and sources. Analyzing documents entails criticizing the perspective of the person who produced the documents, in the place of there, which requires care and expertise on the part of the researcher. Similarly, the nature of a document (in juridical, technical, historical terms, etc.) must be taken into account at the time of analysis, with the researcher taking steps to ensure the document's authenticity and trustworthiness [8].

Content analysis is mainly used for collecting, editing, analyzing, and synthesizing various documents related to the Sufficiency Economy Philosophy from 1988-2020, focusing on the patterns and methods of applying the PSE in various contexts and all regions of the country, effects, and benefits arising from the application of the PSE, factors

contributing to the effective application of the PSE, including issues that some groups and communities still do not fully understand which requires understanding and clarification to effectively drive the PSE and spread more widely.
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4. Results and Discussion

The results of the analysis and synthesis are presented in 5 major points revealing 1) The origins of PSE, 2) The structure and goals of PSE: covering its meaning, key characteristics, new theories, and important goals of the PSE, projects resulting from the royal initiative from the earliest times to the present, 3) The essence of driving PSE at the national, international and global levels, 4) PSE models and their application in various contexts including government, educational institutions, business/private sector, and the people's sector, and the benefits that have arisen, and 5) The power of PSE in providing more choices for the people's survival in a time of crisis.

4.1 The Origins of the Philosophy of Sufficiency Economy

After ascending the throne, His Majesty King Rama 9 visited people in various areas throughout the country, especially the poor people in remote areas, to investigate the fact and gather true information from the people and government officials in those areas. In the meantime, His Majesty observed the geographical conditions, so he was aware of the problems of suffering and misery of the people through his own eyes. [9] In conclusion, difficulties and adversities in people' lives are caused by many reasons, including;

1. **Gradually increasing number of people in today world**: While various important resources that help humans to live become less and less, an imbalance and struggle for resources exist. People in the world must limit their use of resources and consumption. Lack of natural resources could affect the well-being of the people in the world. The King saw this problem and if there is no solution, any trouble in the life of people will definitely occur and there will be probably no resources left for future generations [10]

2. **Country development in the form of capitalism**: Since the first economic development plan in 1 9 6 1 , Thailand has developed in the form of capitalism focusing on economic prosperity alone, and then Thailand experienced rapid economic growth from 1961 – 2 0 1 0 , but it is a progress that causes imbalances in many dimensions that certainly requires serious solutions. Consequently, economic development using "money" as a "goal" regardless of mental or spiritual upliftment causes capital problems, particularly in a degenerate form of soil, water, forest, wisdom, and culture. It is undeniable that higher production costs and loss of self-reliance among the people occur everywhere affecting Thai society to become unstable and lose potential when faced with various crises, such as the 1997 economic crisis [11], [12], [13], [14]. Eventually, the outcomes of the country development are a degradation of natural resources and the environment. In the meantime, most people become unaware of rehabilitation and replacement including the loss of local wisdom to solve the problems that existed in their communities. These situations are all negative images that are becoming more visible. [15]

3. **The economic crisis of 1997:** After decades of country development relying on the mainstream economy which has been a capitalist system, Thailand experienced an economic bubble burst in 1997. The economic crisis affected all classes in society, faced with difficulties in living, having more crime problems including other social problems that worsened and weakened countryside. [16], [9]

Since then, His Majesty King Rama 9 has initiated the royal initiative "Sufficiency Economy" for the Thai people to implement since 1974. On December 4, 1997, King Bhumibol Adulyadej gave his speech again on the topic of "Sufficiency Economy" to various people who attended the auspicious occasion of his birthday at Dusit Palace, Bangkok-Thailand. His majesty emphasized again for the Thai people to see the benefits of a sufficiency economy in the year that Thailand encountered with the economic crisis. The main idea in this regard is also mentioned and has been widely described especially when the people in the nation are in a state of anxiety and confusion about the concept of a sufficiency economy.

Therefore, it is like a spark of awareness and cooperation as well as let's come together to invent, seek, and understand, both at the level of thought and concrete guidelines according to the reality of Thai culture and society. [11] His Majesty the King pointed out the preliminary cause of the economic crisis, which shows the directions to solve problems and prevent the occurrence of the crisis in the future [17] including:

(1) Unproductive spending or habitually consumed
(2) Over-investment is risky and unpredictable without certain immunity
(3) Production processes that do not take into account the utilization of local resources or in the country at full
    capacity.

4.2 Structure and Goals of the Philosophy of Sufficiency Economy

The Philosophy of Sufficiency Economy is a concept and practice that can be used by people at all levels in the middle way of life that can help and lead people to meet happiness, peace, prosperity, and well-being. The important concepts are as follows: [18]

• **Moderation:** Means any action to be self-sufficient or to do something appropriately, in moderation, not extravagant, with just the right amount, which depends on each person. Because the fit of each person is not equal, don't be too big neither careless nor too greedy. Moderation is one way to build a barrier against the negative effects of globalization.

• **Reasonableness: Means to d**o something with reason, should not follow the trend without careful considering whether it is appropriate or not.

• **Self-immunity:** Means not being a careless person and always being ready, balanced, and prepared to respond and support the effects of various areas change; material, society, environment. and culture, that may occur quickly and widely with prudent and concise risk prevention measures.

• **Knowledge condition:** Every element of work must be started and based on actual knowledge as well as requires deep knowledge, broad knowledge, and extreme caution with the ability to apply academics to plan and implement every step of the way.

• **Moral condition:** It is important to live in a society with honesty, diligence, patience, unity, perseverance, wisdom, and prudence so that it leads to a balanced, stable, and sustainable life.

When considering to the final goal of the Philosophy of Sufficiency Economy. It is to create balanced) and stable development, at all levels, from individual, family, and community to society at large by developing the ability to cope appropriately with the critical challenges arising from extensive and rapid changes (i.e. globalization) in the material, social, environmental, and cultural conditions of the world. As can be seen, the fundamental goal that has never changed for the development projects, particularly the royal initiative project is to eliminate misery and provide happiness to the people, as well as, to ensure stability and a good quality of life. [9], [21]

Overall, the three interlocking elements represent the three principles of the PSE: Moderation, Reasonableness, and Self-immunity. These three circulars are interconnected and interdependent. Moderation implies the idea of people living their lives on the middle path, not the extremes. People should rely on themselves without overconsumption. This way of living occurs when people have reasonableness—accumulated knowledge and experience, along with analytical capability, deliberateness, self-awareness, compassion, and empathy as well as being aware of the consequences of their actions. As for the third principle, self-immunity, it refers to the capacity of people to protect themselves against any external state of chaos and to cope with any challenges that are unpredictable and uncontrollable. It indicates a foundation of self-reliance, as well as self-discipline. In addition to these three compositions, another two conditions are needed to make the principles of sufficiency economy work: knowledge and morality. Knowledge covers accumulating information with insight to understand its meaning and the prudence needed to put it to use. Morality refers to trustworthiness, integrity, perseverance, ethical action, honesty, and a readiness to work hard.

4.3 Driving the Philosophy of Sufficiency Economy

Driving the sufficiency economy today, there are both domestic, international, and global directions.

4.3.1 Driving at the national level

Sufficiency Economy is central to alleviating poverty and reducing the economic vulnerability of the poor. It is a means towards community empowerment and the strengthening of communities as the foundations of the local economy and the Sufficiency Economy takes corporate responsibility for a new level by strengthening the community so it can hold practices bring to long-term profitability in a competitive environment. Sufficiency Economy principles are vital for improving standards of governance in public administration, as well as guiding national policy to immunize a country against shocks, craft better policies, and plan strategies for more equitable and sustainable growth. Certainly, Sufficiency Economy thinking demands a transformation of human values, and a revolution in the mindset, both of which are necessary for the advancement of human development. From these lesson-learned as an accomplishment of PSE implementation in Thailand nation, the 3 core working groups making a drive of the philosophy happened comprising a group of experts from the Prime Minister's Office, the National Economic and Social Development Board (NESDB), and together with the Crown Property Bureau. The goal of PSE driving is to encourage most people to recognize the essences of PSE and ultimately Thai people in different societies to use PSE as a tool for achieving quality of life and happiness. However, driving the PSE requires 4 operations as follows; [22]

(1) Creating the correct understanding of the sufficiency economy concepts
(2) Development of concepts and knowledge about the sufficiency economy

(3) Development of learning processes and applications at the family, group, and national level
(4) Linking the network of sufficiency community development of civil society

From the study and analysis of supporting factors or positive factors that help drive the success of PSE application in various fields, it has shown that the philosophy will help to support the village development process into a path of sufficiency, these priority supporting factors include;

(1) The abundance and availability of natural resources and social capital in a community
(2) Effective management of various groups in a community
(3) Obtaining support from external organizations
(4) People having a way of life and culture of life on the middle path
(5) Having clear and potential community leaders

The King emphasized the need for "Examples of success" to be able to implement themselves at all times [23], which is another important factor that helps to apply the sufficiency economy philosophy to success is to have examples of success that could help lead the leaders to understand and can be used in practice, for example, to enable farmers and communities to understand the bio-fertilizer by disseminating knowledge and demonstrating the correct way to use the bio-fertilizer at all stages of agriculture. This way can help to reduce most of the expenses that are spent on medicines, fertilizers, and chemicals. As it will help solve agricultural problems in all aspects. [24]

4.3.2 Driving the Philosophy of Sufficiency Economy Abroad

In addition to the development work in the country, the PSE has been driven abroad through the process of providing academic assistance, particularly to other neighboring countries by the Chaipattana Foundation, for example, the Lao People's Democratic Republic which is a collaboration project between the Chaipattana Foundation and Champasak University. The Chaipattana Foundation has helped and transferred

agricultural knowledge to students and farmers in the Lao People's Democratic Republic.

Driving the PSE in foreign countries, many scholars have commented that the Sufficiency Economy Philosophy in Thailand is becoming a pilot model and alternative for development in South America. Many people are interested in this idea because it corresponds to the concept of a reconciliation economy. Determinedly, building international sufficiency economy networks should start among countries or areas developed with alternative economics which is similar to the philosophy of sufficiency economy. There is a consolidation among the member nations to work together in various fields then gradually expand) to other countries who are interested or want to join the network respectively. It is an operation that is considered a progressive sufficiency economy at the global community level. In addition, if the Philosophy of Sufficiency Economy is translated into other languages other than English, it will greatly promote international mobility. [25]

4.3.3 Driving on a global scale

An article written under the pen name of Lom-Plian-Tid (The wind changing direction) in the Thai Rath Newspaper, Issue of Wednesday, June 3, 2015 (Page 5), well illustrates the direction of the Sufficiency Economy Philosophy on a global scale as showed that "Sufficiency Economic Philosophy" of His Majesty King Bhumibol Adulyadej, is not only a success that has happened to the poor in Thailand but has also been accepted from all over the world. At the end of May 2015, the National Economic and Social Commission (ESCAP) held a general meeting in Bangkok with a special aim of brainstorming opinions of member countries to contribute to the direction of future world development, under the Post 2015 Millennium Development Goals to be finalized at the UN General Assembly on this PSE timber.

Ms. Chamchat Aktar, Deputy Secretary-General of the United Nations ESCAP gave an opinion at the meeting that she had followed-up on "The Philosophy of Sufficiency Economy" of His Majesty the King for a while and found that it was very special. The PSE emphasize balanced development and promoting the

potential of people along the way. Therefore, it is a very valuable approach to sustainable development which is the main issue of the world today and in the future and in line with the direction of sustainable development of the world", which is an opportunity to pave the way for the introduction of the Sufficiency Economy Philosophy to be presented at the United Nations General Assembly to be the direction of future world development.

Evidentially, PSE has shown such a lightening feature that is not found in other concepts which are risk management, building good immunity, and the ability to cope with internal and external changes. In another word, to use it as a barrier against the negative effects of globalization. It is a philosophy that values the ecosystem and the environment. It is economically feasible social justice regarded as a value system including the way of life tends to lead to a shared and peaceful coexistence. All of this contributes to sustainable development not only at the individual, family, and community levels but also at the national level. According to the philosophy of the sufficiency economy, national development must rely on 3 level approaches: a) Strategies for the survival or sustainability of the country under the influence of globalization, b) A national framework for sustainable development, and c) An action plan for local development based on resource suitability. It is strategic from the community level up to the international level. [17], [26]

4.4 The Contribution to Development: Models of applying PSE

Nowadays, Thailand is at the stage of addressing and applying the Sufficiency Economy principles and strategies widely to address current development challenges i.e., organizational management, poor environment, human capital shortage and the role of government. The Philosophy of Sufficiency Economy conveys new messages and ideas in dealing with these challenges and provides a new paradigm of development with an ultimate goal of lifting up people's well-being and quality of life as a development goal. Establishments or organizations at the current

stage of economic development, the new generation of development theorists [27] critically indicates institutional failure has caused and brought about a wide range of socioeconomic and country development problems, concerning inaccessible and inequitable information, missing markets and non-ethical governance and regulation issues. [28] In relation to this condition, trustworthiness, honesty, and integrity are essential in determining behavior, decision-making, and interaction among people in society. Accordingly, in a society in which people have Sufficiency Economy mindset, the movement of economic development should be progressive and satisfying. Moreover, any types of relationship; family kinship, and social networks, are considered essential elements of social capital that a society requires. Certainly, individuals and society benefit from this network in several ways, i.e., people in the community may look after or take care of each other, help each other out, ward off bad influences, and help build networks. All of these can be witnessed in a community with a "sufficiency-oriented" mind.

A good example of Muslim community with a sufficiency economy mindset and strong social capital is the Koy-Rut-Tak-Wa community where as people in the community look after each other and reach out to others, therefore, the community has never had incidences of violence, burglary, or drug or security problems. Another is the development of the spiritual aspect of PSE. When looking at any type of development, these values yield mental and spiritual well-being at the individual level and provide an ethical focus culture at the organizational level. Additionally, PSE enables people to deserve benefits from the realization of peacefulness; they have more profound lives as a result of the moral principle. With a balanced way of living, morality could develop and lift people's mindset and spirits and indicate that survival is a deeply meaningful phenomenon everyone preferred. Hence, this

illustrated a kind of freedom that refers to freedom from the trap of capitalism and materialism in which many people find themselves today, of which, is a freedom satisfied by those who have the PSE mindset. Sustainable development is one of the biggest challenges, not only for economists but also for governments, non-governmental organizations, and people in all regions, while environmental issues are a priority. Achieving economic prosperity at the cost of environmental degradation, deforestation, pollution, and depletion of resources is now perceived and viewed by the popular sector as poor decision-making.

4.5 Credibility of PSE in opening more choices for people' survival in a time of crisis

The significances of the sufficiency economy philosophy for the survival of the people in any crisis shall be analytically identified into five sections as follows:

1. Conveying Happiness:

Incredibly, Thailand can trigger off a new world direction, a new amazing socioeconomic order, and a more sustainable life for people, not only for the Thai people but for the world at large scale. The visions and missions of the King Rama 9 of Thailand is undoubtedly inspired to promote sustainability as a quality and satisfied way of life. Certainly, the people would have a sense of control over their destiny, as opposed to externalities over which they have no control. And as a result, the Thai people are now beginning to see the significances and the wisdom in HM's philosophy of Sufficiency Economy. It certainly accommodates economic growth, technological development, and realization of the globalized world. On sufficiency economy strategies to promote happiness, the Thai government has taken into consideration the responsibility of preserving nature and the environment for happiness of the people. [29] Hence, this is the role and function of the country to create conditions in which the

citizens can obtain happiness. These principles can be achieved through the strategies considered to be the three pillars with the two underlying conditions, people would be able to have secured and stable life in harmony and a sustainable society and environment as well. Such a way of living does not signify self-sufficiency; rather, it reflects self-reliance—the ability to tolerate and cope with all kinds of destructive impacts on their happiness.

2.   Realistic Material Aspiration:

On sustainable development, in other countries, the discussion mainly concerns green economic platform. In Thailand, however, the discussion of the sufficiency economy goes to the two mainstreams, the first is green economics- green growth- and the other is the Sufficiency Economy approach. These two streams are quite different. The discussion on 'green economy' emphasizes the world' capacity to maintain long-term economic development that relies on natural resources and the effects of climate change or the capacity of the planet. [30] Sufficiency Economy perspective has been developed focusing on the nature of the mind, while the other two mainstreams include having realistic material aspiration. The second is the importance of avoiding excessive risks, which was addressed by King Rama 9 as "If we allow greed to take over, we are going to have a catastrophe of some kind; well, that is what just happened," The concept relates clearly to the Buddhist Philosophy i.e., material goals that are the elementary objects that you can buy with income. People really need that stuff and they can't be happy without it. As income rises, people satisfy their basic needs. Then they don't have to continue to put too much effort into that stuff, because it does not generate much more happiness. Absolutely, development of the mind starts when economic problem stops, it goes beyond economics, hence some basic requirements have to be satisfied, but the gain

from happiness from having more than that stuff declines.

3.   A Solution to Poverty Alleviation:

By the core concepts of the Sufficiency Economy emphasize respect for nature, respect for ecology delete and not going beyond the ability of the natural resources. In comparison, under the "business as usual" model, people just do as the market dictates, believing that if you collapse- technology or something will fix it. Hence people will be just optimistic, and not be careful and responsible. [31] Critically, the Sufficiency Economy is to sustain and maintain the freedom, and the pride of the people, and the sovereignty of the country. Without concepts like Sufficiency Economy, eventually, many developing countries would be totally insolvent. Developing countries should instead develop the economy based on their capacity, strength, and culture. Therefore, Sufficiency Economy could be one innovation that provides the solution to the reduction of hunger and hungry people. To start with, Sufficiency Economy can provide an answer to how to manage resources by, for instance, developing green revolution technology in a rice production system. Simple technologies such as harvesting techniques, improving seeds and better fertilizers should be promoted so that the farmers will be ensured of basic needs, this is a way to solve the poverty and hunger problem.

4.   Re-invent Globalization:

On Sufficiency Economy concept is relevant to several things at the conceptual level, linking a culture-rooted way and sustainable development. "Sustainable development and growth should not happen in such a way that it destroys society, instead it brings a lot of ideas on caring, wisdom, prudence, judgment, and participation. At the same time, it brings a lot of this way of thinking and planning for having a quality of life, while the Sufficiency Economy does the same. [32] The Philosophy of

Sufficiency Economy reminds people of the essential elements of society. What brings and keeps society together is always the notion of justice. "It is not that everything will be divided equally- but there is a sense in which people think it is fair. Now, the problem is that the modern capitalist system which has evolved over the last 300- 500 years is not driven from that frame. Its drive is towards accumulation. That is a very powerful drive. It is beneficial because if we have this drive, we build and we create industries. But at the same time, it is built- it is destroyed.   "So globalization is unflattering of the power, the power of the market, the power of capitalism on a global scale. Now people are trying to address the issue of justice, create society and protect the nation at the globalization scale, we now have to re-invent for globalization.

