Vol. 16 No. 4 July – August 2021

# Interdisciplinary Research Review

ISSN 2697-522X (Print)
ISSN 2697-536X (Online)

# Interdisciplinary Research Review (IRR)




**Publisher** : Research and Development Institute, Nakhon Pathom Rajabhat University, 85 Malaiman road, Amphur Muang, Nakhon Pathom 73000, Thailand

**Origin** : The Interdisciplinary Research Review was established with the cooperation of seven institutes:
1. Nakhon Pathom Rajabhat University
2. The Royal Society of Thailand Committee of Interdisciplinary Research and Development
3. Interdisciplinary Research Foundation
4. Phetchaburi Rajabhat University
5. Muban Chombueng Rajabhat University
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# Editorial Note

The Interdisciplinary Research Review (IRR) was established with academic cooperation by the Nakhon Pathom Rajabhat University, The Royal Society of Thailand Committee of Interdisciplinary Research and Development, Rajabhat University (Western Group), and Rajamangala University of Technology Rattanakosin. This Issue, Volume 16 Number 4 (July – August 2021). This issue contains of four interesting articles in multidisciplinary fields: (1) Education policies and COVID-19 in the Philippines:observations and inputs, (2) Comparative of conventional dot blot hybridization and CARD dot blot hybridization for Salmonella detection in pork, (3) Technology acceptance affecting purchasing behavior among online apparel consumers. Charttirot Karaveg, and (4) Institutional capacities and collaboration with communities of disability service centres in Thailand from the perspective of 'social model of disability'.

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

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# Education policies and COVID-19 in the Philippines: observations and inputs

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## Abstract

As the COVID-19 pandemic brings great impact in the education landscape, Philippine Education (DepEd) has issued policy directives to address the health emergency in relation to teaching and learning. This study is focused on five (5) policy directives issued by the DepEd concerning the COVID-19 pandemic. As a descriptive research, this study scrutinized each policy directive vis-à-vis the nature and content in terms of aspects, contexts, and stakeholder involvement. Careful analysis of the data revealed that most of the directives mainly focus on health (those from the DOH and other related agencies) and administration. It is imperative to emphasize how specific aspects and contexts of teaching and learning are lack attention. It appears that the focus points of the policy directives are mainly set on activities outside the classroom.

**Keywords:** Impact, COVID-19, education, philippines, policy, stakeholder

**Article history:** Received 21 April 2021, Revised 2 June 2021, Accepted 2 June 2021

## 1. Introduction

The way a health crisis creates a 360-degree turn in people's lives is unimaginable. The COVID-19 pandemic has surprised the world and its impacts can be seen and felt in various ways: social, political, and economic. Sharif et al. [1] identified COVID-19 as a "source of systemic risk" highlighting the need for extensive investigation on the health crisis and its effects on the financial sector. No geographic territory is spared from the catastrophe of the virus as the society quickly embraces a new way of living and survival as wearing a face mask, observing physical and social distancing have become a norm. In the USA, for example, social distancing is employed as a principal strategy to prevent the virus spread [2]. Strict health protocols are in place to combat the spread of the COVID-19 virus, and as expected, various consequences also go along with these measures [3]. Various government entities have enforced lockdown and quarantine restrictions as a measure to contain the virus transmission; thus economic movements and enterprises are affected [4]. According to Baker et al. [5], COVID-19 has created a critical impact on the stock market as compared to previous crises. Human's economic and social activities are altered because of the health emergency, but life did not stop as the new normal sets in.

There is a never-ending attempt to succeed in responsive and proactive processes to keep human transactions surviving and evolving. While face-to-face meetings are limited, interactions are now held online to continue with the process of negotiation and conversation. Work-from-home schemes are implemented so that expected outputs are delivered anytime, anywhere, even at the comfort of one's home. Policies like these bring beneficial gains such as effective health protocol schemes and preventing loss of employment [6]. According to Spinelli & Pellino [7], the following are identified as the advantages of virtual meetings: the better environmental profile, lower costs, and on demand streaming. Anxiety, distress, apprehension, and other concerns fill the minds of people. In a study by Abd-Alzaraq et al. [8], the economy and infection mitigation are the primary concerns based on a tweet analysis conducted. As technological breakthroughs seem to shape people's post-pandemic experience, it is vital to note how contemporary times could give rise to the future. It is undeniable that current practices continue to influence and affect the future.