5.   Social Learning:

Applying the Sufficiency Economy Philosophy does not have a fixed formula, it must be adapted to different situations at the individual, community, regional, and country levels. However, effective implementation must take into account the principles in 5 areas (Office of the National Economic and Social Development Board, 2008); Economy, Mental aspect, Socio-cultural, Natural resources and the environment, and Technology. Particularly, the socio-cultural aspect is considered more meaningful- people play special roles in helping each other, knowing, loving, unity, strengthening families and communities, and preserving identity, language, wisdom, and Thai culture. [33] Because unless the nations have participation by people in planning their communities, their cities, their businesses, or whatever it is, they're not going to wrestle with these questions and think about how the systems work and all the complexities, so it is the term "social learning". We have to get people thinking about the system, and one of the ways of doing that is by enabling them to get engaged with their problems in their society. Obviously, the PSE principle encourages people when they struggle with the questions of how we deal with the problems of water management, crop management, and so on, and

how much money we have and energy used, and so on, that makes the most people understand how the systems work together.

5.   Conclusion

The Philosophy of Sufficiency Economy is one of the royal initiatives that His Majesty King Bhumibol Adulyadej has given as a philosophy for Thai people to live a long life based on the principles of **moderation, reasonableness, and self-immunity**. The Sufficiency Economy is likely laying a solid foundation and sustainable life as well as a concrete practical guideline for people at all levels, from family, community to state level whether they are working in the agricultural, non-agricultural, or business sectors.

The application of the Sufficiency Philosophy does not have a fixed formula. This has to be adjusted according to different situations at the individual, community, region, and country levels. For its application and results will find that overall leader of the Sufficiency Economy Philosophy is the principle of living life. It appears that the ability to bring a livelihood, reduce expenses, and have a life without need is already evident in many areas where benefits or profits will be in the form of the happiness of the people. [34]

Driving the Sufficiency Economy Philosophy at the country, the international and the global levels has been proven can make the philosophy well-known broadly and build a reputation for Thailand as well.

However, to apply PSE effectively, it must take into account the principles in each aspect as follows:

1. **Economy** - not overspending Do not overinvest Think and plan carefully. immune not too risky Mental - have a strong mind. Have a good conscience, and generosity, for the common good more than personal benefit

2. **Socio-Cultural** - Helping each other, knowing love and unity, strengthening families and communities, preserving Thai identity, language, wisdom, and culture.

3. **Natural Resources and Environment** – Use and manage them wisely and carefully with the ultimate goal of restoring resources to achieve sustainability that will last for the next generations.

4. **Technology** - know how to use the right technology following the needs and environment technology development from folk wisdom.

From a growth-driven to a sustainable development policy, countries still face clear and present challenges in development. Those challenges stem from dysfunctional institutions, poor quality of people's lives, environmental degradation, and the optimal role of government. As this study has criticized, the philosophy of sufficiency economy of the King of Thailand reveals a new paradigm for development as well as helps address those development challenges. Trustworthiness, honesty, integrity, sharing, and altruism, the important elements of PSE, can be considered the social capital embedded in society that encourages proper economic and non-economic activities. PSE acts as an informal institution that can substitute for a formal institution in cases of a dysfunctional or missing formal institution. It also helps shape strong formal social capital in the society. One of the most important applications of the PSE is to help improve human well-being. The PSE emphasizes the self-reliance of an individual and of a community, together with the essentials of education. Poverty reduction can be achieved, by which PSE helps people reduce vulnerability, build their own capability to shape their lives, and have choices. With the PSE mindset, people will be moderate, reasonable and self-immune; therefore, they will not overexploit or abuse the environment or natural resources. They will embrace the environment, conserve it for the future and live in harmony with nature.

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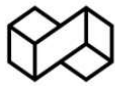
School Administration Model in Driving the Sustainable Development Goals (SDGs)

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Abstract

The objectives of this qualitative research were 1) to synthesize structural components of the school administration model in driving the Sustainable Development Goals (SDGs) from concepts and theories, and to check empirical confirmation; 2) to investigate the problem states and the factors supporting solutions in driving the Sustainable Development Goals (SDGs); 3) to develop the school administration model in driving the Sustainable Development Goals (SDGs); and 4) to prepare the policy recommendations and guidelines for policy implementation for the school administration model in driving the Sustainable Development Goals (SDGs). Key informants consisted of forty respondents, the instruments used were a synthesis table, a confirmation form, an unstructured interview form, and a meeting record form. The data were analyzed by frequency, percentage, and content analysis and classified into issues. The study results revealed as follows: 1. The structural components consisted of nine core components with twenty-three sub-components; and the empirical confirmation was 100 percent. 2. The problem states and factors supporting solutions consisted of political stability, local adaptation, limited resources, lack of awareness, curriculum gaps, teacher preparation, monitoring and evaluation, local ownership, and teacher professional development. 3. The components of the school administration model consisted of 1) principles; 2) objectives, 3) operational procedures, 4) evaluation, and 5) conditions for achievement. 4. The policy recommendations and guidelines for policy implementation consisted of policy support, teacher professional development, curriculum enhancement, resource mobilization, community engagement, global citizenship education, monitoring and reporting, recognition and awards, and continuous improvement and evaluation.

Keywords: School Administration Model, Sustainable Development Goals (SDGs).

1. Introduction

Thailand's 20-Year National Strategy (2017–2036) [7] stated in terms of a strategy for Thailand's sustainable development and growth, emphasizing the achievement of the Sustainable Development Goals (SDGs) to address social, economic, and environmental aspects while promoting good governance and cooperation. The ultimate goal is to position Thailand as a developed ASEAN nation by 2037.

In accordance with the Thirteen National Economic and Social Development Plan (2022–2027) [6] determined the Sustainable Development Goals (SDGs) place emphasis on the main goal is to raising everyone's quality of life

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overall, with a special emphasis on factors that support physical and mental health, a clean environment, opportunities for people to maximize their potential to improve their livelihoods, and a dedication to protecting the environment and natural resources for future generations.

Moreover, the United Nations (2023) [11] stated that Sustainable Development Goal 4 aims for inclusive, equitable education by 2030, ensuring equal access to primary, secondary, and tertiary education, eradicating gender disparities, and promoting literacy and numeracy. It promotes sustainable development, human rights, gender equality, and cultural diversity, with global scholarships and qualified teacher supply.

According to Alarifi et al. [1], the foundations of high-quality public education include teaching students how to properly interact with the knowledge community, maintaining lifelong learning, helping them participate in development, raising student productivity and performance, producing high-quality educational products, developing teachers' educational competency, tying the curriculum to industry demands, and raising the bar for administrators in educational institutions.

Therefore, SDG Action [8] viewed education as the enabler for sustainable development; higher education institutions (HEIs) are a crucial player in this endeavor since they are in the epicenter of knowledge creation and intergenerational transfer for sustainable development. HEIs are also in charge of developing curricula and training teachers for use in classrooms. Lastly, HEIs work at the interfaces between science, policy, and practice as well as upskilling corporations. At every step of lifelong learning, HEIs can and should play a significant role in developing SDG 4 paths and capacities both domestically and internationally.

Likewise, Kleespies & Dierkes [4] indicated the importance of the Sustainable Development Goals to students of environmental and sustainability studies. As prospective future members of society, students play a critical role in advancing the SDGs, addressing pressing human issues, and shaping the planet's destiny. As of right now, this study aims to close the gap in international research and investigate how students around the world perceive the SDGs. The goal is to find out how significant the SDGs are to students in each nation. Within each country and associated with factors unique to that nation in order to find trends and differences between the nations. The findings are meant to give today's decision-makers in various nations direction for their next course of action.

Based on the description above and a report of issues and trends in education for sustainable development [2], education for sustainable development is also an important tool for achieving the Sustainable Development Goals. This idea was supported by the Second Committee of the 74th United Nations General Assembly, which adopted a resolution on Education for Sustainable Development, which emphasized that education for sustainable development is an important component in achieving the goal of quality education and is a key to achieving the Sustainable Development Goals.

Therefore, school administrators play a crucial role in supporting and creating opportunities for sustainable development, particularly in education. It should focus on quality education, encouraging teachers to learn related knowledge and skills, and promoting lifelong learning in the community. School administration should also create an open learning environment that promotes diversity, cultural differences, and abilities, fostering confidence and responsibility for a sustainable environment and society. As a research team that would like to studying the school administration model in driving

the Sustainable Development Goals (SDGs), the results will benefit the educational quality for students in the near future.

2. Research Questions

2.1 What are the structural components of the school administration model in driving the Sustainable Development Goals (SDGs) from concepts and theories and check empirical confirmation?

2.2 What are the problem states and the factors supporting the success in driving the Sustainable Development Goals (SDGs)?

2.3 What is the school administration model in driving the Sustainable Development Goals (SDGs)?

2.4 What are the policy recommendations and guidelines for policy implementation for the school administration model in driving the Sustainable Development Goals (SDGs)?

3. Research Objectives

3.1 To synthesize structural components of the school administration model in driving the Sustainable Development Goals (SDGs) from concepts and theories and check empirical confirmation.

3.2 To investigate the problem states and the factors supporting the success in driving the Sustainable Development Goals (SDGs).

3.3 To develop the school administration model in driving the Sustainable Development Goals (SDGs).

3.4 To prepare the policy recommendations and guidelines for policy implementation for the school administration model in driving the Sustainable Development Goals (SDGs).

4. Materials and Methods

The researcher divided into two phases as follows:

Phase 1: To synthesize structural components of the school administration model in driving the Sustainable Development Goals (SDGs) from concepts

and theories, and check empirical confirmation, dividing into two steps:

Step 1.1: The synthesizing of structural components of the school administration model in driving the Sustainable Development Goals (SDGs) from thirty academic papers from both Thai and foreign educators that were published via electronic media. Data were analyzed by frequency.

Step 1.2: The checking empirical confirmation of derived structural components of the school administration model in driving the Sustainable Development Goals (SDGs) from Step 1.1 by focus group discussion of five experts and relevant representatives of school administrators to correct, rearrange, and define the appropriate and comprehending. The instrument used was a confirmation form. The data were analyzed by percentage.

Phase 2: To investigate the problem states and the factors supporting the success in driving the Sustainable Development Goals (SDGs). The instrument used was a semi-structured interview form in an in-depth interview with thirteen administrators of small-sized schools that had less than 150 students under Chiang Mai Primary Educational Service Area Office 1. The data were analyzed by classifying into issues.

Phase 3: To develop a school administration model in driving the Sustainable Development Goals (SDGs) was separated into two steps:

Step 3.1: A school administration model for driving the Sustainable Development Goals (SDGs) was constructed by a research team by considering the results from Phrase 1 and Phase 2 to be model components of the school administration model in driving the Sustainable Development Goals (SDGs). The instrument used was model components consisting of 1) principles, 2) objectives, 3) operational procedures, 4) evaluation, and 5) conditions for

achievement. The data were selected appropriate issues to construct a model.

Step 3.2: The verification of accuracy and appropriateness of a school administration model in driving the Sustainable Development Goals (SDGs). The researchers provided a workshop of nine experts in various fields, faculty lecturers, and school administrators, selected by purposive sampling. The instrument used was a verification form of accuracy and appropriateness. The data were analyzed by percentage. Nine experts also corrected and edited all components and sub-components.

Phase 4: To prepare the policy recommendations and guidelines for policy implementation for the school administration model in driving the Sustainable Development Goals (SDGs) by organizing a brainstorming session consisting of fifteen local community leaders, school administrators, school board or representatives of Educational Service Area administrators, supervisors, experts, and independent academics, including the research team, selected by purposive sampling. The data were analyzed by classifying them into issues.

5. Results

The research results were as follows:

Phase 1: Results of synthesizing structural components of the school administration model in driving the Sustainable Development Goals (SDGs) from concepts and theories, and checking empirical confirmation dividing into two steps:

Step 1.1: Results of synthesizing the core components and sub-components of driving the Sustainable Development Goals (SDGs). The research team studied thirty academic papers from both Thai and foreign educators that were published via

electronic media, consisting of concepts, articles, and relevant research on driving the Sustainable Development Goals (SDGs) as follows: 1) Anggal (2022); 2) Annan-Diab & Molinari (2017); 3) Aroonsrimorakot & Vajaradul (2016); 4) Blasco, Brusca & Labrador (2021); 5) Cai & Wolff (2023); 6) Chaleta, et al. (2021); 7) Damigos et al. (2021); 8) El-Jardali, Ataya & Fadlallah (2018); 9) Ferrer-Estévez & Chalmeta (2021); 10) Gedeon (2022); 11) Glavič (2020); 12) Jang & Shin (2022); 13) Kasemcheunyot (2020); 14) Kioupi & Voulvoulis (2019); 15) Kleespies & Dierkes (2022); 16) Leal Filho et al. (2019); 17) Manopattanakron, Pimthongm & Pongsophon (2022); 18) Mishra (2018); 19) Okubo et al. (2021), 20) Purcell, Henriksen & Spengler (2019); 21) Rahman et al. (2023); 22) Ribeiro et al. (2023); 23) Sa-u & Pathranarakul (2020); 24) SDG Action (2022); 25) Seangyai & Wisutthirattanakun (2021); 26) Times Higher Education (2023); 27) UNESCO. (2017), 28) UNESCO Department of Economic and Social Affairs Sustainable Development (2021); 29) United Nations Thailand (2023); and 30) Woraurai (2022).

The core components and sub-components of driving the Sustainable Development Goals (SDGs) were shown on Table 1.

Step 1.2: Checking empirical confirmation of derived structural components of the school administration model in driving the Sustainable Development Goals (SDGs) from Step 1.1 by focus group discussion of five experts and representatives of school administrators to select the appropriate components. All components and sub-components were overall accepted, and five experts corrected and defined the definitions for implementation as follows:

Table 1: The synthesizing table of the core components and sub-components of driving the Sustainable Development Goals (SDGs).

No.	Components	No.	Sub-Components.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	28	30	Total
1	Policy	1.1	The government department	✓		✓	✓		✓	✓	✓		✓			✓	✓	✓	✓	✓	✓	✓	✓				✓			✓	✓	✓		20
		1.2	Support schools.	✓	✓	✓			✓	✓		✓	✓	✓			✓	✓	✓			✓						✓	✓					14
		1.3	Policy integration agency.	✓			✓	✓	✓		✓	✓				✓	✓	✓	✓									✓	✓	✓	✓			14
		1.4	Implement policy agency.	✓			✓	✓		✓	✓	✓	✓	✓					✓	✓	✓	✓	✓				✓	✓	✓		✓	✓	✓	19
		1.5	Providing opportunities.			✓	✓			✓	✓	✓				✓	✓	✓	✓									✓	✓		✓		✓	14
		1.6	Inclusive practices.	✓	✓	✓			✓	✓	✓	✓	✓				✓	✓	✓															11
2	Vision.	2.1	SDG alignment.	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				✓	✓	✓	✓	✓	✓			✓	✓	✓	✓			21
		2.2	Long-term commitment	✓	✓	✓					✓					✓	✓											✓	✓	✓	✓		✓	10
		2.3	Supporting.	✓	✓	✓	✓	✓					✓	✓	✓	✓	✓	✓	✓	✓	✓		✓		✓	✓	✓		✓			✓	✓	21
		2.4	Global citizenship	✓			✓	✓	✓		✓		✓			✓	✓											✓	✓				✓	11
		2.5	Equity.	✓	✓			✓	✓	✓			✓	✓			✓	✓										✓	✓	✓	✓		✓	13
		2.6	Stakeholders.	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓				✓			22
3	Leadership.	3.1	Administrators.	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓				✓			✓	✓	✓	✓	22
		3.2	Decision-making	✓		✓				✓	✓		✓		✓	✓				✓							✓						✓	11
		3.3	Global awareness	✓					✓	✓			✓		✓	✓	✓			✓		✓	✓				✓						✓	12
		3.4	Resource management	✓	✓				✓	✓	✓			✓			✓			✓		✓	✓				✓				✓		✓	13
		3.5	School board committee	✓			✓	✓	✓	✓		✓	✓	✓	✓					✓	✓	✓	✓		✓	✓		✓						16
4	Curriculum and Instruction.	4.1	Curriculum integration.	✓			✓	✓	✓	✓	✓	✓	✓	✓			✓	✓			✓	✓			✓				✓	✓	✓			17
		4.2	Pedagogical approaches.	✓			✓	✓	✓	✓	✓	✓	✓	✓			✓	✓			✓	✓			✓			✓	✓	✓	✓			18
		4.3	Resource access.	✓			✓	✓			✓				✓	✓	✓	✓			✓	✓	✓			✓	✓					✓		14
		4.4	Innovation.	✓		✓		✓	✓	✓			✓				✓	✓			✓	✓	✓									✓		12
		4.5	Global citizenship education.	✓			✓	✓	✓	✓	✓	✓	✓	✓			✓	✓			✓	✓			✓			✓	✓	✓	✓	✓		19
5	Professional Development.	5.1	Teacher training.	✓	✓	✓			✓	✓						✓	✓	✓	✓	✓						✓	✓	✓	✓	✓	✓	✓		16
		5.2	Access to quality education.	✓		✓					✓					✓				✓							✓	✓	✓	✓		✓		10
		5.3	Resource development.	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓		✓			✓	✓	✓	✓			22
		5.4	Continuous learning.	✓			✓	✓			✓			✓	✓	✓	✓			✓					✓			✓			✓			13
		5.5	Partnership.	✓	✓	✓		✓			✓			✓	✓	✓			✓	✓	✓				✓					✓				11
		5.6	Cooperative learning.	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓			✓	✓	✓		✓	✓			✓	✓		✓	✓	✓	✓		21
6	Community.	6.1	Collaboration.	✓			✓			✓	✓		✓	✓			✓	✓	✓	✓		✓			✓	✓			✓			✓		17
		6.2	Resource mobilization.	✓			✓			✓			✓	✓			✓	✓	✓	✓	✓		✓		✓			✓	✓	✓	✓			16
		6.3	Community promotion.	✓			✓		✓				✓				✓	✓	✓	✓	✓	✓	✓		✓			✓	✓	✓	✓			15
		6.4	Environment.				✓					✓								✓					✓	✓			✓		✓			6
		6.5	Culture.	✓			✓		✓				✓			✓	✓			✓					✓	✓					✓			10
7	Monitoring.	7.1	Goal setting.	✓	✓	✓			✓	✓					✓	✓	✓	✓		✓	✓	✓	✓		✓					✓	✓	✓		17
		7.2	Clear objectives.		✓						✓			✓					✓	✓					✓			✓			✓		8
		7.3	School supervisors.	✓	✓		✓			✓	✓			✓	✓			✓	✓		✓	✓	✓	✓		✓			✓		✓	✓		17
		7.4	Data collection.	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓			✓	✓			✓	✓			✓	✓	✓	✓	✓	✓		21
		7.5	Regular reporting.		✓	✓							✓						✓	✓			✓	✓			✓			✓			9
8	Communication	8.1	Internal communication	✓					✓	✓	✓		✓	✓	✓	✓				✓	✓	✓	✓	✓	✓	✓	✓	✓					17
		8.2	Clear messaging.																	✓					✓	✓				✓			4
		8.3	Regular updates.	✓					✓	✓	✓					✓				✓					✓	✓		✓					8
		8.4	Continuous Improvement		✓	✓	✓				✓			✓	✓					✓					✓		✓	✓			✓		11
		8.5	Student engagement.	✓	✓	✓		✓	✓	✓	✓		✓	✓	✓			✓	✓			✓	✓	✓	✓		✓	✓			✓	✓		21
9	Research and Innovation.	9.1	Research institutions.	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓			✓	✓	✓			✓	✓			✓	✓		20
		9.2	Workshops.	✓			✓										✓					✓											5
		9.3	Funding.	✓			✓			✓	✓		✓		✓	✓						✓						✓				✓		9
		9.4	Technology.	✓	✓		✓	✓			✓	✓							✓	✓	✓			✓						✓		✓		13
		9.5	Innovation centers	✓	✓		✓	✓		✓	✓	✓	✓	✓	✓			✓			✓	✓	✓	✓	✓	✓	✓				✓	✓	✓	21

1. Policy consists of 1.1 Ministry of Education: The government department responsible for setting educational policies and guidelines related to SDG integration. 1.2 The Office of Educational Service Areas: Implement policies and support schools at the regional level.

2. Vision consists of 2.1 SDG Alignment: School leaders align the school's mission, vision, and values with the SDGs. 2.2 Supporting: School leaders support the importance of the SDGs within the school community and beyond. 2.3 Stakeholders: Engage with teachers, students, parents, and the community to promote SDG awareness and commitment.

3. Leadership consists of 3.1 Administrators: Provide leadership and direction for SDG integration within their schools. 3.2 School Board Committee: Collaborate to develop and implement SDG-related initiatives.

4. Curriculum and Instruction consist of 4.1 Curriculum Integration: Embed SDG-related content and concepts across subjects and grade levels. 4.2 Pedagogical Approaches: Promote teaching methods that foster critical thinking, problem-solving, and active learning related to the SDGs. 4.3 Global Citizenship Education: Develop programs that cultivate students' sense of global citizenship and social responsibility.

5. Professional Development consists of 5.1 Teacher Training: Provide training and workshops to teachers on SDGs, effective pedagogy, and related resources. 5.2 Resource Development: Create resources and materials to support SDG education, such as lesson plans and teaching aids. 5.3 Cooperative Learning: Encourage cooperative learning and collaboration among educators to share best practices related to SDGs.

6. Community consists of 6.1 Collaboration: Collaborate with external organizations, government agencies, NGOs, and local communities to advance SDG-related projects. 6.2 Resource Mobilization: Seek funding and resources from partners to support SDG initiatives within the school. 6.3 Community Promotion: Engage the local community in SDG awareness campaigns and activities.

7. Monitoring consists of 7.1 Goal Setting: Set measurable targets and benchmarks for SDG-related achievements within the school. 7.2 School Supervisors: Monitor schools' progress in implementing SDG-related activities. 7.3 Data Collection: Collect data on SDG-related activities, student learning outcomes, and progress toward goals.

8. Communication consists of 8.1 Internal Communication: Communicate the school's commitment to the SDGs to staff, students, and parents through newsletters, meetings, and events. 8.2 Student Engagement: Involve students in advocating for the SDGs, and promoting youth leadership and activism.

9. Research and Innovation consists of 9.1 Educational Research Institutions: Conduct research and innovation on the impact of SDG integration in schools. 9.2 Innovation Centers: Develop innovative solutions and technologies to support SDG education.

Phase 2: To investigate the problem states and the factors supporting solutions in driving the Sustainable Development Goals (SDGs). The researchers used a semi-structured interview form in an in-depth interview with thirteen administrators of small-sized schools that had less than 150 students under Ching Mai Primary Educational Service Area Office 1. Results of the problem states and the factors supporting solutions were shown in Table 2.

Phase 3: To develop a school administration model in driving the Sustainable Development Goals (SDGs) was separated into two steps:

Step 3.1: Results of a school administration model in driving the Sustainable Development Goals (SDGs) were constructed by a research team by considering the results from Phrase 1 and Phase 2 to be model components of the school administration model in driving the Sustainable Development Goals (SDGs) consisted of principles, objectives, operational procedures, evaluation, and conditions for achievement.

Step 3.2: Results of the verification components of a school administration model in driving the Sustainable Development Goals (SDGs), the accuracy was at 92 percent and appropriateness was at 89 percent.

Table 2: Results of the problem states and the factors supporting solutions.

The problem states	The factors supporting solutions
1. Political Stability: Political stability is crucial for the consistent and long-term implementation of SDG-related policies and practices in school administration. Political instability can disrupt progress.	Continuity of education policies and initiatives across political transitions ensures that SDG-related efforts remain on track.
2. Local Adaptation: Balancing the need for standardized approaches to SDG integration with the importance of allowing schools and communities to adapt the goals to their unique contexts can be a challenge.	Principals and school administrators who champion the SDGs and create a supportive environment for their implementation play a crucial role in the success of the model.
3. Limited Resources: Many schools in Thailand, particularly in rural areas, face resource constraints in terms of funding, infrastructure, and qualified staff. Implementing SDG-related initiatives may require additional resources that are often not readily available.	Effective allocation of resources, including seeking external funds and infrastructure improvements, teaching materials, and technology support the implementation of SDG initiatives within schools.
4. Lack of Awareness: Many people, organizations, and governments have limited awareness of the SDGs, their significance, and their targets. This lack of awareness can result in indifference or inaction.	Promote widespread awareness and education about the SDGs at the grassroots level, in schools, and through media campaigns to mobilize public support and engagement.
5. Curriculum Gaps: The existing curriculum in many schools may not adequately cover topics related to sustainability, making it challenging to educate students about the SDGs and their importance.	Update and expand the curriculum enhancement to include issues involving to sustainability, social responsibility, and global citizenship. Ensure that the curriculum aligns with the SDGs.
6. Teacher Preparation: Not all educators may feel adequately prepared to teach SDG-related topics. Training and professional development opportunities may be lacking, leaving teachers ill-equipped to address sustainability issues effectively.	Recruitment and retaining qualified teachers can reduce a persistent issue, affecting the implementation of SDG-related initiatives. This includes improving teacher quality, curriculum content, and the overall learning environment.
7. Monitoring and Evaluation: Establishing effective systems for monitoring and evaluating the impact of SDG-driven changes in school administration can be resource-intensive and complex.	Implement monitoring and reporting mechanisms to track progress in integrating the SDGs into the school administration model. Share successes and challenges with relevant stakeholders.
8. Local Ownership: Achieving buy-in and commitment from local school administrators, teachers, and communities to align their practices with the SDGs can be challenging. It may require significant awareness-building and capacity-building efforts.	Active involvement of parents, local communities, and civil society creates practical opportunities for students to engage with real-world sustainability projects and initiatives for SDGs to take ownership of education outcomes.
9. Teacher Professional Development: Ensuring that education in Thailand meets the standards of quality and relevance set out in the SDGs is a significant challenge to improve teacher quality, curriculum content, and the overall learning environment.	Invest in the power of technology and innovation to develop teacher solutions for achieving the SDGs, such as renewable technologies, digital platforms for education, and the integration of sustainable practices.

Nine experts also corrected and edited all components and sub-components as follows:

1. Model principles consisted of:

1.1 Demonstrate strong leadership commitment to the SDGs by setting the vision, values, and priorities for their integration into the school's culture.

1.2 Engage all stakeholders, including students, teachers, parents, staff, and the local community in the SDG integration process.

1.3 Prioritize teacher training and professional development to equip educators with the knowledge and skills needed to effectively teach the SDGs.

1.4 Establish systems for monitoring and reporting progress toward SDG-related goals and objectives.

2. Model objectives consisted of:

2.1 To embed the SDGs as a core component of the school's mission, culture, and administrative framework.

2.2 To educate that educator to have the knowledge, skills, and resources needed to effectively teach the SDGs.

2.3 To build collaborative relationships with local organizations, businesses, and community groups to support SDG initiatives.

2.4 To implement sustainable practices within the school's operations and facilities, serving as a model for students and the community.

2.5 To regularly monitor progress toward SDG-related goals and objectives and transparently communicate results.

3. Model operational procedures consisted of:

3.1 Plan (P) consisted of 1) Establish a planning committee comprising representatives from different stakeholder groups, including school leaders, teachers, students, parents, and community members. 2) Conduct a comprehensive needs assessment to identify the school's current status regarding SDGs, including existing initiatives, strengths, weaknesses, and areas for improvement. 3) Prioritize

specific SDGs or targets that align with the school's mission, vision, and values. 4) Create a detailed action plan that outlines specific initiatives, activities, and timelines for integrating the prioritized SDGs into the school's operations and curriculum. 5) Allocate financial, human, and material resources to support SDG initiatives, ensuring that budgetary considerations are in line with the action plan.

3.2 Act (A) consisted of 1) Offering ongoing professional development opportunities and workshops for teachers to enhance their capacity to effectively teach the SDGs. 2) Collaborate with teachers to implement the SDG-focused curriculum developed during the Planning phase. 3) Raise awareness among students, teachers, parents, and the community about the importance of SDGs in education. 4) Collaborate with local organizations, businesses, and community groups to support and enhance SDG initiatives. 5) Continue to engage with policymakers and government agencies to advocate for supportive policies and regulations related to SDG integration.

3.3 Observe (O) consisted of 1) Collect relevant data and information related to SDG integration efforts, including student performance, engagement, and behavior. 2) Evaluate whether SDG-related goals and objectives are being met and identify areas that require improvement. 3) Ensure that the plan includes timelines, responsible parties, and resource allocations. 4) Prepare comprehensive reports that summarize the progress, achievements, and challenges related to SDG integration. 5) Communicate the findings of the observation phase to all stakeholders, highlighting successes, challenges, and the plan for continuous improvement.

3.4 Reflect (R) consisted of 1) Review and analyze the data collected during the observation phase, including student performance, engagement, behavior, and feedback from stakeholders.

2) Reflect on the feedback and input gathered from stakeholders during the reflection phase. 3) Consider how feedback can inform future decision-making and planning. 4) Identify successful SDG initiatives that can be scaled up within the school or replicated in other schools. 5) Share best practices and lessons learned with other educational institutions.

4. Model evaluation consisted of:

4.1 Define specific objectives for evaluating the school's SDG integration efforts, such as assessing student learning outcomes, gauging community engagement, or measuring the impact of sustainability practices.

4.2 Analyze both qualitative and quantitative data to gain a comprehensive understanding of the school's progress in SDG integration.

4.3 Evaluate the professional development and training programs provided to teachers to determine their effectiveness in preparing educators for SDG integration.

4.4 Compile the assessment findings into a comprehensive report that includes an overview of the school's SDG achievements, challenges, and recommendations for improvement.

4.5 Share progress updates and revised action plans with stakeholders and the community.

5. Model conditions for achievement consisted of:

5.1 Policy commitment from school leadership, including the principal and senior administrators, to prioritize and champion SDG integration.

5.2 Active engagement of all stakeholders, including students, teachers, parents, staff, and local community members, in SDG initiatives.

5.3 The school's curriculum is intentionally aligned with the SDGs, ensuring that SDG-related content is integrated across subjects and grade levels.

5.4 Ongoing professional development opportunities for teachers to enhance their knowledge and skills in teaching SDGs.

5.5 Establishment of systems for monitoring and reporting progress toward SDG-related goals and objectives.

The model's name of the school administration model in driving the Sustainable Development Goals (SDGs) is POO(PAOR)EC. The summary model is shown in Figure 1.
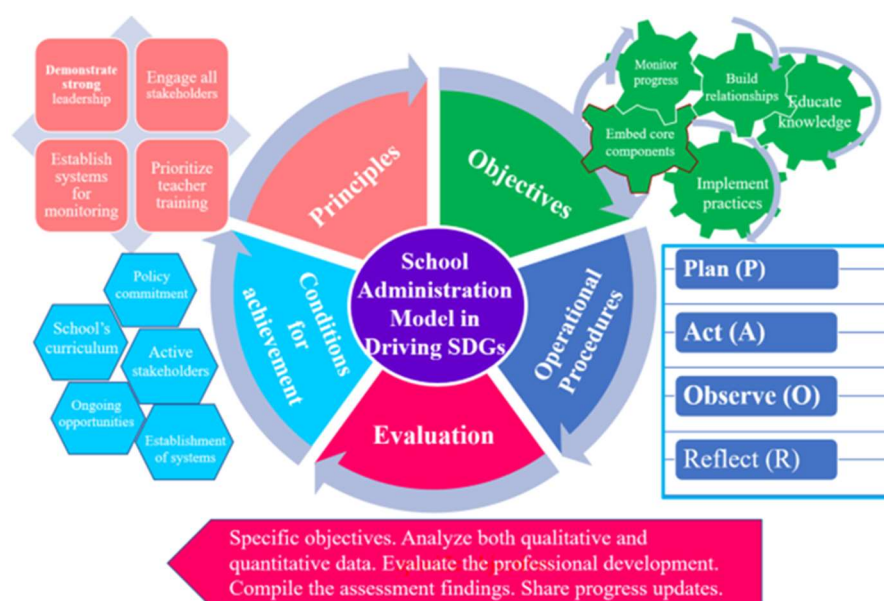

Figure 1: Research Framework

Phase 4: Results of policy recommendations and guidelines for policy implementation for the school administration model in driving the Sustainable Development Goals (SDGs) to propose parent agencies such as the Office of Basic Education Commission, the Office of Educational Service area both the secondary and the primary education, and others by organizing a brainstorming session via Zoom program of fifteen informants and the research team classified the issues in Table 2.

Table 3: Results of policy recommendations and guidelines for policy implementation.

Policy Recommendations	Guidelines for Policy Implementation
1. Policy Support: Advocate for supportive policies at local, regional, and national levels that prioritize sustainability in education.	Establish a policy advocacy task force within the school administration. Collaborate with educational associations and other stakeholders to influence policy changes that align with the SDGs.
2. Teacher Professional Development: Develop and implement teacher training programs that focus on sustainability education and the SDGs. Encourage ongoing professional development to keep educators updated on best practices.	Establish partnerships with teacher training institutions, NGOs, and educational experts to design comprehensive training modules. Offer incentives and recognition for teachers who participate in sustainability-focused professional development.
3. Curriculum Enhancement: Review and update the curriculum to integrate SDG-related topics across various subjects. Ensure that learning materials and textbooks reflect sustainability principles.	Form curriculum review committees composed of educators, subject matter experts, and representatives from relevant industries. Create guidelines for the integration of SDGs into lesson plans and assessments.
4. Resource Mobilization: Seek external funding sources, grants, and donations to address resource constraints and invest in sustainable infrastructure and technology.	Create a dedicated office or department responsible for grant applications and resource management. Develop a transparent process for allocating resources based on sustainability priorities.
5. Community Engagement: Foster partnerships with local communities, NGOs, and businesses to support sustainability initiatives and provide real-world learning opportunities for students.	Establish community liaison positions within schools to coordinate engagement efforts. Develop clear guidelines for collaboration, including project planning, monitoring, and evaluation.
6. Global Citizenship Education: Promote global citizenship education that emphasizes understanding and addressing global challenges, including the SDGs.	Integrate global citizenship topics into the curriculum, emphasizing cultural awareness, social justice, and global interconnectedness. Encourage international exchange programs and partnerships with schools from diverse regions.
7. Monitoring and Reporting: Implement monitoring and reporting mechanisms to track progress in integrating the SDGs into the school administration model.	Establish clear indicators and benchmarks for tracking SDG integration. Regularly collect data and report progress to school stakeholders, parents, and the broader community.
8. Recognition and Awards: Recognize and reward schools, teachers, and students for their efforts in driving the SDGs, fostering motivation and enthusiasm.	Establish a recognition program that acknowledges achievements related to the SDGs. Consider certificates, awards, or public recognition at local or national levels.
9. Continuous Improvement and Evaluation: Commit to a culture of continuous improvement by regularly evaluating the effectiveness of SDG initiatives.	Conduct regular evaluations using predefined criteria to assess the impact of SDG integration. Use evaluation results to refine policies, practices, and curricular content.

6. Discussion

The authors selected the significant issues to discuss as follows:

In terms of structural components of the school administration model in driving the Sustainable Development Goals (SDGs) from concepts and theories and checking empirical confirmation, the Ministry of Education establishes educational policies for SDG integration, with regional policies implemented by the Office of Educational Service Areas. School leaders align their mission, vision, and values with SDGs, promoting critical thinking and global citizenship education. Collaboration with external organizations is crucial, consistent with UNESCO's [10] suggestion of education as a public good, a global common good, and a fundamental human right. The Education 2030 agenda emphasizes inclusive, equitable quality education for sustainable development. Factors affecting access include poverty, conflicts, disasters, gender inequality, and privatization. The concept of education for sustainable development (ESD) aims to scale up education and develop sustainability competencies.

In terms of the problem states and the factors supporting the success in driving the Sustainable Development Goals (SDGs), the implementation of Sustainable Development Goals in school administration faces challenges like political instability, limited resources, lack of awareness, and inadequate teacher preparation. Despite these obstacles, ensuring teacher quality and curriculum content remains a significant challenge. The success of implementing Sustainable Development Goals (SDGs) in education depends on several factors; it requires political stability, local adaptation, limited resources, awareness, curriculum gaps, teacher preparation, monitoring, local ownership, and professional development, promoting education, and improving the learning environment in accordance with Kioupi & Voulvoulis [5], who indicated that strong discipline competencies (such as those in the natural, social sciences, engineering, and business) should be used in conjunction with sustainability competencies. Working in cross-disciplinary or inter-disciplinary teams to solve sustainability problems necessitated the expression of divergent viewpoints on the same problems and benefits from the synthesis of various viewpoints to foster the emergence of novel conceptualizations and inventive strategies.

In terms of the school administration model in driving the Sustainable Development Goals (SDGs), the school administration model focuses on achieving the SDGs through strong leadership commitment, stakeholder engagement, teacher training, and monitoring progress. It involves establishing a planning committee, conducting needs assessments, creating action plans, allocating resources, offering professional development opportunities, and collaborating with teachers. The model's summary model is POO(PAOR)EC, requiring policy commitment, active stakeholder engagement, curriculum alignment, and continuous professional development. It was quite different from the six principles for responsible management education, which consisted of 1) purpose: the students' abilities were developed to be future generators of sustainable value, 2) values: our academic activities and curricula will be incorporated into the values of global social responsibility, 3) method: educational frameworks, materials, processes, and environments will be created to enable effective learning experiences for responsible leadership, 4) research: the conceptual and empirical research will be engaged in advance our understanding of sustainable value, 5) partnership: managers will be extended our knowledge, and 6) dialogue: educators, students, business, and government will be supported in dialogue.