Although the "economic shock" of the pandemic has been regarded as "highly unusual" [9], business entities have closed down and those that have barely survived continue to struggle as community lockdowns and other quarantine mechanisms are still in place. The health sector has suffered a great loss as some areas continue to record an increasing number of patients infected with the virus. A study by Tan et al. [10] concludes that even non-medical professionals are also vulnerable to the biggest threat of psychological stress at the onset of the pandemic. Even

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government services are hampered as public funds are directed to pandemic response and mitigation. The rise of the unemployment rate has burdened not only the economy but also the public sector as amelioration and support programs are central for the survival of the citizens. Central to COVID-19 response is "policy learning" so sound policies could be developed and implemented [11].

In the education context, the challenges brought about by the pandemic are also immeasurable. As the economy faces devastation and misses opportunities due to COVID-19, the process of teaching and learning has been adjusted to respond to the needs of the stakeholders. According to Franchi [12], the pandemic has brought the education landscape two inevitable effects: impending disturbance in education and clouded students' future. The delivery of safe and equitable learning modalities amid a pandemic has posed serious concerns to education stakeholders. It is also imperative to note how experts in the education sector have implemented carefully crafted mechanisms to ensure that no one is left behind and learning never stops. Initial concerns rest on the modality since actual face-to-face instruction is prohibited. Distance learning or also known as remote learning is engulfed with criticisms about whether appropriate learning materials are available, or if students and teachers are prepared for this scenario. As suggested by Dunn [13], it is vital to analyze currently employed strategies and view these through the lens of political contexts. At the height of the pandemic, temporary school shut down are found to be "effective at saving lives" since concerns of local transmissions among schoolchildren are addressed [14].

The Philippine education system has witnessed how the COVID-19 pandemic tests the bureaucracy's resiliency and innovative mindset of the Department of Education (DepEd). The dawn of the COVID-19 crisis in the Philippines in March 2020 took education stakeholders by surprise as the basic education sector was busy preparing for final examinations and end-of-school-year ceremonies. It was one step away from officially ending of the academic year but as school closures were implemented, face-to-face classroom interactions were stopped leading to a shortened school calendar. As the pandemic experience is taking longer than usual, the move to start the new school year is faced with both disapproval remarks and affirmative sentiments.

While remote learning is being pushed by DepEd, President Rodrigo Duterte has stated that he is only in favor of a face-to-face classroom set up only when the vaccine is developed. In the long run, these experiences will lead to new mandates, directives, and policies, prompting the government to be more capable of addressing these concerns in the future [15]. The onset of the pandemic has made DepEd realize its crucial role in ensuring the safety of a hundred thousand Filipino teachers, academic staff, and a few million students. As early as January 2020, official orders have been released to serve as a guide in implementing protocols related to COVID-19. These orders and memoranda were issued by policymakers in the DepEd central, regional, division, and district offices down to the school level. These official issuances are black-and-white mechanisms to ensure that procedures, practices, and protocols are cascaded and implemented. It is essential to recognize that equity is at the core of COVID-19 policy response, facilitating the participation of the sector from below [16].

The following inquiries serve as a springboard of this study as DepEd memoranda are analyzed. As these official documents reflect the structure of a larger policy in addressing the health concerns in the context of education, policy inputs are offered based on the findings of the study.

1. How may the policy directives related to COVID-19 response issued by the DepEd be described and analyzed?

2. What inputs to teaching and learning during a pandemic may be proposed based on the findings of the study?

The study places its significance in advocating responsive and proactive policy measures during a pandemic. It challenges how think-tanks projects in teaching and learning in contemporary times, as education stakeholders, prioritize ways and means to deliver quality and equitable education to Filipino schoolchildren without compromising established health protocols. Through the lens of official orders and memoranda, it is expected that policies are scrutinized, and ways forward will be identified through evidence-based approaches and a practice-driven mind-set. The crucial role of policymaking in the field of education is especially critical as advocates call for uninterrupted and accessible learning modalities especially in basic education.