However, the National Scheme of Education B.E. 2560-2579 (2017-2036) [9] determined the key success factors of the goals of each strategy are the educational institutions that must adhere to them as guidelines for operations, and there is a review and improvement of measures and success goals to keep up with changes occurring in each area for the development of learner potential. Now, the paradigm of educational management as a state education organizer has become an educational arrangement for all sectors of society that focuses on providing education for equality and inclusive education as well as promoting lifelong learning for everyone, which is in line with the SDGs.

In terms of the policy recommendations and guidelines for policy implementation for the school administration model in driving the SDGs, the policy recommendations outline guidelines for implementing sustainability in education, including advocating for policies, implementing teacher professional development programs, updating curriculum, seeking external funding, fostering community engagement, promoting global citizenship education, monitoring progress, rewarding schools, teachers, and students, and continuously improving SDG initiatives' effectiveness. It was similar to the findings of El-Jardali, Ataya & Fadlallah [3], who revealed that the 2030 Agenda for Sustainable Development outlines a wide range of interconnected objectives, such as ending poverty and fostering economic growth, as well as promoting social inclusion, environmental sustainability, and world peace by that year. To achieve the Sustainable Development Goals (SDGs), policy decisions must be supported by evidence that has been co-designed and co-produced with the appropriate stakeholders, taking political and local circumstances into account.

It can be concluded that Thailand's school administration model is crucial in achieving the Sustainable Development Goals (SDGs). By integrating sustainability principles into education, Thailand is fostering comprehensive development across social, economic, and environmental dimensions. This approach, aligned with equilibrium and sustainability principles, positions Thailand to reflect a commitment to a future for its citizens and the world. The model involves teacher training, curriculum enhancement, cross-disciplinary approaches, and community partnerships, empowering students with global citizenship skills and ensuring dynamic implementation.

7. Recommendations

7.1 The school administration model in driving the Sustainable Development Goals (SDGs) can be the initiation for other educational institutions.

7.2 Educational administrators can consider problems and adopt factors supporting the success of driving the Sustainable Development Goals (SDGs).

7.3 Educational administrators can consider policy recommendations and guidelines for policy implementation of driving the Sustainable Development Goals (SDGs).

8. Recommendation for Further Research

8.1 There should be a study of the school administration model in driving the Sustainable Development Goals (SDGs) across all regions.

8.2 There should be a study of a school administration model in driving the Sustainable Development Goals (SDGs) across all of Thailand.

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The Concept of Repairing the Man-made Ozone Hole

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Abstract

This study explores an innovative concept for repairing the man-made ozone hole using hydrogen gas, addressing one of the most critical environmental challenges of our time. We investigate the feasibility, potential impacts, and broader implications of this intervention. The proposed method involves injecting pure hydrogen gas into the stratosphere to neutralize ozone-depleting substances, particularly chlorine monoxide. Our analysis encompasses the chemical mechanisms, delivery methods, and optimal conditions for this process.

We compare this artificial approach with natural ozone repair processes, evaluating their respective advantages, disadvantages, and expected outcomes. The study reveals that while hydrogen injection offers potential for rapid, targeted ozone restoration, it also presents significant technological challenges and risks of unintended consequences. These include potential alterations in stratospheric water vapor content and complex atmospheric feedback loops.

The research extends beyond technical feasibility to consider crucial ethical, geopolitical, and long-term atmospheric implications. We discuss the ethical considerations of large-scale atmospheric manipulation, potential geopolitical tensions arising from such capabilities, and the impact on global climate change mitigation efforts.

Our findings suggest that while hydrogen-based ozone repair shows promise, it requires extensive further research, international cooperation, and careful consideration of its wide-ranging effects. The study concludes by emphasizing the need for a holistic, interdisciplinary approach to ozone layer restoration, balancing technological innovation with ecological stewardship and global environmental governance.

1. Introduction

Global warming stands as one of the most critical environmental challenges of our era, resulting from a complex interplay of factors including increased industrialization, technological advancements, and human activities that release greenhouse gases into the atmosphere [1-4]. These gases contribute to climate change, leading to increasingly severe weather patterns and significant environmental impacts. Within this context, ozone plays a vital role in mitigating the severity of global warming by shielding the Earth from harmful ultraviolet radiation. However, human activities, particularly the release of chlorofluorocarbons (CFCs), have led to significant ozone depletion [5,6]. CFCs, once widely used in refrigerants and aerosols, release chlorine atoms in the stratosphere, which catalyze the destruction of ozone molecules [7].

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This article explores the concept of repairing the man-made ozone hole using hydrogen gas. We will examine the formation and composition of atmospheric ozone, the mechanisms of ozone depletion, and the potential benefits and risks of reduced ozone levels. Central to our discussion is a proposed method for artificial ozone repair using hydrogen gas, which we will compare with natural ozone formation processes such as those occurring during thunderstorms. Our analysis encompasses the chemical reactions involved, potential implementation strategies, and the broader environmental implications and safety considerations of ozone hole repair.

By delving into these aspects, we aim to contribute meaningfully to the ongoing discussion on addressing ozone depletion and its relationship to global warming. The importance of this research lies in its potential to offer innovative approaches to combating ozone depletion, a critical factor in global climate change. Through exploring the feasibility of using hydrogen gas for ozone repair, we hope to stimulate further research and discussion on proactive measures to protect our atmosphere and mitigate the impacts of global warming. This study not only addresses the immediate concerns of ozone depletion but also considers the long-term implications for global climate strategies and environmental protection efforts.

2. What is Ozone?

O_3 is not called an element and is not a compound, but is a molecular element, O_3 or ozone is a molecule made up of 3 oxygen atoms bonded together. Ozone is a gas that occurs naturally,   such as from thunder or sunlight, etc. It is caused by the combination of 1 molecule of oxygen gas   with 1 free oxygen atom that is separated from the oxygen gas by the stimulation of ultraviolet C (UV-C) rays that appear in the Earth's atmosphere, the stratosphere [8]. (Stratosphere), which is the atmosphere   at an altitude between 10-50

kilometers from the surface, is the layer of the atmosphere that has the densest ozone. The ozone layer acts as a protective shield. It protects plants and animals from the sun's rays. Ultraviolet B (UV-B) rays are harmful to life and nature if received in excessive amounts. Humans have used ozone in many ways, such as using it as a precursor in the production of chemicals and as a detergent to kill bacteria, etc. Ozone gas is classified as a toxic gas. Inhaling ozone gas is harmful to the respiratory system. This is different from the word ozone which is sometimes used in the context of tourism or recreation, as in the phrases "breathe ozone" "get ozone" or "source ozone". UV filtering of ozone UV-A (320-400 nm) is filtered by approximately 5 percent ozone. UV-B (280-320 nm) is approximately 95 percent filtered by ozone. UV-C (100-280 nm) is filtered by 100 percent ozone [9].

3. Ozone destruction

In the past until now, ozone has been destroyed by human activities such as industry, causing the ozone hole. Most CFCs come from industrial plants and equipment that provides cooling in daily life, such as refrigerators, air conditioners in homes or cars, and various sprays, When CFCs are in the stratosphere they break down to chlorine atoms (Cl), which react quickly with ozone (O_3) to become oxygen gas (O_2) and chlorine monoxide (ClO). This molecule can be changed back to chlorine atoms (Cl) and cycle back. It can destroy ozone thousands and thousands of times (chain reaction). When ozone in the earth's atmosphere is destroyed. As a result, there is a large ozone hole in many places around the world [11]. As a result, UV rays can pass directly to the earth. which is harmful to life on earth, such as skin cancer in humans abnormal growth in plants, etc. The origin of chlorine comes from CFCs, commonly referred to as freon, which are used. For cooling, such as in a refrigerator, this group of substances will remain stable for a long time. When dispersed into the

atmosphere, it breaks down to free atoms of chlorine (*Cl*) and immediately reacts with ozone resulting in the formation of monooxide (*ClO*). Information from surveys from airplanes Balloons and satellites and information from NASA and the National Oceanic Atmospheric Administration (NOAA) The amount of ozone in space is decreasing [12]. Since 1986, scientists have been surveying ozone during spring in the southern hemisphere over the continent. Antarctica found that the amount of ozone decreased to only 88 DU and found that there were compounds of chlorine monoxide (*ClO*) in very high quantities, this group of substances destroys the ozone layer [13]. This phenomenon is called the ozone hole, which is an area where the amount of ozone in the atmosphere is lower than the required standard, which is 220 Dobson [14].
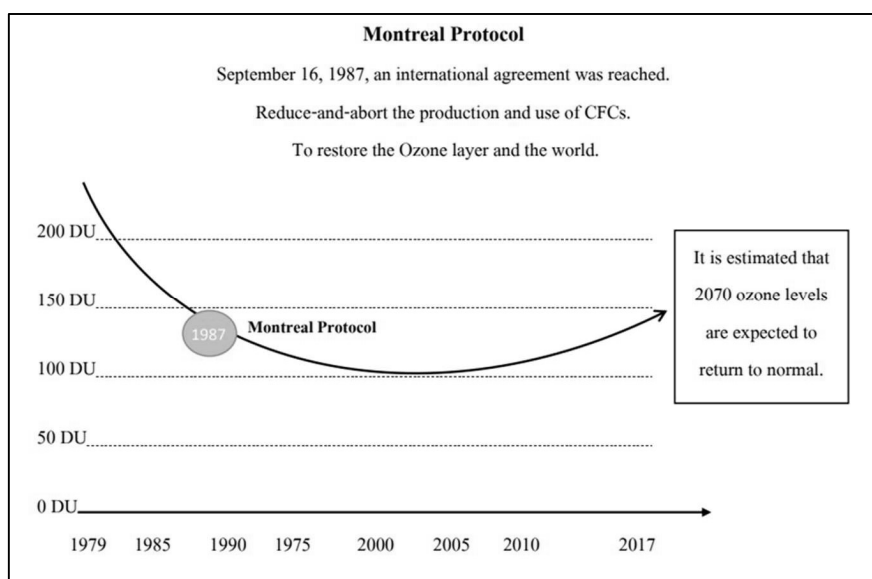
Figure 1. Graph showing the amount of ozone gas present in the Earth's atmosphere from 1979-2017. [10]
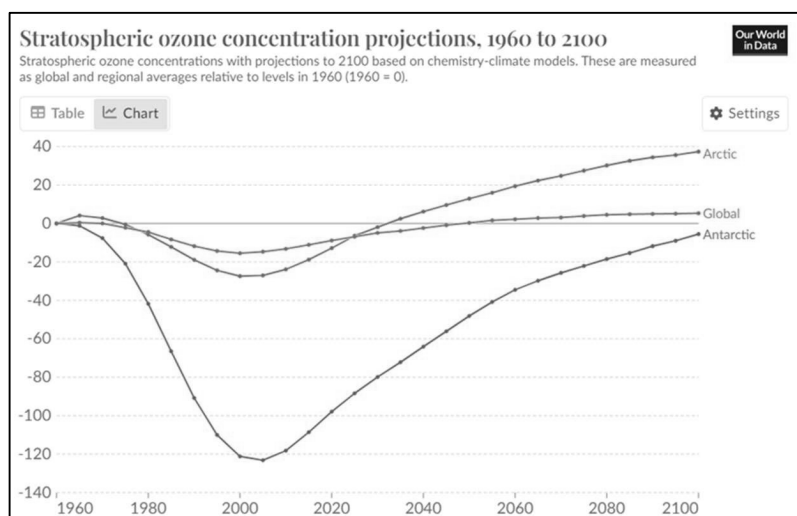

Figure 2. Ozone concentration rate in the stratosphere 1960 to 2100 [10]
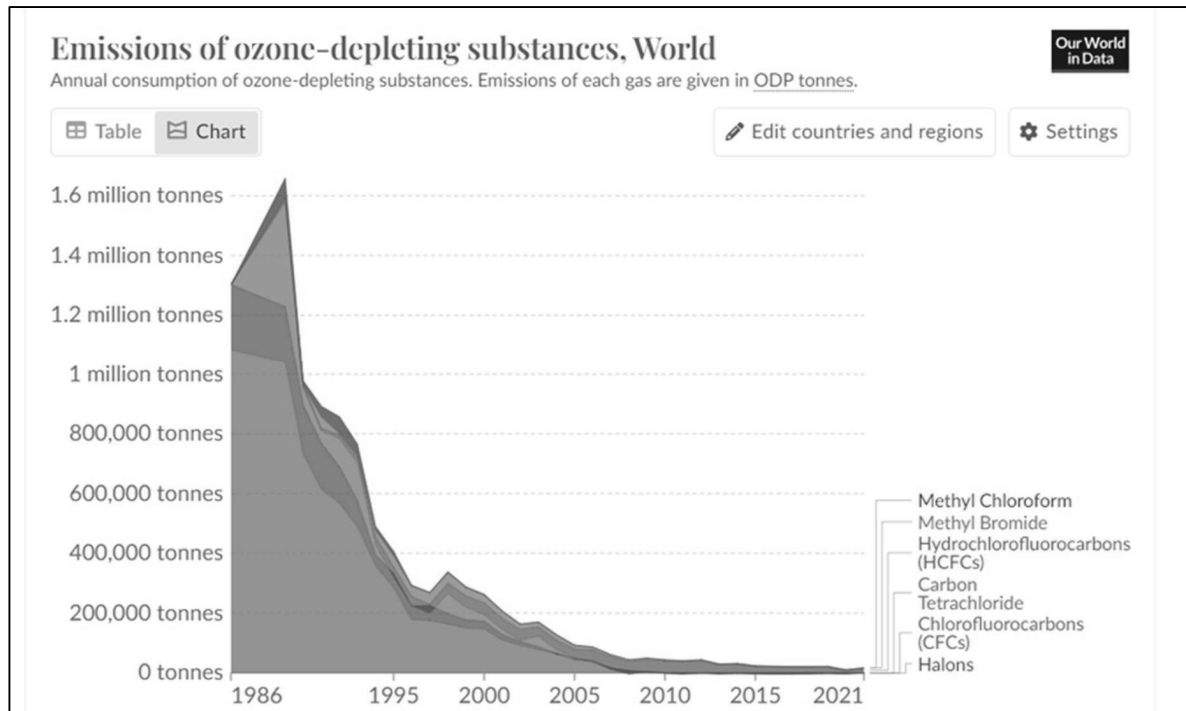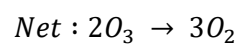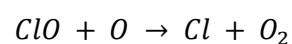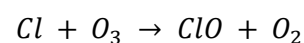
Figure 3. Emission rates of ozone-depleting substances from 1986-2021 [10]

Destruction of ozone by various gases

$$NO(g) \ + \ O_2(g) \ + \ hydrocarbons \ \xrightarrow{sunlight} \ CH_3CO - OONO_2(g)$$

$$NO_2(g) \ \xrightarrow{sunlight} \ NO(g) + O(g)$$

$$O_3 \ \xrightarrow{UV \ light} \ O_2 + O$$

$$NO \ + \ O_3 \ \rightarrow \ NO_2 \ + \ O_2$$

$$NO_2 \ + \ O \ \rightarrow \ NO_2 \ + \ O_2$$

$$Net: 2O_3 \ \rightarrow \ 3O_2$$

$$O_3 \ \xrightarrow{UV \ ligh} \ O_2 + O$$

$$Cl \ + \ O_3 \ \rightarrow \ ClO \ + \ O_2$$

$$ClO \ + \ O \ \rightarrow \ Cl \ + \ O_2$$

$$Net: 2O_3 \ \rightarrow \ 3O_2$$

$$NO_2 + R \rightarrow PAN$$

$$NO + ROx \rightarrow NO_2 + other\ products$$

$$O + (O_2) \rightarrow O_3$$

$$O_3 \rightarrow O_2 + O \qquad\qquad NO(g) + O_3(g) \rightarrow NO_2(g) + O_2(g)$$

$$O + H_2O \rightarrow 2HO$$
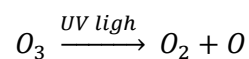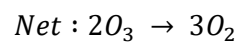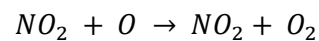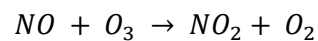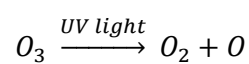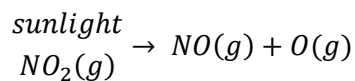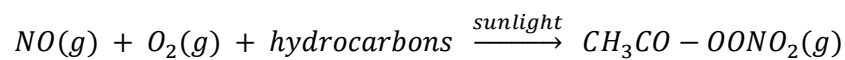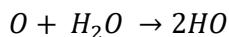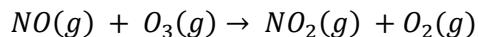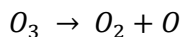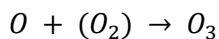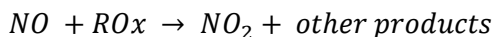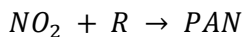
The concentration of O_3 decreases if there are atoms of the substance added, which will disturb the balance between O_3, and O_2, causing O_2. oxygen atom reacts with molecular oxygen (O_2) to form ozone (O_3) increased or O_3 decreased which free oxygen radicals the resulting radicals will cycle through further chemical reactions and become pollutants.

The air and ozone are important causes that will react with nitric oxide is form nitrogen oxide (NO_2) further, if there is a lot of NO in the air, O_3 will be the cause. more photochemical smog which nitrogen dioxide itself is a light brown gas [15]. Has a slightly pungent smell similar to chlorine which free oxygen radicals. The resulting radicals will cycle through further chemical reactions and become pollutants. Has an irritating effect on the respiratory system causing a burning throat and nose. In addition, nitrogen dioxide exposed to steam

In the air, it forms acid rain (nitric acid, HNO_3), which is toxic to the environment. nitrogen dioxide. It is also the cause of Peroxyacetyl nitrate (PAN) Which is another air pollutant that causes irritation and is toxic to plants. Nitrogen dioxide reacts with hydrocarbons, especially those in the organic group.

Volatile organic compounds (VOCs) come from various sources such as oil, automobiles, and processes industrial production compounds containing oxygen in the molecule have the chemical formula RO_x and will react with nitric acid [16].

Oxides form nitrogen oxide gas which is toxic to the environment, causing photochemical smog reactions to go on and on and result in high levels of air pollutants. The reaction in which VOCs enter this reaction requires nitric oxide gas, which may result in continuously causing more reactions with O_3 gas, causing photochemical smog and pollution air has increased exponentially caused by a reaction with nitrogen dioxide (NO_2), oxygen (O_2) and hydrocarbons react with sunlight as a catalyst will get the components of peroxyacetyl nitrate (CH_3CO-OO-O_2), which is a toxic substance with an irritating effect [17].

4. Concept of increasing ozone by humans

The concept of artificially increasing ozone in the atmosphere using pure hydrogen gas involves a multi-step approach aimed at counteracting the ozone-depleting effects of chlorine monoxide (ClO) gas. This process requires careful consideration of various factors to ensure its effectiveness and safety. Let's explore each step in greater detail:

1. Finding the appropriate temperature and equation for repairs:

Ozone repair must be conducted under specific temperature conditions to maximize effectiveness. At standard temperature and pressure, concentrated ozone is blue. It becomes a blue liquid at -112°C and a black solid below -193°C. The ideal repair conditions occur at night when there's no sunlight and temperatures are low.

The target area is the ozone hole where *ClO* reactions are actively occurring. The primary reaction we aim to achieve is:

$H_2 + ClO \rightarrow HClO + H$
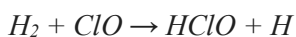
This reaction converts harmful *ClO* into hydrochloric acid (*HClO*), which can then be removed from the atmosphere through precipitation. It's crucial to note that this process must be carefully controlled to prevent the formation of excessive ozone or other unintended atmospheric effects.

2. Finding a way to release hydrogen gas in the target area:

The stratosphere, where the ozone layer is located, presents unique challenges for gas delivery. Temperatures in this layer range from -60°C to 10°C, with slow air movement and minimal water vapor. To overcome these challenges, we propose using high-altitude aircraft or large balloons capable of reaching the stratosphere. These vehicles would be equipped with specialized systems to release pure hydrogen gas directly into the ozone hole.

The release mechanism must be precisely controlled to ensure the hydrogen is delivered at the correct altitude and concentration. This may involve developing new technologies for gas storage and release under extreme conditions.

3. Surveying to find appropriate temperature and conditions for repairs:

Before and during the repair process, it's crucial to continuously monitor atmospheric conditions. We propose using Fourier-Transform Infrared Spectroscopy (FTIR) systems to survey gas quantities and temperatures in the target coordinates. This data would be relayed to a control server in real-time.

Advanced artificial intelligence (AI) systems would then analyze this data to determine the feasibility of repair operations and optimize the hydrogen release strategy. This AI-driven approach allows for rapid adjustments based on changing atmospheric conditions, ensuring the repair process remains effective and safe.

4. Releasing pure hydrogen gas into the ozone hole:

The final step involves the actual release of hydrogen gas. This process would begin with small, controlled releases to test the system and observe initial reactions. The amount of hydrogen released would be gradually adjusted based on real-time FTIR data and AI analysis.

Continuous monitoring of infrared radiation patterns would provide insights into the effectiveness of the hydrogen release. This data would be used to refine the process, adjusting variables such as gas concentration, release rate, and timing to maximize ozone production while minimizing any potential negative effects.

Throughout this process, it's essential to maintain a comprehensive data collection and analysis system. This will allow for the development of more refined models and strategies for future ozone repair efforts, as well as provide valuable insights into atmospheric chemistry and climate change mitigation techniques.

By expanding on these four key areas, we provide a more comprehensive understanding of the complexities and considerations involved in artificial ozone repair using hydrogen gas. This detailed approach addresses the reviewer's request for more in-depth explanation of the concept.

5. Probability rate of success

If gases with various temperature variables, the success rate will be very high because the reaction of *ClO* gas is a reaction that repeats in a loop, such that when hydrogen

is added during that time, it can increase the amount of ozone. Like thunder, hydrogen and oxygen can be produced. This increases the amount and reduces the ozone hole.

Consequences that may occur if the process is not complete may cause too much ozone or may cause the weather conditions in the area to fluctuate [19].

Table 1. Comparing human and natural ozone repair (advantages and disadvantages)

	Human ozone repair	**Repair ozone naturally**
Reaction	Hydrogen + ClO	Hydrogen + ClO Oxygen + Hydrogen
Result	$HClO$	$HClO$
Positive result	Increase the amount and reduce the ozone hole.	Increase the amount and reduce the ozone hole
Negative effects	If successful and cannot be controlled, it may increase the excessive amount of ozone. If not successful, it may cause the atmosphere to fluctuate	Other minerals may be formed because the temperature is very high, such as sulfur and phosphorus.
Cost and time conditions	It costs money but can be done at any time and the rate of emissions can be controlled for the best results.	No cost, time, or natural variables can be controlled.

6. Conclusion

The exploration of ozone layer depletion and potential repair mechanisms reveals the complex interplay between natural processes and proposed human interventions. This study has examined the feasibility of using hydrogen gas as a means of artificial ozone restoration, comparing it with natural recovery processes. The stratospheric ozone layer's crucial role in shielding Earth from harmful UV radiation underscores the importance of addressing its depletion, which has been primarily caused by anthropogenic emissions of chlorofluorocarbons (CFCs) and other ozone-depleting substances.

The proposed method of injecting hydrogen gas into the stratosphere offers a potentially rapid and targeted approach to ozone repair. However, this technique presents significant challenges, including the need for precise delivery systems, real-time monitoring of stratospheric conditions, and careful

consideration of potential unintended consequences. The success of such an intervention would depend on various factors, including atmospheric dynamics, chemical interactions, and technological capabilities.

In contrast, natural ozone repair processes, while slower, provide a self-regulating and globally balanced approach to recovery. The continuing effectiveness of the Montreal Protocol in phasing out ozone-depleting substances supports this natural healing process. The comparison between artificial and natural repair methods highlights a trade-off between the potential for rapid, localized intervention and the reliability of long-term, global recovery.

Future research in this field should focus on several key areas. Advanced atmospheric modeling is crucial to predict the long-term effects of hydrogen gas injection on stratospheric chemistry. The development of high-precision delivery systems and monitoring

technologies is essential for any potential implementation. Small-scale trials could provide valuable insights into the efficacy and safety of the proposed method. Additionally, comprehensive studies on ecological impacts, policy frameworks, and public perception are necessary to address the multifaceted challenges of ozone layer restoration.

As we continue to grapple with global environmental challenges, the concept of human-induced ozone repair represents a bold step in planetary stewardship. However, it is imperative that any such interventions be approached with caution, thorough scientific scrutiny, and international cooperation. The path forward likely involves a balanced approach, combining continued support for natural recovery processes with carefully considered, scientifically-guided interventions where necessary.

Ultimately, the goal remains the restoration and preservation of Earth's ozone layer. Whether through natural processes, human intervention, or a combination of both, the protection of this vital atmospheric shield is crucial for the well-being of our planet and its inhabitants. As research progresses, it is essential to maintain a holistic view, considering not only the immediate effects on ozone levels but also the broader implications for atmospheric chemistry, climate dynamics, and global ecosystems.

7. Discussion

The proposed hydrogen gas intervention for ozone repair, while innovative, raises complex issues beyond its technical feasibility. This discussion focuses on critical, less-explored aspects of the concept.

Stratospheric Water Vapor Implications:

The reaction of hydrogen with chlorine monoxide not only aims to reduce ozone depletion but also produces water vapor as a byproduct. This increased stratospheric water vapor could have significant, potentially counterproductive effects. It may lead to increased polar stratospheric cloud formation, paradoxically enhancing ozone depletion in polar regions

Furthermore, changes in stratospheric water vapor content could alter the radiative balance, potentially influencing global climate patterns in ways that are difficult to predict

Geopolitical Tensions and Security Concerns:

The ability to manipulate the stratosphere could be perceived as a form of environmental control, potentially leading to geopolitical tensions. Nations might view such capability as a strategic asset or threat, raising concerns about the militarization of environmental technologies. This could necessitate new international treaties and monitoring systems to prevent misuse and ensure transparent, cooperative implementation.

Feedback Loops and System Resilience:

Introducing hydrogen into the stratosphere may trigger unforeseen feedback loops within the atmospheric system. While the primary aim is ozone repair, the intervention could affect other chemical cycles, potentially altering the atmosphere's natural buffering capacity and resilience. Understanding these complex interactions is crucial for predicting long-term outcomes and avoiding unintended destabilization of atmospheric equilibrium.

Ethical Implications of Atmospheric Modification:

This intervention represents a deliberate, large-scale modification of Earth's atmosphere, raising profound ethical questions. It challenges our understanding of stewardship and the extent to which humanity should actively manage global systems. This ethical dimension extends beyond environmental concerns, touching on philosophical questions about our role in shaping the planet's future.

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TRENDS IN WRITING RESEARCH: EXPLORING TEACHERS' WRITING PRACTICES AND ITS IMPLICATIONS TO POLICY IMPROVEMENT

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Abstract

Teachers must be researchers and are inspired to think critically and solve problems analytically when they conduct research. Thus, a culture of research has a pivotal role in the quality of education services. Research is the mainstream in delivering evidence-based instruction; teachers must have the grit to understand and integrate research into their practices. The study used a descriptive qualitative research design utilizing focus group discussion with an open-ended questionnaire to acquire the in-depth experiences of the teacher-researchers. Purposive sampling was used in the study, and ten teacher-researchers participated in one of the secondary schools in the Philippines. Based on the findings, five themes emerged: research and intervention, improved teaching practices, professional development and growth, addressing classroom challenges, and continuous policy development. Writing research has developed into a trend in education that covers every challenge that calls for self-evaluation and assistance in teaching and learning. Writing research improved the practices and results which are evidence-based, leading to a more tangible, methodical process. Research can be seen as a tool to enhance and learn about the many approaches to teaching and learning. Therefore, teachers must be driven to improve their writing research practices and satisfy their desire to become more effective and successful teachers in delivering quality services through research. Research makes significant contributions to learning and realizations of strategies and practices that can be used to accelerate teaching and learning with this trend in research writing, this will enhance instructions using evidence-based approaches.

Keywords: Classroom-based instruction, Policy improvement, Professional development, Research, Teaching practices

1. Introduction

Teachers must be researchers and are inspired to think critically and solve problems analytically when they conduct research. Research is the mainstream in delivering evidence-based instruction; teachers must have the grit to understand and integrate research into their practices. Thus, embracing the culture of research should be incorporated into teachers' addressing the trends and challenges in delivering quality services in education. Writing research has been linked to teachers who want to improve their classroom interventions and instructional strategies. This approach will result in a more methodical process for evaluating the intervention, plans, programs, and teaching abilities offer in the school.

Furthermore, the culture of engagement of teachers to produce research and evidence-based study makes its way in improving the teaching practices and enhancing the learning of the students in the ever- changing educational landscape. The Basic Education Research Agenda, or Department of Education Order No. 16 (2016), strengthens the ability of teachers to contribute to educational reform and development through educational research. As change is inevitable and affects the way of delivering quality services in education, teachers must have the initiative to embrace the culture of research. Its impact has been

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significant changes in the point of view on the power of research to serve the students and attain the addressed goals in the curriculum.

Creating a culture of research in the educational field has the potential to provide positive results and eventually increase students' achievement standards [2]. Writing research reveals the underlying patterns in education and the ways that classroom environments influence the efficacy of teaching methods and instructions. This will give teachers a stronger foundation on which to build and advance their practice during the teaching process. Including a culture of research into lessons is a better way to broaden students' horizons and increase their prospects for relearning and upskilling. Furthermore, research serve as an avenue of change on how education is delivered through a more evidence-based practice.

In recent years, there has been a movement in research writing to do primary research by identifying and assessing learning-related aspects and instructional approaches. In addition, action studies that sought to determine the impact of the researchers' innovations and interventions were conducted after the learning phase and evolution of writing. Because action has been made through the development or design of novel materials through teaching and learning, writing practices and results are evidence-based, leading to a more tangible, methodical process. Research can be seen as a tool to enhance and learn about the many approaches to teaching and learning. Thus, a culture of research has a pivotal role in the quality of education services. The study of [20] notions that a literature review and the research conceptualization were two areas where they ran into difficulties when constructing their action research. Teachers experience challenges in writing research. Moreover, [11] research must be done to foster the ability of critical thinking to support students in learning. As to the study of [3], plan, do, check, and act were the outcomes of the competency-based production process for high-quality teachers. Teachers should embrace the culture of research as we move forward, and their engagement is evidence that every lesson they teach and service they provide pave the road for better services in education. To have more evidence-based approaches in teaching and

learning and to have better outcomes on the various interventions that are delivered to students, research.

Through the writing of research studies, the researcher has gained a better understanding of the rationale behind and significance of writing research in educational systems, as well as how it can enhance and retrain instructors' capacities to deliver high-quality educational services. This study aims to determine the following research objectives: (1) to explore the teachers' experiences in writing research and (2) to identify how these experiences become an avenue in enhancing and improving the teaching and learning process through research.

2. Methodology

The study used a descriptive qualitative research design employing focus group discussion (FGD). As notion by [15], the method of qualitative research is used to comprehend people's views, conversations, actions, and beliefs. Focus Group Discussion (FGD) was done with an open-ended question to attain the objective of the study. Focus Group Discussions are in-depth interviews conducted in a group whose sessions have characteristics based on the idea, substance, and methods of interviewing [12]. Prior to starting the focus group discussions, the researcher gave an overview of the objectives of the study and sought the participants' consent by discussing the contents of the "Informed Consent Form." The FGD lasted for almost two hours.

Ten teacher-researchers participated the study in one of the secondary schools in the Philippines. Purposive sampling was used in the study to choose the participants. Purposive sampling is used as a means of more accurately aligning the sample to the objectives and targets of the research [8]. The participants were teacher-researchers in one of the secondary public schools in the Philippines who experienced writing research for two consecutive years and presented it in a research colloquium/conference. The participants were four males and six females, mostly aged 30-35. Four teachers have been teaching for five years, and six teachers have been teaching for ten or more years. The study's participants are teacher-researchers with backgrounds in both basic and action research writing. This will lead

to a thorough comprehension of the phenomenon of writing research and the identification of writing study trends that will aid in the design of policy.

Experts validated the questionnaire to examine its validity. Ethical issues have been taken into account to ensure that the responses and identities remain private and confidential and are only used for the purpose of the study.

3. Results and Discussion

Based on the responses of the participants, five themes were emerged: *Research and Intervention, Improved Teaching Practices, Professional Development and Growth, Addressing Classroom Challenges and Contributions to Education Policy*

3.1 Research and Intervention

The research offers insight into how to deploy intervention best, mainly when dealing with problems that are distinct to at-risk students. Each teacher's ability to innovate and be creative in giving varying instructions that handle diversity has grown more excellent as a result of investigations. This was strengthened in the study of [9]. Teachers must possess the determination to acquire new skills and respond to emerging trends if they are to continue to be advocates of transformation and education for future generations. Teachers 1 and 2 discussed how using interventions allowed them to develop fresh ideas for approaches and practices. As mentioned by T1 *"Writing studies or research will help you create interventions and concepts that will support your teaching"*. Thus, T2 added that *"through research, coaching and mentoring should be evident to guide and develop our research capabilities such writing and developing policy in the school context"*. The use of mentoring is a potential strategy for assisting teachers in implementing interventions [7]. Thus, teachers used coaching and mentoring as their support system and guide to develop these patterns of conduct. Writing research can contextualized and individualized learning materials and teaching processes that take a broad and intense commitment. Teacher 5 affirmed this *"through research, it*

will be continuous process of learning and upskilling one's capabilities and this will be an avenue of learning new ideas and novel practices that can contribute to a more innovative and produce interventions". Teachers can alter and enhance their approaches by engaging in this practice or research. As empirical data support research interventions, this means that treatments have a greater probability of achieving the desired results due to the fact that they are based on solid facts. Teachers should have the willpower to constantly learn new things in order to progress as the sole source of competency and expertise [4]. A variety of settings can benefit from the use of research as an intervention to address challenges, improve findings, and promote progress. Teachers using research as an intervention implies putting evidence-based findings to use to guide decision-making as well as executing strategies that have been demonstrated to be effective.

3.2 Improved Teaching practices

Researchers who create evidence-based teaching strategies, such as teachers, also use this as the key to enhance the way that instruction is delivered. Because of the study, intervention, remediation, and enrichment programs are used to improve each student's performance. A teacher has a thorough awareness of the practice of teaching when research is integrated. As reiterated in the study of [1], training for teachers is crucial because it can have a significant impact on how students conduct the activities they engage in. Teachers 1 and 2 reiterated that the breadth of knowledge grows even further when they include research into their instruction and can cultivate a drive for learning so that there can be more development and flexibility in how students are taught. As shared by T1, *"research developed a more evidence-based practice that contributes in improving the teaching practices"*. Thus, providing learning opportunities such as seminars, workshops, and writing shops can be a great help in enhancing teachers' competencies in writing research. Added by T2, *"improving one's skills and knowledge takes time and a systematic way and through research,*

teachers can improved their novel ways of delivering instructions". Research expertise on the professionalism of teachers can be improved through digital literacy [19]. Writing research

expands each teacher's expertise and helps them learn how to become better teachers. Through writing, students investigate notions and come up with new ones. To learn about changes in the educational system and the causes of instructors' writing, teachers become researchers. As mentioned by T3 "teachers are lifelong learners that every day is an opportunity of learning and this will serve as a guide of elevating their teaching skills and practices and embracing the culture of research." This implies that teachers are lifelong learners who incorporate new knowledge and skills into their daily actions and opens an opportunity of new practices that can adapt in their teaching.

In other words, the actions and aspects of daily life provide evidence that teachers may learn from various viewpoints. This was strengthened in the study of [7], which shows that in order to become proficient in evidence-based practice (EBP) in the setting, teachers can benefit from research-learning projects (RLPs). Research has shown that if immersion is accomplished in every circumstance, there is more of a bridge in every gap in teaching and learning, and more witnesses can be offered to the practice activities. Every problem and concern that practitioners encounter in improving their skills is resolved through conducting research. Consequently, [13] notions that teachers seemed to be the most knowledgeable and to use strategies for prevention more frequently, but they also seemed to know less and use tailored behavioral intervention techniques. Research makes significant contributions to knowledge and understanding of tactics and methods that can be used to advance teaching and learning quickly. By using evidence-based procedures, the emerging trends in research writing make it easier to overcome any obstacle.

3.3 Professional Development and Growth

Research encourages learning for oneself.

Every teacher has a desire to grow and strives for improvement in their work and learning through writing research. When there is a chance to dedicate oneself to writing research to better oneself, teachers act as researchers. As T4 mentioned that *"through research, professional growth and development was affected and improved the knowledge and his ability to use it for career advancement by becoming a more skilled producer and integrator of evidence-based procedures through research."* Teachers must conduct their research, which encourages students to think critically and solve problems analytically. Teachers must have the tenacity to comprehend and apply research to their practices because it is the norm when giving evidence-based instruction. As [16] stated, research and innovations can be utilized as a credential for promotion. Teachers should become researchers, as T5 also suggested *"as individual nurturing the skills and capabilities of the students, teachers must upskill, retool and improve one's practice and research can lead a way toward improvement".* This implies that teachers must stay up with the broad advancements and developments in education. Every teacher becomes more creative and open to accepting and embracing the movement toward a transformative world of learning and providing high-quality services in education through the use of research-based approaches. Continuous training programs with research integration must be provided to the teachers [21]. With the various writing workshops, conferences, and training available, teachers are more committed to writing and disseminating the body of knowledge through publications.