As official order and memorandum are cascaded and implemented, it creates avenues to successfully navigate the teaching and learning terrain, which leads to students' academic achievement goal, whether in the middle of a health crisis or not.

In this study, official memorandum (policy directives) issued by the DepEd related to COVID-19 were analyzed, with the overall aim of providing inputs to policies related to teaching and learning during the pandemic in the context of Philippine education. Specifically, it scrutinizes (1) what aspects/contexts the policy directives try to address: economic, social, health/medical, pedagogical, etc., and (2) how each stakeholder is involved and projected in the issuance.

## 2. Conceptual Framework

This study specifically involves DepEd policy directives related to COVID-19. Department issuances

have been identified in relation to the pandemic as DepEd website particularly provides a page titled "COVID-19 – Memoranda" which serves as the database for these orders or memoranda. COVID-19 pandemic in the Philippines has been a consistent variable in this study as it provides the context and content of analysis. Seddighi [17] revealed the need to craft a policy considering the pandemic to establish proactive ways to combat the crisis. True enough, a bureaucracy's efficiency can be tested with existing policies at hand and those pipelined for strategic programs and projects. It is also worthy to note how policies have created a negative impact on groups, as Dintrans et al. [18] found out in Chile, where government policies aim to keep the elderly from the virus, but lead to unfavorable magnitude in terms of mental, physical, and financial concerns.

For this study, each policy directive was scrutinized according to nature and content. The proponent believes that it is an aspect worthy of exploration to identify how DepEd has established policies even before lockdown and quarantine measures have been imposed in the Philippines. It will provide a clear picture of the direction and policy development mechanisms in a chronological manner. A study by Liu & Saltman [19] investigated the policy lessons based on initial reactions to the pandemic and revealed "structural health limitations" during the spread of the virus. Looking at the pre-COVID-19 era provides an in-depth view of the current situation. Each DepEd issuances at hand were examined according to aspects and contexts presented. A study by Murray & Murray [20] showed that more than scientific factors, political and economic concerns are also considered by government leaders' decisions related to COVID-19 response. This is to classify whether each issuance deals with economic, social, health/medical, or pedagogical concerns. Through this, it can be noted how DepEd puts weight on numerous areas of concerns and priorities.

Lastly, stakeholder involvement is also argued on how each issuance engages school leaders, teachers, community partners, students, parents, and others. Unaltered communication channels prepare all stakeholders for the likelihood of emergencies [21]; thus, their involvement is crucial. By looking at the nature and content of the issuances, it can be gleaned how DepEd tries to include different agents that make up the Philippine education ecosystem, especially during the health crisis.

Once the nature and content of each issuance have been analyzed according to the time of release, along with the aspects and contexts, and stakeholder involvement, policy inputs to teaching and learning during a pandemic are developed. According to Richards & Scowcroft [22], the contribution of patients, families, and frontline health and social care professionals in terms of policy efforts can address concerns on the

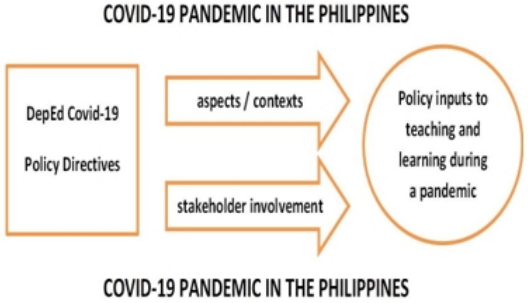


**Figure 1**: Conceptual framework of the study.

negative effects of service interruption, lockdown, and access to various provisions. This is especially crucial since a bureaucratic government agency like DepEd employs memorandum and order to facilitate policy dissemination and implementation. In the long run, developed policy inputs are expected to be responsive, appropriate, and equitable since these are drawn from the examination of contemporary practices.