Writing research has become a trend in the educational field that addresses every difficulty that requires self-evaluation and help. So, to improve oneself, one must be motivated to advance their practices and research and meet their urge to become more productive and successful teachers. With the study of [10], writing research offers professional development that enables teachers to encourage students to write in both digital and social contexts. In the society in which we now reside, everyone is recognized as having equal rights to education. Writing

research included the acquisition of new knowledge, the use of technology in writing instruction, attitudes toward using technology in writing, and chances to exercise leadership responsibilities [5]. Professional Development (PD) is one of the crucial components of helping teachers improve their effectiveness and responsiveness to the changing landscape of education because teaching is a lifetime process and can addressed the different classroom challenges.

3.4 Addressing Classroom Challenges

Teachers can continue to develop their teaching methods and stay up with developments in their field by keeping up with the most recent research findings. By providing teachers with ideas and insights based on solid data, research is essential in addressing issues in the classroom and improving teaching and learning. The process of discovery and learning is aided by research. As shared by T6, "*research addressing the problems and difficulties in classroom-based instruction can be done through research".* As to [16], writing abilities, student motivation, and student engagement are vital motivators that help teachers build their research skills. Performing research paves the path for offering intervention and enrichment activities that will support the student's development. Research aids in resolving the difficulties in classroom-based instruction with the methods above. Even though teachers see themselves as subject-matter experts, they have limitations when it comes to imparting knowledge to students during the teaching-learning process [18]. Moreover, T7 mentioned "*that projects, tasks, and encouraging students to delve deeper into their interests are all effective ways to incorporate research into the classroom."* In addition to enhancing the educational experience, encouraging a culture of research gives students lifelong skills that are priceless. As to the study of [1], teachers became more autonomous and supportive as a result of the intervention. Furthermore, T10 shared, teachers can find creative ways to engage students, encourage active learning, and accommodate various learning styles by researching educational research. Conducting research, exploration, and discovery makes it a way to become an efficient teacher in

delivering instructions and research helps teacher to learn about and comprehend teaching practices into a more innovative way of delivering instructions.

3.5 Contributions to Education Policy

Teachers are more conscious of the need to add to the body of knowledge they may share to raise the standard of educational services as a result of various inquiries and discoveries. As a result, this study can serve as a model for policy changes that will increase teachers' interest in conducting research. A culture of research among teachers of primary education can be successfully developed with the support of policies based on tangible, factual concepts [2]. As T8 and T9 shared that findings, developments, and solutions resulting from research can be advantageous to society. Thus, effective policymaking based on open innovation must maximize the benefits of transparency and encourage the investment required to turn open efforts into new technologies in delivering instructions [6].

The following emergent themes from the study will serve as the foundation for developing the school's research culture: research and intervention, enhanced teaching practices, professional development and growth, addressing classroom challenges, and contributions to education policy through it. There will be further information supporting the best practices in the school that incorporate research. Today, competencies need to be nurtured and improved when imparting knowledge. One of the priorities to be improved is the teachers' ability to use technology, adapt to the ever-changing educational landscape, and embrace the culture of research to deliver instruction, as well as their growth mindset as an integration catalyst and organization leader. This will help us transform the teaching and learning competencies in the integration of research in education and widespread in embracing the research culture.

Conclusions and Recommendations

As teachers become researchers, a great approach to learning new things and developing teaching practices into an evidence-based practitioner is through

research. Through research, each teacher gains a greater understanding of the need to be innovative and creative and develop instructional methods that can support both learning and teaching in the dynamic educational environment. As a result, teachers now routinely do research to deliver high-quality services in education and find solutions to problems. Considering that a teacher is a lifelong learner and strives for success, trends in writing research are relevant to all teachers. Based on the findings of this study, teachers should be more knowledgeable about research so that they may use it in their area of specialization. A working example of how developing one's professional and personal growth and development can be facilitated by preparation and knowledge, conducting and organizing research symposiums and conferences to discuss findings, disseminate them around the group, and educating each member individually. Through this, learning will be adjusted and evaluated with research. While conducting research is an independent process, an individual can perform better if their input is acknowledged and valued more. Giving teachers incentives, training opportunities, and publication opportunities will significantly aid their recognition of their studies and embrace an institution's research culture. Teachers must allow students to learn about research principles and do research in the classroom while taking ethical considerations into account. This increases teacher motivation to publish studies and their capacity to develop innovative and research-based approaches.

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Employability Skills of Senior High School Tech-Voc Students: A Measure of Industry Preparedness

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Abstract

Senior high school for technical-vocational education is one of the highlights of the enhanced Basic Education Curriculum of the Philippines. The relevance of Technical and Vocational Education and Training (TVET) in the economic growth of the country has increased the need for quality technical workers who should be industry-ready. Thus, this study sought to find out the industry preparedness of Technical-Vocational-Livelihood (TVL) students of a senior high school in the Philippines as a measure of their industry preparedness. It was identified based on the perception of the students and their immersion supervisors using four skill categories, namely general work habits, communication skills, technical skills, and technology literacy. The respondents were one hundred TVL students and twenty industry representatives. The instrument used was a checklist type of questionnaire; weighted mean and chi-square tests were used as statistical treatment. Students perceived that they were well-prepared in terms of general work habits, communication skills, and technical skills; yet, marginally prepared in technology literacy. The supervisors, however, perceived the preparedness of the students as "marginally prepared" in technical skills and technology literacy while "well-prepared" in the remaining category. The conclusion of this study revealed that the TVL students were prepared to face the labor industry in all four skill categories but needed to focus more on technology literacy and technical skills. The research has recommended that the TVL program should continue and maintain good performance in instructions and laboratory; that the program should continue utilizing the technical skills and technology literacy to the students and must focus on enhancing the students' acquisition of general work habits and communication skills.

1. Introduction

The implementation of the recent modification in the basic education system in the Philippines has taken place. The K to 12 curriculum was enacted in 2013, introducing an extension of two years to the fundamental education curriculum of the nation. The K to 12 program was signed into law by former President Benigno Aquino III on May 15, 2013, under Republic Act (RA) 10533. The aforementioned program consists of a total of thirteen (13) years of foundational education, encompassing Kindergarten, six years of elementary education, four years of Junior High School, and two years of Senior High School. The primary objective of this program is to ensure that students are given the time to fully comprehend and master various concepts and skills. Additionally, the program intends to cultivate a mindset of continuous learning, thereby fostering lifelong learners. Ultimately, the program strives to provide graduates with

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the necessary knowledge and abilities to succeed in higher education.

Senior high school is part of the K to 12 curriculum. It is the additional two (2) years, the grades 11 and 12, which serve as preparation for the student for their chosen career and profession. Students can choose the particular tracks and strands based on their competence and interests. Preparing students after junior high school is very important to provide time for mastery of skills and concepts. It focuses on developing lifelong learners and preparing the graduate to apply the knowledge and mastery of skills in the future. Senior High School students have the option to choose from four distinct paths, which include academic, technical-vocational-livelihood, arts and design, and sports. Students engage in an immersive educational experience that encompasses earn-while-you-learn options, so facilitating their acquisition of pertinent exposure and practical experience within their selected field of study.

Moreover, the K to 12 curriculum provides students time to learn more about their special skills. According to Yap [1] in the official publication of the Senate of the Philippines, it was implemented in the country because the Philippines is one of the three countries that only offers a ten-year basic education. The issue of students facing challenges in the increasingly competitive global job market has long been recognized as a significant concern. The extended instructional process of the K to 12 educational curriculum is considered essential in providing Filipino children with a higher quality of education.

Moreover, the Technical-Vocational-Livelihood (TVL) track is a crucial component of the K to 12 curriculum, with the primary objective of providing students with the necessary skills and competencies to be prepared for future employment opportunities. This particular program primarily focuses on developing abilities that will enable learners to get certificates of competency (COC) and National Certifications (NC). These certifications are crucial for individuals seeking improved employment prospects in the fields of agriculture, electronics, and trade. This aspect is equally significant while seeking

opportunities overseas, as the acquired abilities will provide students with the necessary preparation to enter the job market.

Consequently, the implementation of the K to 12 education system will adequately prepare students for the workforce. The provision of ample learning time for pupils will enable them to further explore and deepen their understanding of their individual areas of interest. In the future, individuals will be able to secure employment that aligns with their specific skills and abilities, even in the absence of a tertiary education. Furthermore, by extending the duration of secondary school by two years, students will complete their education and reach the age of eighteen, which is the legally permissible age for full-time employment. This will allow individuals to enhance their intermediate-level skills and enhance their chances of securing employment or pursuing entrepreneurship.

Getting students ready for life after secondary school is critical work. Yet how do schools know whether the function they are doing is having the coveted outcomes? A staggering measure of time and vitality is put resources into the accumulation and investigation of evaluation results and graduation information, yet schools frequently disregard asking students how they esteem the training they have gotten.

In addition, the government joins with numerous companies for technical and vocational courses to empower students to pick up skills in the field. It is enclosed in the curriculum known as student work immersion. The immersion trains students and strengthens their skills or expertise for their work in the future. It prepares students to work in companies. The coping demand for senior high school students to become job-ready is an impending question that this study answered. This study was focused on identifying the industry preparedness of TVL students as perceived by the students and their respective immersion supervisors. The industry preparedness was based on the four-skill category areas, namely general work habits, communication skills, technical skills, and technology literacy.

2. Literature Review
2.1   Work Readiness

According to the definition provided by Walker and Campbell (2), work readiness refers to the degree to which individuals who have completed their education are judged to possess the necessary traits and attitudes that enable them to be adequately prepared for and successful in the professional setting. Given the quickly changing nature of the working environment, the extent to which graduates are "work ready" is viewed as characteristic of their potential as long as employment and professional success. The fact that TVET institutions are equipping graduates with the qualities that make them work-ready has significant implications for graduate employment. They should be at par with the selection standards of the industry.

Thus, it is relevant to assess the capabilities of the students in accordance with their needed improvement as the labor industries require. The acquisition of insight and knowledge is a prerequisite for progress and development. This phenomenon might be characterized as the practice of perceiving, comprehending, and executing. The process of reflecting, analyzing, and taking action based on the outcomes derived from the analysis are fundamental characteristics inherent to human beings. The advancement of humanity has been reliant on the practice of evaluation, whether it occurs within an individual's own thoughts or through external means. That same context is where this study is focused.

Further, even though employers and employees work together in the direction of getting the job completed, the expectations and the values each holds are not continually communicated or understood. It is essential to understand this and be aware of some of those expectations.

Expectations of Employers. In the context of employment, it is generally anticipated by employers that once entry-level employees have acquired the necessary job-related skills and knowledge, they will exhibit a high level of competence in carrying out their assigned tasks. This entails demonstrating a certain level of autonomy and accountability by effectively managing their time without external prompts, evaluating their own performance on a daily basis, adhering to appropriate workplace conduct, and effectively addressing personal issues without allowing them to impede their professional responsibilities.

Expectations of Employees. Employees bring valuable contributions to the workplace through their expertise, their intellectual capabilities, and their dedication. In exchange, individuals can reasonably anticipate receiving comprehensive training, equitable and respectful treatment, clear communication regarding rules, policies, and modifications to their responsibilities, explicit delineation of work expectations, timely notification of matters directly impacting them, provision of acceptable and secure working conditions, a manageable workload, just compensation and benefits, a reasonable degree of autonomy in their tasks, and the opportunity to contribute suggestions that are duly considered.

In addition, employees anticipate equitable assessment of their work and recognition thereof, along with a decent chance to apply their expertise, abilities, training, or past experiences. Furthermore, they desire clarity regarding the integration of their job within the broader framework of the business.

Work dissatisfaction frequently arises when certain expectations are not met. One of the primary sources of frustration and discontentment arises from inadequate communication between management and personnel, encompassing insufficient feedback on employees' performance, excessive work demands, insufficient acknowledgment of their efforts, incongruity in labor values between employees and employers, interpersonal conflicts within the workplace that are challenging to resolve, and notably, a lack of sense of belonging, acceptance, or significance as an individual.

While employers generally aim to meet the expectations of their employees, they often lack awareness of these expectations due to infrequent and explicit communication. It is the responsibility of each employer and employee to speak about their expectations, in particular, if they need them to be met. Since supervisors

and managers regularly set the overall tone of the place of the job by making policies that affect the conditions and relationships of the workplace, it is usually their duty to be aware of things that contribute to a low-pressure environment. It is hoped that companies recognize the detrimental effects of excessive stress, prolonged overtime, and limited involvement in decision-making processes on employees. Nevertheless, in the event that employees no longer possess such concerns, it becomes their responsibility to effectively communicate their apprehensions to their respective employers.

Citing these employer-employee expectations helps them understand the expectations of employers in general and also look at the expectations of students when they become employees. Gaining a comprehensive understanding of these expectations would facilitate the TVL students' ability to enhance their readiness for employment. It is imperative to engage in a discourse around the expectations of Technical-Vocational-Livelihood (TVL) students in their capacity as employers. This discussion aims to identify unrealistic expectations and explore strategies for managing emotions in circumstances where these expectations are not fulfilled.

2.2   Skill Assessment Parameters

Going deeper into the study, the researchers provide vital information regarding the variables concerned. These variables are general work habits, communication skills, technical skills, and technology literacy.

2.2.1   General Work Habits

These skills are measured in accordance to what extent a student would perform in terms of the following: the ability to work in teams, motivation for success, ability to solve problems and to meet deadlines, the measure of acceptance of constructive criticism, ability to solve problems, confidence in abilities, ability to make decisions when necessary, and the ability to work independently.

Marr [3] in personal development stated that meeting cut-off dates is the single maximum vital aspect in comparing overall performance for a salaried position. When work requirements are not clear and do not have

measurable goals, time limits are easy to overlook. A clean deadline is an objective. It prevents one from hiding what he misses. Missed cut-off dates lead to excuses. When one makes excuses, he loses an employer's self-belief and can be the primary to be let go. A business team is depending on each other. One team member's failure to satisfy a closing date endangers some other group members' ability to preserve the timetable. Each cut-off date is a hyperlink in a bigger chain. When one link fails, it compromises the whole chain. If one functions because of the vulnerable hyperlink in a business, his job is at risk of being lost. One forces his manager to search for reasons in the back of inefficient results. If one misses closing dates, he becomes a target. Other co-workers will resent him due to his failure reasons why they need to work harder in order to make up for the missed deadlines.

2.2.2   Communication Skills

According to the 2013 Job Outlook Report, a survey conducted by the National Association of Colleges and Employers involved 219 employers in the United States. The findings revealed that 49.7 percent of these employers considered conversation competencies to be the most desirable skill in their personnel. Interestingly, communication capabilities were identified as the most deficient skill observed in recent college graduates. Among the various highly desired talents, it was seen that 28.9 percent of respondents identified a lack of initiative, 27.2 percent noted a deficiency in collaborative skills, 20.8 percent identified a dearth of a strong work ethic, 11 percent detected a deficiency in analytical capabilities, and 8.7 percent identified a lack of technical ability [4].

One of the most significant shortcomings observed in contemporary graduates is to their proficiency in written communication across diverse audiences. Specifically, they struggle with effectively conveying their ideas persuasively, engaging in logical and critical thinking, and demonstrating responsible work habits in the absence of direct supervision. The financial impact of inadequate written communication in this specific region has been

approximated to exceed $1 billion per year for enterprises in the United States.

Since the results cited above were based on studies conducted among college graduates, how much more lacking in communication skills are the senior high school students? In that sense, communication skills in the TVL track, in this study, pertain to the abilities to get information, communicate with supervisors, peers, or subordinates, document and record information, have English language, contact with others, face-to-face discussions, active listening, reading comprehension, speaking, written comprehension, oral comprehension, oral expression, and deductive reasoning.

2.2.3   Technical Skills

Technical skills are the core of the overall assessment of the level of preparedness of TVL students in facing the labor industry. These are the abilities that play the most important part of the package. The study used different parameters in terms of technical skills since there is a variety of strands in the TVL track in the research locale. The said strands include shielded metal arc welding (SMAW), electrical installation and maintenance (EIM), bread and pastry production, cookery, and automotive servicing.

According to the training regulations (TR) of the Technical Education and Skills Development Authority (TESDA), the following are the common and core competencies of the TVL tracks involved in this study:

Shielded Metal Arc Welding. The Welding NC I (Shielded Metal Arc Welding) Qualification encompasses the necessary competencies required for welding carbon steel plate components in accordance with prescribed specifications, including layout, blueprints, diagrams, work orders, welding methods, or oral instructions, utilizing Shielded Metal Arc Welding (SMAW) equipment. The present qualification adheres to the AWS D1.1 Structural Welding Code, ASME IX Boiler and Pressure Vessel Code, API 1104 Code for Gas and Oil Pipeline Facilities, and ISO 9606-1 Qualification of Welders for Steel.

The competencies encompass a range of skills and abilities, such as the application of safety practices, the interpretation of drawings and sketches, the execution of industry calculations, the contribution to quality systems, the utilization of hand tools, the preparation of weld materials, the setup of welding equipment, the fitting up of weld materials, the repair of welds, and the welding of carbon steel plates using the Shielded Metal Arc Welding (SMAW) process.

Electrical Installation and Maintenance. The Electrical Installation and Maintenance NC II Qualification encompasses the necessary competencies for individuals to effectively install and maintain electrical wiring, lighting, and associated equipment and systems within residential houses/buildings, with a voltage limit of 600 volts.

The competencies encompass the following areas: proficiency in utilizing hand tools, executing measurements and calculations, preparing and interpreting technical drawings, adhering to quality standards, terminating and connecting electrical wiring and electronic circuits, conducting preliminary activities, performing wiring and cabling tasks for single-phase distribution, power, lighting, and auxiliary systems, installing electrical protective devices for distribution, power, lighting, auxiliary, lightning protection, and grounding systems, and installing wiring devices for floor and wall mounted outlets, lighting fixtures/switches, and auxiliary outlets.

Bread and Pastry Production. The Bread and Pastry Production NC II Qualification encompasses the necessary skills and competencies required for individuals to effectively clean equipment, tools, and utensils. Additionally, it involves the preparation, portioning, and plating of pastries, breads, and other dessert items to be served to guests in various hospitality establishments such as hotels, motels, restaurants, clubs, canteens, resorts, luxury lines/cruises, and related operations.

The competencies encompass the development and maintenance of industry knowledge, adherence to workplace hygiene protocols, proficiency in computer operations, implementation of workplace safety practices, delivery of effective customer service,

preparation and production of bakery products, preparation and production of pastry products, creation and presentation of gateaux, tortes, and cakes, preparation and display of petit fours, and presentation of desserts.

Cookery. The Cookery NC II Qualification is a set of abilities that individuals must attain in order to effectively sanitize kitchen spaces and proficiently cook both hot and cold meals, as well as desserts for patrons in diverse food and beverage service establishments.

The aforementioned competencies encompass fundamental skills in the production of bread and pastry, with a particular emphasis on the following proficiencies: upkeep and sanitation of kitchen facilities, creation of stocks, sauces, and soups, preparation of appetizers, salads, and dressings, assembly of sandwiches, cooking of meat, vegetable, egg, and starch dishes, handling of poultry and game, preparation of seafood dishes, creation of desserts, and packaging of pre-prepared foods.