## 3. Methodology

Descriptive research was used in the study since it aimed to appreciate past or contemporary occurrences. To be particular in this study, the focus is on the official issuances of the Philippines' DepEd concerning the COVID-19 pandemic. Being qualitative, this study used critical case sampling. With these parameters, the proponent of the study set samples to be the official issuances of the DepEd during the COVID-19 pandemic. From available official documents from the DepEd website, five (5) manuscripts were identified to be related to COVID-19 and pandemic response, tagged as policy directives. These files were labeled as department orders and memoranda from January to March 2020. Usual issuances not related to the health crisis were excluded from the data set.

Qualitative content analysis was utilized as the data analysis method. This method involved subjective interpretation of the content or text data employing methodical identification, thereby classifying themes or codes. Since data sources for this study are official DepEd issuances which are available online, these are considered public domain knowledge, accessible and downloadable anytime. This study posed no ethical threats to human subjects and objectivity, fairness, and honesty were observed by the researcher in the analysis of the data.

## 4. Results and Discussion

Five (5) DepEd policy directives make up the data set. These issuances were both released and signed by the Department Secretary. The table below summarizes the issuances used in this study:

**Table 1.** Summary of DepEd policy directives during COVID-19 pandemic in the Philippines.

| No. | SUBJECT | CODE | DATE OF ISSUE |
|---|---|---|---|
| 1 | First Set of Policy Directives of the DepEd Task Force COVID-19 | DM No. 15, s. 2020 | February 4, 2020 |
| 2 | Second Set of Policy Directives of the DepEd Task Force COVID-19 | DM No. 21, s. 2020 | February 12, 2020 |
| 3 | Third Set of Policy Directives of the DepEd Task Force COVID-19 | DM No. 23, s. 2020 | February 19, 2020 |
| 4 | Fourth Set of Policy Directives of the DepEd Task Force COVID-19 | DM No. 31, s. 2020 | March 5, 2020 |
| 5 | Fifth Set of Policy Directives of DepEd Task Force COVID-19 | DM No. 34, s. 2020 | March 9, 2020 |

### *4.1 Pre-pandemic outbreak response: Task force creation and policy directives*

COVID-19-related data set of the DepEd which covers the period of January – August 2020, showing 11 issuances released from January to March 16, 2020, the day when quarantine schemes were officially implemented. The remaining fourteen (14) issuances were made available thereafter, released from March 26, 2020, until June 19, 2020. All in all, this twenty-five (25) DepEd memoranda and orders encompass COVID-19 related documents under the DepEd as of press time.

Before the pandemic outbreak in the country, it is noticeable how DepEd has tried to engage its stakeholders about the agency's function in line with the COVID-19 response. The very first issuance is a memorandum from the Office of the Undersecretary while the rest are memoranda from the Office of the Secretary.

A task force was then created to combat what was labeled as "Novel Coronavirus Acute Respiratory Disease" through DepEd Memorandum No. 11. In recognition of the disease as a critical health concern, expressing that the issue is a "matter of serious and urgent concern," a body was tasked to "formulate policies and develop of strategies and action plans". The task force was comprised of two clusters: the policy group and the operations group. Early on, the policy group has tapped only those from the central office, with the DepEd Secretary as the chairperson, and several undersecretaries and regional directors as members. Moreover, the operations group was led by the Assistant Secretary for Administration as the chairperson, with Quick Response and Recovery Team members with School Health Division as members.

Scrutiny of the task force composition can lead to an idea of the centralized nature of the bureaucracy, since the operations group which was mandated to monitor even the school level situation, is supervised by the policy group. Tapping representatives from the school or district level to contribute to policy efforts can be an opportunity to have a wider perspective of the situation concerning the health crisis.

It is also critical to note policy-level mandates which are top-to-bottom transactions, as coordination is limited only to national agencies like the Department of Health and the Inter-Agency Task Force for the Management of Emerging Infectious Diseases in the Philippines. Schools are involved in the policy level for functions like promulgation of standard protocols, monitoring systems, and other one-way direction schemes. Five (5) sets of policy directives were then issued as developed by the task force, DM No. 15, 21, 23, 31, 34, s. 2020. All these five (5) directives comprehensively communicated information about coronavirus, health safety protocols, and school-level efforts to combat the spread of the disease.