Automotive Servicing. The Automotive Servicing NC I Qualification encompasses a range of abilities that individuals must attain in order to proficiently carry out fundamental engine repair tasks, as well as the removal and installation of vehicle components, for cars powered by both diesel and gasoline engines.

The competencies encompass the following areas: the application of appropriate sealant/adhesive, the movement and positioning of vehicles, the execution of mensuration and calculation tasks, the reading, interpretation, and application of specifications and manuals, the utilization and application of lubricants/coolants, the performance of shop maintenance duties, the estimation of job requirements, the interpretation and creation of technical drawings, the adherence to health, safety, and environmental procedures, the inspection of technical work quality, the maintenance of quality systems, the provision of work skill instructions, the identification and selection of original automotive parts and products, the execution of diesel engine and gas tune-up procedures, the removal and replacement of electrical/electronic units/assemblies, the removal and tagging of engine system components, the handling of automotive steering, suspension, and brake system components, and the handling of transmission system components.

2.2.4   Technology Literacy

Due to the increasing innovation in the industry, a vital skill that a technician must have is a sharpness or even a basic understanding of technology. Literacy in technology is the knowledge of engineering and technology, computers and electronics, analytical or scientific software, computer-aided design CAD software, interacting with computers, and electronic mail.

Research revealed that workers show a determined gap between the skills possessed and the skills needed in terms of the lack of transversal [5, 6], technical [7, 8], and employability skills [7]. In relation to the TVL program, it is evident that the technology within the country is not at par with international standards. Considering the possibility of evaluating local students prior to their graduation would indicate whether or not they are capable of meeting industry standards. However, weaknesses that were observed are significant factors to consider for both the students and the program.

Now, there are identified important stages in the assessment procedure. The determining criteria for assessing quality and identifying the appropriateness of employing relative or absolute standards, gathering pertinent data, and employing these criteria to ascertain value, quality, utility, effectiveness, or significance have been identified [9]. The determination of quality criteria in this study was based on the program's objectives and industry standards. Those measures or variables are general work habits, communication skills, technical skills, and technology literacy.

Undoubtedly, there has been a significant shift in the criteria used to evaluate the effectiveness of TVL in recent years. The criteria for evaluating the preparation of graduates from technology programs have been modified according to shifts in technological, economic, and social demands. Teaching the functioning of the current software would be rendered futile due to the rapid obsolescence of acquired skills and knowledge.

A research conducted in collaboration with the National Association of Colleges and Employers (NACE) reveals that employers across many industries seek similar skills in prospective job candidates. However, employers often report a deficiency of these desired skills in newly hired individuals. The study revealed that although good grades alone are unable to mitigate the hiring process, high-grade factor averages remain significant in evaluating job applications [4]. Non-technical abilities are seen essential in the contemporary labor market. However, despite the awareness among vocational researchers on employers' expectations from college graduates, there remains a significant disparity between these expectations and the actual skill set possessed by graduates [10].

Based on the findings of NACE study, businesses assert that the most effective way for graduates to distinguish themselves from their peers is by demonstrating exceptional qualifications in key skill areas that are highly valued in the industry. According to the Job Outlook, the preferred qualities, ranked in order of importance, are analytical capabilities, teamwork skills, communication skills, technical ability (relevant to one's field of study), and a strong work ethic.

To conclude, the list of related literature and studies cited above were all linked to the burden brought to the researchers to examine the preparedness of TVL students of a senior high school in the Philippines through the identification of their industry preparedness. This study can be a very good platform for addressing the gaps in curriculum implementation.

3. Methodology

The research design used in this study was a descriptive quantitative method that attempts to establish the significant difference between groups of subjects on the basis of criterion measures. Descriptive research describes data and characteristics of the population or phenomena the researchers aimed to study.

One hundred (100) student respondents had been selected for the study. Stratified random sampling was used. They were the TVL students enrolled at a senior high school in the Philippines. The student respondents came from the different strands of the TVL tracks with nine (9) respondents from shielded metal arc welding (SMAW), seventeen (17) from electrical installation and maintenance (EIM), forty-one (41) from home economics, and thirty-three (33) respondents from automotive servicing. They were the students who underwent immersion during the conduct of the study. Moreover, twenty (20) representatives from the linkage partners of the school in their immersion were also respondents to the study. They served as the industry respondents and were chosen purposively.

A questionnaire was used to determine the results of the study. Four skill categories were used to express the job preparedness of the students in terms of the required skills required by entry-level technical employees. The scale that was utilized in the survey to determine the student's preparedness was a 4-point scale of "well prepared", "marginally prepared", "somewhat prepared", and "not prepared". The training regulations (TR) of the Technical Education and Skills Development Authority (TESDA) were highly considered. Revisions and changes were strongly encouraged and were accepted by the researchers for the appropriateness of the questionnaire. After assessing the content and identifying any ambiguity in the items, several revisions, and final validation, the questionnaire was finalized, copied, and distributed. In the analysis of gathered data, mean and chi-square were utilized to establish significant differences among the parameters.

4. Results

The analysis and interpretation of data gathered about the industry preparedness of TVL graduating students were presented in the tables and organized according to the objectives of the study.

Table 1. Industry Preparedness of TVL Students in Terms of General Work Habits

Statements	Student		Rank	Industry		Rank
	WM	**QD**		**WM**	**QD**	
1. The ability to work in teams	3.71	WP	1	3.35	WP	1
2. The ability to meet deadlines	3.49	WP	5	3.25	WP	4.5
3. The ability to accept constructive criticism	3.18	MP	8	3.25	WP	4.5
4. The ability to have confidence in own competencies	3.51	WP	4	3.25	WP	4.5
5. The ability to make decisions when necessary	3.53	WP	3	3.15	MP	8
6. The ability to work independently	3.43	WP	7	3.25	WP	4.5
7. The ability to be organized	3.45	WP	6	3.30	WP	2
8. The ability and willingness to work beyond "normal" working hours	3.55	WP	2	3.20	MP	7
Average Weighted Mean	3.48	WP		3.25	WP	

Table 1 shows the weighted mean of 3.48 of the student respondents' evaluation of their general work habits. Along with their perception, industry respondents rated their general work habits with a weighted mean of 3.25. Both average weighted mean fell under the qualitative description "well-prepared." According to the students' perception, statement number 1 got the highest weighted mean accounting for 3.71. This showed that they had the ability to work in teams. It was remarkable on the perceived level of skill assessment that student-respondents saw themselves as well-prepared in all statements except for statement number 3, the ability to accept constructive criticism. The said statement got a weighted mean of 3.18 and was qualitatively described as "marginally prepared."

On the other hand, on the part of the industry respondents, they agreed with the students in statements number 1, 2, 4, 6, and 7. All those statements were rated "well-prepared." Complementing statement number 1, the industry perceived the students as most prepared in their ability to work in teams having the highest weighted mean of 3.35. They had rated the students as "marginally prepared" in their ability to make decisions and willingness to work beyond the normal working hours with a weighted mean of 3.15 and 3.20, respectively. Moreover, the industry marked the lowest ability of the students in decision-making.

Table 2. Industry Preparedness of TVL Students in Terms of Communication Skills

Statement	Student		Rank	Industry		Rank
	WM	**QD**		**WM**	**QD**	
1. The ability to communicate verbally with peers	3.37	WP	5	3.75	WP	1
2. The ability to communicate verbally with clients	3.22	MP	8	3.15	MP	7.5
3. The ability to write clearly	3.40	WP	4	3.50	WP	2
4. The ability to use proper grammar	3.26	WP	7	3.15	MP	7.5
5. The willingness to ask for clarification when necessary	3.31	WP	6	3.30	WP	3.5
6. The ability to listen with understanding	3.56	WP	1	3.30	WP	3.5
7. The ability to speak to groups	3.50	WP	2	3.25	WP	5
8. The ability to give constructive feedback to others	3.41	WP	3	3.20	MP	6
Average Weighted Mean	3.38	WP		3.33	WP	

The skill preparedness of the TVL students in terms of communication skills is shown in Table 2. The students perceived their preparedness with an average weighted mean of 3.38, "well-prepared," while the industry rated them with an average weighted mean of 3.33, also "well-prepared."

Statement number 6, on the student-respondents, got the highest weighted mean accounting for 3.56 showing their ability to listen with understanding. This was followed by statement number 7, with a weighted mean of 3.50 stating that students have the ability to speak to groups. The student's ability to communicate verbally with clients was marked with the lowest weighted mean of 3.22 but still fell under the descriptive rating "marginally prepared."

However, the industry rated the students with the highest weighted mean of 3.75, "well-prepared," in terms of their ability to communicate verbally with peers. They had agreed with the students when it comes to the ability to communicate verbally with clients along with the use of proper grammar.

Table 3. Industry Preparedness of TVL Students in Terms of Technical Skills

Strands	Student WM	QD	Rank	Industry WM	QD	Rank
1. Shielded-Metal Arc Welding	3.58	WP	3	3.00	MP	2.5
2. Electrical Installation and Maintenance	3.57	WP	4	2.75	MP	4
3. Home Economics	3.65	WP	1	3.97	WP	1
4. Automotive Servicing	3.62	WP	2	3.00	MP	2.5
Average Weighted Mean	3.61	WP		3.18	MP	

The main core of this study was skill preparedness in terms of technical skills. Table 3 shows the weighted means of the student respondents' evaluation as well as the industry respondents. SHS-TVL got an average weighted mean of 3.61, "well-prepared," as perceived by the learners but the industry rated them as "marginally prepared" with an average weighted mean of 3.18. This showed that the students' perception somehow differed from what is actually observed in the actual job setting.

Among the four strands offered in the locale, Home Economics rated themselves the highest with a mean of 3.65. All of the students perceived themselves as "well-prepared." However, among the strands, Electrical Installation and Maintenance got the lowest mean of 3.57. More importantly, the perception of the industry was quite different for the students. They have marked "marginally prepared" the three strands namely SMAW, EIM, and Automotive Servicing with the mean of 3.00, 2.75, and 3.00 respectively. Only the Home Economics strand was rated "well-prepared."

Table 4. Industry Preparedness of TVL Students in terms of Technology Literacy

Statement	Student WM	QD	Rank	Industry WM	QD	Rank
1. The ability to perform basic computer operation	3.30	WP	1	3.80	WP	1
2. The ability to manage computer files	3.21	MP	3	3.05	MP	5
3. The ability to use computer drawing software (CAD)	3.07	MP	7	2.60	MP	7
4. The ability to show skills in digital mechanical designing	3.15	MP	6	2.60	MP	7
5. The ability to use computerized numerical control CNC Programming software	2.97	MP	8	2.60	MP	7
6. The ability to interact with computers, to set-up functions, enters data, or process information.	3.16	MP	5	3.20	MP	3
7. The ability to use interconnected networks (internet).	3.28	WP	2	3.10	MP	4
8. The ability to use, transfer, or communicate through electronic mail	3.17	MP	4	3.20	MP	2
Average Weighted Mean	3.16	MP		3.02	MP	

Table 4 shows the weighted means of the students' skill preparedness in terms of technology literacy. Both the students and the industry scored the ability to perform basic computer operations highest among the statements. They had marked it "well-prepared" with a mean of 3.30 and 3.80 respectively. It was remarkable to note that the industry's perception was far higher than what was perceived by the students.

Moreover, the industry rated low on statements 3, 4, and 5 with a weighted mean of 2.60. It fell under the descriptive rating "marginally prepared." These three statements pertained to the ability to use computer drawing software (CAD), skills in digital mechanical designing, and the ability to use Computer Programming Software (CNC). The students agreed with the industry in the said statements.

Table 5. Summary of TVL Students' Industry Preparedness

Skill Category Areas	Students		Rank	Industry		Rank
	WM	QD		WM	QD	
1. General Work Habits	3.48	WP	2	3.25	WP	2
2. Communication Skills	3.38	WP	3	3.33	WP	1
3. Technical Skills	3.61	WP	1	3.18	MP	3
4. Technology Literacy	3.16	MP	4	3.02	MP	4
Average Weighted Mean	3.41	WP		3.20	MP	

The summary of TVL students' industry preparedness was shown in Table 5. Technical skills ranked 1 among the students' perceptions with a weighted mean of 3.61. It was marked as "well-prepared" contrary to the industry's perception of a weighted mean of 3.18, "marginally prepared." Both variables agreed with the general work habits that ranked second among the four skill category areas. The students rated themselves "well-prepared" in general work habits, communication skills, and technical skills while "marginally prepared" in terms of technology literacy.

However, the industry scored the general work habits and communication skills as "well-prepared" and the technical skills and technology literacy as "marginally prepared." the average weighted mean for the student respondents is 3.41, "well-prepared" while the industry respondents got 3.20, "marginally prepared."

Table 6. Significant Differences in the Perceptions of the Students and
the Representatives of the Labor Industries on Job Preparedness of TVL Students

N	Df	Chi-Square Value	Tabular Value	Interpretation
120	3	0.0817	7.815	Not Significant

Table 6 presented the significant difference in the perceptions of the students and the representatives of the labor industries on the job preparedness of TVL students. It revealed that when the variances were assumed, a chi-square value of 0.0817 and a tabular value of 7.815 were obtained. Since the computed chi-square value was lesser than the tabular value, a level of significance of 0.05, proved that there is no significant difference between the perceptions of the students and the representatives of labor industries on the job preparedness of TVL students. Though the perception of the industry was marked as "marginally prepared" and the students scored themselves "well-prepared", the difference between the two was not that significant.

5. Discussion

The 21st-century skills are defined as the set of competencies that are required among students to succeed in study, work, and life. These skills include learning and innovation skills, digital literacy skills, and life and career skills [11]. They have been necessary since these focus on the application of knowledge rather than just obtaining them [12].

Moreover, living in the twenty-first century requires people to acquire 21st-century skills, particularly senior high school-TVL students who hope to find work after graduation. If this is the case, students should take advantage of the opportunity to improve and obtain the skills necessary for employment.

Among other skills, life and career skills were the skills that students needed to broaden their work choices. Life and career skills encompass what most businesses refer to as employability skills, but in a broader sense [13]. In some countries, the percentage of females participating in Technical and Vocational Education and Training (TVET) is lower than males due to a variety of variables including government, school, societal, and family involvement [14] [15]. Though gender is a main factor in the TVET system when it comes to

employability, having life and career skills may have alleviated the problem.

Thus, efforts must be made to develop 21st-century skills to generate employable graduates from Technical Vocational Education and Training (TVET) programs. The impact of program changes, which occur frequently, on students and teachers is due to the quality of the generated graduates, who are unable to satisfy the current job market requirements. Graduate quality and innovation ecosystems can be improved by increasing TVET graduates' technical innovation skills. Thus, the Technological Pedagogical and Content Knowledge (TPACK) paradigm, as well as components of 21st-century skills, can be used to help TVET graduates improve their knowledge and abilities [16].

Furthermore, community connections are an essential component of 21st-century education. Partners can play numerous important responsibilities [17]. This could include financial support from stakeholders, increased moral support from parents, good relationship with barangay authorities, and a sense of belonging within the community. Thus, community connections and professional involvement should be incorporated into the curriculum because they are critical components in the development of technicians and technologists.

It is also critical for the partnership between academia and industry to maintain checks and balances inside the TVET system. With this, TVET students and graduates will be equipped with the abilities required by the 21st-century TVET sector.

6. Conclusions and Recommendations

The TVL students are mostly male on the premise that TVL is a skill course. The majority of the students were enrolled in Home Economics and Automotive Servicing but there is a considerable number of students in Shielded-Metal Arc Welding and Electrical Installation and Maintenance. The TVL students perceived that they were well-prepared to face the labor industry in terms of general work habits, communication skills, and technical skills. However, they were

marginally prepared in terms of technology literacy. The industry perceived that the TVL students were well-prepared in general work habits and communication skills but marginally prepared in technical skills and technology literacy. Generally, the TVL graduating students are prepared to face the labor industry.

In light of the findings and conclusions, the following are the recommendations:

- The TVL program should be continued and maintained with good performance in instructions and laboratory.
- The TVL program should utilize technical skills and technology literacy for the students. Moreover, the program must focus on enhancing the students' acquisition of general work habits and communication skills.
- The questionnaire of this study can be used as a standard evaluating tool for TVL immersions. It can also monitor the effectiveness of the program itself and countercheck both its strengths and weaknesses. The questionnaire is reflective of the student's performance in training and can be used as a basis for immersion grading.
- A similar study can be conducted every five (5) years intervals to monitor the development of the program and that it can serve as a basis for program development.
- An in-depth study of the same background that focuses on determining the strengths and weaknesses of the program can also be conducted.

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ISO 20400 guidance standard for sustainable procurement: a search for challenges and recommended strategies for successful implementation

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Abstract

The objectives of this review article are to discuss: 1) definitions and importance of SP; 2) development and process of ISO 20400 standard SP; and 3) challenges and recommendations for the successful implementation of the ISO 20400 SP guidance standard. The article used state-of-the art literature review methodology relevant to the stated objectives. The findings reveal that ISO 20400 is important as it provides guidelines for integrating sustainable issues into the procurement process of an organization but has some challenges in its implementation process, such as cost, lack of management support, sustainability labels, marks, and certifications, which can be overcome when an organization takes into account these challenges in the procurement process for implementing sustainably. Steps for successful implementation of SP include: i) proper planning; ii) integrating sustainability features; iii) selecting suppliers; iv) managing sustainably; and v) evaluating and improving sustainability performance. In spite of having many steps and challenges for implementation, most organizations that have implemented SP firmly believe that the benefits are much greater than the challenges, as it helps in achieving sustainable development objectives.

Keywords: sustainable procurement, challenges of the ISO 20400 standard for sustainable procurement, social and environmental responsibility, sustainable development

1. Introduction

The ISO 20400 guidance standard is an international standard for sustainable procurement (SP) with the goal of helping organizations perform purchasing functions sustainably with due consideration of social responsibility, accountability, transparency, human rights, and ethical behavior. It provides guidelines to integrate social responsibility into organizations that aspire to integrate sustainability into the working process by outlining the steps, roles, and duties of purchasing staff [1]. It encompasses two broad aspects of the purchasing process, namely, politics and strategies, with the objective of implementing sustainable purchasing practices and policies for achieving a sustainable society and culture [2]. The approach of the ISO 20400 guidance standard is synthesized as it is applicable to all organizations, irrespective of their sizes, sectors, geographical location, and sectors, both public and private, and all kinds of purchasing decisions, including raw materials, office supplies, catering, etc. The ISO 20400

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guidance standard is not intended for certification purposes; however, it is important as it provides various steps or guidelines for integrating sustainable issues into the procurement process, policy, and strategy of an organization. In other words, it is important to incorporate the key principles, including ethical behavior, transparency, accountability, and managerial issues, into the process of organizational procurement. The operational definition of ISO 20400 is that procurement with the utmost positive whole-life basis impacts on the environment, society, and economy [3].

This article aims at describing: 1. definitions of SP and its importance; 2. development and implementation of SP; and 3. challenges and recommendations.