### *4.2 First set of policy directives: Missed chances and opportunities*

The first set of policy directives was issued to relay information and provide guidance to the DepEd community nationwide. The memorandum includes nine (9) enclosures that cover the background situation, measures, and prevention (safety precautions and protocols), activation of the risk management team, guidance in reducing seasonal influenza in schools, self-protection, medical referral form, and template of health situation report.

The background situation enclosure presents a typical overview of the condition relative to the health situation. It mainly communicates details on the virus spread in the country. It is the same information that can also be found in daily newspapers or online media. Only two (2) sections pertain to the functions of DepEd: The Secretary "called on schools to implement DOH guidelines" and the creation of DepEd Task Force. True enough, the first enclosure appears to be very technical and complicated, owing to most details not related to DepEd functions.

It could have been a proactive step if an overview of how schools could respond to the health concerns was presented, and the manner the DepEd aggressively could address the pressing needs of schools during these situations was extrapolated. These scenarios undoubtedly present the background of the situation in the education context. The background situation could have been a glimpse of how the Philippine education sector has been or is projected to be affected by the impending health crisis.

Enclosure No. 2 is contextualized in schools and offices, about prevention and control of the virus spread. Provisions included in the document are travel restrictions and health monitoring of DepEd personnel and learners, discouraging conduct of activities that require the gathering of people, and information campaign. Enclosure No. 3 mandates the formation and activation of risk reduction and management teams in

various levels, with the regional level assuming the coordination and monitoring tasks. However, school-level teams are mandated to twelve (12) particular descriptive roles, from coordination to actual legwork which includes even the "regular disinfection of doorknobs and handles". Part of the job is to "ensure an adequate supply of water and soap in schools." For Enclosure No. 4, the Preventive Alert System in School (PASS) is operationalized by explicitly stating that the "teacher conducts early morning health inspection to detect the presence of fever".

The fifth enclosure relays information from the Department of Health, as safety precautions and protocols are not even contextualized in the school setting. Enclosure No. 6 is for school administrators, directing them to "encourage, educate, and establish" different stakeholders in various contexts. Part of it is the capacity to "separate sick learners and staff" and assigning a "sick room". Designating a "sick room" is indeed a proactive measure, but not when schools are struggling to meet the classroom needs of the students who must go on shifts because of inadequate learning classrooms. Enclosure No. 7 contains health protocol to mitigate the spread of Corona Virus, almost like Enclosure No. 5, but this time, it comes with a Filipino translation and colorful graphics. Enclosures No. 8 and 9 are forms and templates related to health procedures. Amid an impending pandemic, the bureaucracy never fails to come up with templates and reports to be submitted.

The first policy directives cover various aspects of health (medical) and administrative concerns. It misses out on the chance to mention actual teaching and learning practices about the prevention of virus spread. While stakeholder participation is limited, parents, through the school administrators, are only allowed to take part as passive stakeholders who need to be educated. Tapping parents, community leaders, local government units, and other external stakeholders to play an active role in the initial steps and preparation regarding information and awareness campaigns can also be a solution waiting to be uncovered. The first set of policy directives has been a limited exploration between the DepEd and DOH. Also, as template reports and forms make up the last enclosures, the policy directive has failed to discuss how these could be significant to the bureaucracy, or how these are evaluated and utilized.

### *4.3 Second set of policy directives: A number game on class suspension*

The second set of policy directives is about guidelines on class suspensions based on the number of schools, or municipalities, or provinces that have positive cases of infections. Three enclosures are also part of the directives, all from the DOH. This time, consolidation of weekly health reports is ordered despite the lack of discussion on its significance or contribution to virus mitigation efforts or how these are utilized to come up with future decisions and policies.

Enclosure No. 1 is a memorandum from the DOH, reiterating guidelines on disease response in schools and higher education institutions. School administrators are tasked to "take necessary steps to prevent, contain, and mitigate possible transmission of the diseases in communities." The content is like the previously issued memorandum, and this time, community engagement and coordinated response are given emphasis, involving higher-level education officials, local government units, and public health officials. Local community emergency response teams are also tapped in handling individuals with suspected exposure to the virus.