The article may help to introduce and enlighten those who are looking to implement sustainable procurement in their organization. In addition, the review provides a research agenda for unexplored issues in the literature. The article used state-of-the art literature review methodology relevant to the definition and importance, challenges, and recommended strategies in the implementation of the guidance standard in an organization's procurement process for achieving sustainability. The article is organized as follows: Introduction, Definitions of sustainable procurement and its importance, Development and process of the ISO 20400 guidance standard for SP, Challenges in implementing sustainable procurement, Recommendations, and finally, the article is discussed and concluded.

2. Definitions of SP

Sustainable Procurement (SP) improves the procurement process of an organization by integrating sustainable behavior in the purchasing department, and this behavioral change is beneficial not only to the organization but also to the society as a whole as it minimizes the impact on the environment. There are many definitions of SP, which vary depending on individual studies, organizations, and countries. SP is considered the bridge to link the environment, economy, and society in taking purchasing decisions and therefore accelerate the sustainable development concept and goals in practicable ways through following sustainable consumption patterns [4]. However, the operational common definition of SP is the ability to procure environmentally friendly products that save resources for creating a sustainable environment [5].

2.1 Importance of Implementing Sustainable Procurement

There is a growing importance of SP as most organizations target achieving efficiency and sustainable development goals [11] because SP stimulates more sustainable consumption and production [12], which results in a positive impact on the environment, society, and economy [1]. Due to this, most organizations aspire to adopt SP practices, which also have an impact on the chain of suppliers, employees, and customers of business management [13]. A study has reported that the implementation of SP can increase organizational financial performance as it helps to increase income while reducing costs [14]. In other words, there are triple-line impacts in the following SP, including safety of the environment, reducing waste and carbon footprints, increasing energy efficiency and usage of renewable energy, protecting and improving the well-being of mankind and society, financial performance, reducing costs and investments, and increasing profit for economic development.

Table 1 provides some major definitions of sustainable procurement (SP).

Table 1: Definitions of Sustainable Procurement (SP)

Bizjak [6]	**Incorporation of sustainability concepts such as triple bottom line in the purchasing steps of organizations, that is, evaluating the result in three dimensions of the environment, economy, and society.**
Leal Filho et al. [7]	The procurement of goods and services that yield the utmost usefulness for the investment and are usable throughout the lifecycle with little negative effect on the environment due to organizational, social, and environmental considerations.
Glas [8]	Measures to integrate and implement environmentally, socially, and economically developmental goals in the procurement process of both the public and private spheres while at the same time producing the highest quality at the lowest investment cost.
ISO [1]	The procurement with immense beneficial impact on the economy, society, and the environment.
Walker et al. [9]	Reform in the purchasing and supply processes to obtain sustainable development goals by guaranteeing a strong, healthy, and impartial society, promoting good governance, and living within environmental limits.
British Standards Institute [10]	Purchasing of goods, items or services that contribute positive outcome for the environment, economy and society and minimal negative impacts on disposal.
DEFRA [5]	A way that organizations procure goods, services, and other resources with the goal of achieving maximum value and benefit to the organization and society at large with minimal investment costs and resources that harm the environment.

3. Development and process of the ISO 20400 guidance standard for SP

Before initiating ISO 20400, the following points should be considered by every buyer:

- There should be clear consideration of buying culture, such as the method of buying and from whom it is to be bought or being bought; in addition, criteria for controlling risks from suppliers, the organization's requirements from the suppliers, etc.
- Buyers should have a study to gain knowledge and to investigate the supply chain cost within an organization, along with the cost of revenue towards paying suppliers and their societal and environmental impact.
- Buyers should think strategically, with due consideration of both obstacles and benefits, in implementing SP throughout the supply chain operation process.
- Buyers should cooperate and get along with managers and administrators in the buying process of the organization, and at the same time, they should be aware of the advantages and challenges of implementing SP.

DEFRA [15] offers documents for procurement guidance for organizations that are interested in obtaining the standard, highlighting the innovative role and approaches of the government and personnel in the public sector in the UK, which spends about 16 percent of the GDP of the UK. The guidance is also applicable to small business projects that need to take an active role in the supply chain. For implementing effective and integrated sustainable procurement, there should be collaborative supply chain policies and approaches and at the same time exploring commercial risk [16, 17]. Tomossy & Alam [18] made a study with attempts to bring out the important practices of public procurement in economic, social, and environmental contexts for achieving sustainable development goals in many developing countries, such as Indonesia. This article highlighted the prevailing regulatory framework in Indonesia and hurdles in its implementation by giving examples from Australian best practices to introduce reforms and also putting emphasis on the interagency network and the governmental approach to promoting sustainable development goals.

According to Harris & Divakarla [3], a project committee consisting of 20 countries is formed for the development of the ISO 20400 SP Guidance Standard, based on ISO 26000:2010, and the standard is different from other certified environmental management standards (ISO 14001) because it is only a guidance standard.

The following provides the four major components of the ISO 20400 guidance standards for SP, as shown in Figure 1. Each component, except the first, is to be correlated with the other components in the procurement process.
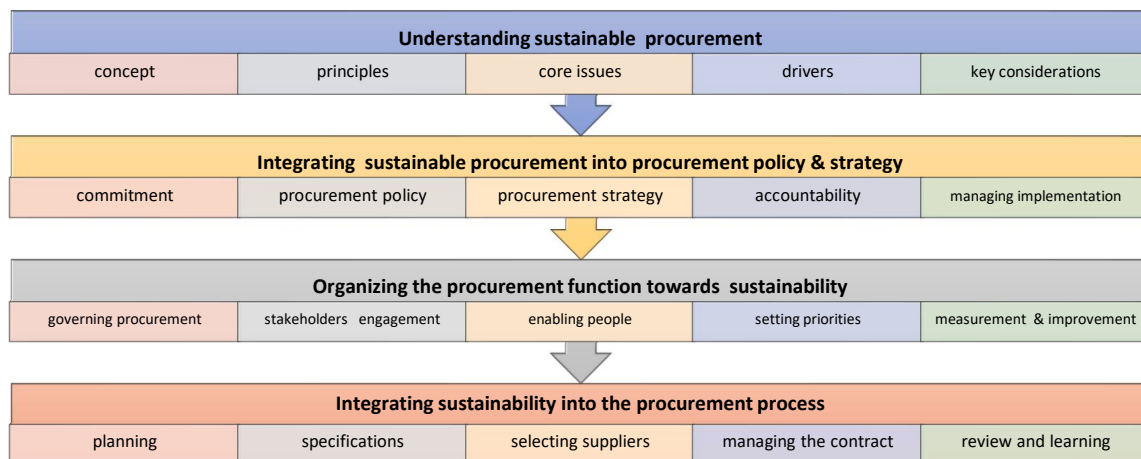
Understanding sustainable procurement				
concept	principles	core issues	drivers	key considerations

Integrating sustainable procurement into procurement policy & strategy				
commitment	procurement policy	procurement strategy	accountability	managing implementation

Organizing the procurement function towards sustainability				
governing procurement	stakeholders engagement	enabling people	setting priorities	measurement & improvement

Integrating sustainability into the procurement process				
planning	specifications	selecting suppliers	managing the contract	review and learning

Figure 1. *Major components of ISO 20400 sustainable procurement guidance* (Adapted from Harris & Divakarla [3])

From the above figure 1, there are four major components of ISO 20400 sustainable procurement guidance. The first component is to fully understand the sustainable procurement process, while the last component is to integrate sustainability into the procurement process.

The major operating issue for all components is the consideration of social accountability. There are seven core issues of SP based on the ISO 26000:2010 standard on social responsibility, as given in Figure 2.

Figure 2. *Core issues of ISO20400 guidance standard* (Adapted from Harris & Divarkala [3])

There are 5 circular steps and processes for the successful amalgamation of sustainability into the procurement process, as shown in Figure 3:

Figure 3. Integrating sustainability into the procurement process
Source: ISO [1]; Zarei et al. [19]

4. Challenges in implementing Sustainable Procurement

Literature Review

Challenges
Analyzed barriers to the adoption of SP in the construction industry of Indonesia. The result found three important barriers: sub-standards, knowledge gaps, insufficient practice in design, and financial burden [20].
Analyzed some challenges and strategies for adopting SP in construction and its influences for achieving the SDG's goals. It is suggested that the government and stakeholders build partnerships, followed by three dimensions of sustainability, including society, economy, and environment [21].
A study was conducted in Pakistan to identify drivers and barriers to SP in public higher educational institutes. The results identified interdepartmental cooperation as the top driver, followed by governmental regulations, while the top obstacles include the absence of interdepartmental cooperation, environmental laws, and change resistance [22].
Identified several challenges in the implementation of green procurement, including financial constraints, lack of policy support, and ineffective mechanism. Also recommended are strategies such as adequate budget allocation to purchase sustainable products, incentives such as low-interest loans, integration of the circular economy, and usage of eco-friendly products [23].
Examined the challenges to successful implementation of SP in government-sponsored universities, which revealed challenges such as differences in making decisions, conspiracy among stakeholders, problems in dealing with governmental agencies, a dearth of planning and budgetary allocation, and a shortage of professional procurement training [24].
Studied the perceived problems of government employees and social organizations in SP implementation, which suggested efficient usage of public resources, reputation improvement, social equality, and more organizational involvement to improve awareness. Identified challenges as lack of training and resistance to change, which can be solved through the availability of communication channels and training [25].
Assessed the factors that cause barriers to SP in the public sector of Pakistan, which indicated external factors, including governmental legislation and the pressures of stakeholders. To overcome the problem, suggested steps including the government's role in introducing rules and regulations,

the initiative of donors and stakeholders to pressurize organizations in adopting SP, the inclusion of SP's education in the educational curriculum, and the provision of training to employees [26].

A study that investigated green procurement practices in companies that manufacture furniture in Malaysia revealed lack of awareness among managers, followed by time consumption, as the main barriers to implementing SP practices in the environment [27].

This study reported the necessity of procurement associations in SC, which revealed the importance of collaborations between inter-organizations in procurement functions as it leads to achieving lesser investment in costs while getting higher-quality procured items [28].

This study revealed the attitude of the management team and the culture of an organization as the two major barriers to SP practices. Other significant barriers include lack of efficacious leadership, management support, training, skill, capability, suppliers' services, cultural integration, transparency, political support, sustainable product quality, government regulations, congenial environment, and supplier's commitment [29].

Studied the perceptions of construction professionals to evaluate challenges in implementing SP in Canada by using a questionnaire and a semi-structured interview. The results revealed lack of funding as the main challenge, while the main benefit includes a reduction of CO_2 emissions and generated waste. Also, lack of strong leadership and dedication are the main challenges to achieving the goals of SP in the Canadian construction industry [30].

Examined complete insight about the challenges in Ireland using a deductive approach. The results revealed challenges for SP to suppliers as a lack of obligatory guidelines, insufficient investment, funding, time, and knowledge [31].

Studied the challenges of the UN's SP system based on an online survey system and found a significant association between SP practices and business performance measurement. The results identified resources (training, expertise), performance measurement, and supply and demand as the most important barriers. Their research analysis provides an innovative approach for identifying barriers in SP and addresses a gap in the SP and supply chain management literature [32].

Investigated factors influencing SP practices in Zimbabwe. The result stated that inadequate management was one factor that limited adoption of SP and also found the absence of social and environmental factors in purchasing decisions. It is recommended to train and educate employees on practicing sustainable ways, and suppliers should be given incentives to motivate the development of sustainable products along with the implementation of a sustainable policy [33].

Investigated the depth of SP practices in various organizations in Malaysia. The results indicated a wide discrepancy in SP's adoption in various sectors, such as the private sector, which comparatively has a higher score for SP's practices than the public sector, and many factors that cause barriers to the implementation of SP. The topmost factor was the lack of awareness and guidance of SP among employees, decision-makers, stakeholders, and funding organizations, while the pro-factors were improved working conditions, transparency, and efficiency of the organization [34].

Compared the SP practices of two countries, Australia and Malaysia. Result revealed differences such as Australian paying more on safety aspect while Malaysia on diverse dimensions. Both countries suffer from financial pressure, and this barrier needs to be tackled with the initiative and support of governmental organizations [4].

The results revealed that for the proper adaptation and implementation of sustainable sourcing, there is necessity to change the internal and external relationships of the supply chain and procurement [35].

A review study of SP identified four main concepts: the outside environment; the inside environment; accountability in implementing SP, both social and environmental; and achievement issues, particularly the challenges and strategies of SP [36].

The authors stated that since SP is found to an increasing extent on the purchasing agenda, managers of the supply chain seek to show corporate social responsibility [9].

Investigated in an international context to identify regional variation in the policy and practice of SP. It also provides practical insights into the implementation of policies around the world, both at the government and organizational levels, and found that the main barriers to implementing SP are cost and a lack of management support [37].

On analysis of the literature, it is found that there are many challenges in the implementation of SP. The present article aims to summarize these challenges to find out the factors highlighting the significance as well as the barriers of this guidance standard in SP for social, economic, and environmental sustainability. SP has been increasingly exposed to media attention since the time of the construction agreement for the Olympics in London in 2012. This has resulted in an improved corporate image on a massive scale among clients and contractors, thus making them work harder to introduce sustainable green projects. However, there are many challenges that hamper implementing SP, and among them, cost is one of the most important barriers. These barriers can be reduced by calculating the life cycle cost or through innovation. Subcontractors in the supply chain have a negative attitude towards sustainability as they have to face the costs of implementation. This has been supported by the findings of a survey of contractors [38, 39].

There are many challenges to the integration and implementation of SP, including labeling sustainability, signs, and standards of certification. Even though labels are useful in the evaluation procedure of the procurement process to verify that each organization's sustainable requirements are met, there are difficulties in selecting the appropriate evaluation procedure because there is a high probability of a biased evaluation procedure. There are several factors contributing to this drawback, such as inadequate financial expenses, a lack of technical experts, and inadequate infrastructure. Usually, the standard has a list of various evaluation activities, including document review, tests, inspections, audits, and so on, which can be performed by either party, seller or buyer. Whatever it is, it is important for the responsible organization to specify the procedure of evaluation and the party who will carry out the evaluation procedure [3].

Dryden [40] listed the challenges of SP as given below:

- Knowledge gap about sustainability
  Many professionals working in procurement do not have clear, systematic knowledge about the procedures and benefits of SP, which poses a big challenge to successful implementation. So, it is essential to accurately process and assess the relevant data from the procurement process, along with the provision of training and education for employees about the importance and process of SP.
- Time, funding, and other resources
  Responsible procurement team needs to have adequate time to learn the processes of carrying out sustainable sourcing and purchasing work, as well as how to evaluate the performance and sustainability of the organization as well as the supplier.
- Inadequate support from suppliers
  For switching to SP practices, it is essential to find suppliers who practice an eco-friendly supply process and who fully understand the importance of sustainability.
- Inadequate cultural support and funding from the public sector
- Absence of external factors, such as the absence of adequate government funding, causes challenges in SP practices.
- High costs
  When switching to the SP method, procurement departments face challenges about the cost of switching to the SP method.
- Difficulty in assessing proper technology
  Many procurement staff face challenges in finding tools and technologies to implement SP successfully.

5. Recommendations

Many organizations aim to implement environmentally friendly SP practices so as to minimize the environmental impact. However,

there are many challenges in its implementation that need recommendations for improvement. Some recommendations are as follows:

- There should be mandatory support from top management, along with a clear understanding of the SP concept, its integration into the organization, and a written procurement procedure and checklist. Increase research on SP through more research grants, by partnering with other regional organizations, searching for funders, implementing low-cost investment, integrating sustainability into the working process of the organization, increasing the staff's knowledge on sustainability, and forming a committee from different divisions to increase working efficiency [12].
- Increase awareness of SP strategies through advertisement, publicity, publication, and other information-sharing outlets and remove challenges and expenses in the implementation of sustainable procurement.
- Incorporate collaborative supply chain policies and approaches and, at the same time, explore commercial risk.
- To increase more participation in SP, the working system of the supply chain should be reformed so as to increase the knowledge of SP among inexperienced organizations.
- There should be inter-organizational cooperation for SP.
- Provide funding and government support, along with the provision of education and training at various levels of the organization, which will help the procurement team improve the work process in a sustainable way.
- Companies should incorporate innovative sustainable procurement practices into the working processes of organizations to save costs and increase sustainability.
- Smaller organizations need to obtain accurate services and products to have the liberty to use innovative SP

strategies, decisions, and practices so as to meet the demands of customers.
- The supply chain should work collaboratively to enlighten young and inexperienced organizations in order to lead them to increased participation in bringing about change.
- Business organizations need to give sufficient time to the responsible procurement team so that they can learn, develop, and adopt new skills that are beneficial for the environment [41].

6. Discussion and conclusion

SP provides guidance for being socially responsible by integrating an innovative process into making purchasing decisions. Implementing SP will be beneficial not only to the organization but also socially and environmentally, as SP aims to minimize the environmental impact of procurement. SP can be successfully implemented by understanding the procurement working process and challenges encountered. ISO 20400 standards of SP integrate a sustainability culture into the purchasing operation procedures of an organization by outlining the guidance of the standard, such as the role of top managers and directors to integrate social responsibility into the purchasing functions, organizational goals, and objectives. Thus, from the above review, it is found that there are several factors that cause challenges to an organization in adopting sustainable practices, as given below.

- Financial constraints/funding
- Lack of awareness
- Lack of skilled managerial leadership quality
- Inadequate policies and strategies guidelines for SP
- Insufficient skill and competence among the responsible professionals of SP
- Poor cultural approval, support, and transparency
- Unavailable guidelines and poor supplier commitment
- Lack of training

In spite of the many challenges of SP, there are many benefits in implementing ISO 20400 Guidance Standards for SP, which can be listed as follows:

1. ISO 20400 Guidance Standards provide multi-dimensional benefits, such as increasing the sustainability of the economy, environment, and society.
2. ISO 20400 Guidance Standard will result to improved mutually beneficial and harmonious relationships between contractors and suppliers, and this will boost productivity while reducing risks.
3. ISO 20400 Guidance Standard increases the security of the supply chain, helps to reduce risky decisions in finance, environment, and prestige, enhances the confidence of customers as well as suppliers, promotes employee's welfare, widens the scope to find new markets for products and services, improves environmental management skills and other management practices, and develops innovative measures to solve problems of the environment, humanity, and economy within the supply chain.

At the end, it can be stated that SP has some barriers in its implementation process, such as cost, lack of management support, sustainability labels, marks, and certifications. These barriers can be reduced by calculating the life cycle cost through innovative approaches of the organization and by defining the type of evaluation activities the party carries out in the evaluation procedure. Incorporation of sustainability into the steps of procurement can be done successfully by responsible managers outlining and implementing specification steps such as: i) proper planning; ii) integrating sustainability features; iii) selecting suppliers; iv) managing sustainably; and v) evaluating and improving sustainability performance. It can be concluded that regardless of the several challenges to implementing SP strategies, most organizations are following sustainability and have implemented SP

because the benefits are much greater than the barriers.

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