One contextualization of the memorandum is on the four response levels identified by which class suspension will be based. The first two levels recommend no suspension of classes but with explicit appropriate responses to be carried out. Levels 2 – 4 mandate the reporting of cases to the local health office and DOH Regional Center for Health Development. The last two levels listed class suspension depending on the virus transmission situation in the community. Enclosure No. 2 is an advisory on the use of masks which could be attributed to the success in combatting panic buying and hoarding, ensuring sufficient supply to medical front-liners and those required to wear it. Enclosure No. 3 advises the public to "avoid attending, participating in, and organizing events that draw a large number of attendees". This is also a proactive move to generally inform the public to be cautious about their activities, thus mass gatherings are recommended to be canceled.

The second set of policy directives includes administrative, health (medical), and social concerns. It encompasses a larger scope of involvement among internal and external stakeholders, along with various government agencies, particularly the DOH.

### *4.4 Third set of policy directives: Temporarily back to normal before the new normal*

Included in the third set of policy directives are measures that seemingly go back to the normal life settings with featured restrictions, despite the development in the looming health crisis as the virus disease is now officially named COVID-19. This time, if in case DepEd personnel or learners went on travel (despite the previous discouragement) to destinations with confirmed cases of COVID-19, they were required to undergo mandatory 14-day self-quarantine. Maier and Brockman [23] have developed a model that supports containment policies that cover the quarantine of individuals, yielding beneficial results. With the absence being accounted to leave credits (for personnel) and the provision of alternative delivery modes (for learners and not marked absent), the order is indeed a systematic and carefully structured and responsive plan.

"In a crisis, governments often make difficult decisions under uncertainty and time constraints," [24]. The third set of policy directives also gives the go signal to conduct activities at the national and regional levels, including off-campus activities, with adherence to safety and health protocols. Prohibiting the gathering of many people would advance campaigns and protocols such as social distancing, which according to Adolph et al. [25] is "critical to flatten the curve against emergent infectious diseases".

In terms of budget and expenditures, it has been finally noted that the school's maintenance and other operating expenses (MOOE) will be the source of funds to purchase whatever is needed to comply with the previously mandated measures. Private schools are again urged to implement the mandates advocated by the DepEd with COVID-19 response. Besides, an enclosure in the third set of policy directives presents a joint statement from the DOH, Department of Tourism (DOT) and the Department of Interior and Local Government (DILG), stating an assurance that it is safe to organize and attend public gatherings, meetings, and festivals, provided that precautionary health and safety measures are in place.

The third set of policy directives deals with administrative, fiscal (budget), and social aspects. The directives have been a springboard for a larger scope as a joint statement issued by the DOH, DILG, and DOT is included.

### *4.5 Fourth set of policy directives: The dawn of leave credits amid COVID-19*

The fourth set of police directives is issued with 2 other enclosures from the DOH and the Civil Service Commission (CSC). It relays how the risk of the health situation is at the "very high" in the global arena. A travel ban to specific destinations is enforced, as DepEd personnel with previously authorized travel are now strongly advised not to proceed. More importantly, as previously policy stated that leave credits may be utilized for self-quarantine and/or treatment, a memorandum was issued by the CSC ordering that used leave credits may be restored.

Health (medical) protocols are stated in the policy, which includes guidance on home quarantine, use of disposable surgical masks, proper hand hygiene, food handling, disposal of used gloves, tissues, and masks, cleaning, and disinfection. Those who have undergone the mandatory quarantine are required to secure a medical certificate before going back to work. Those infected are required to submit a medical certificate issued by the Referral Center for Emerging and Re-emerging Infectious Diseases, stating that the learner or personnel has been treated and allowed to return to school. Lastly, the policy also warns personnel against unauthorized travel, reiterating the need to secure an official travel authority from the agency.

Enclosure No. 1 is relayed from the CSC for the use of leave credits absences due to self-quarantine or COVID-19 treatment. Under three categories, officials and employees, and frontline service providers who tested positive for COVID-19 and incurred absences due to quarantine and treatment will not be charged against their leave credits. Furthermore, it has been stated that "After the cited 14-day period has elapsed the official employee diagnosed with the COVID-19, their absences shall be charged from their earned sick leave credits." It is indeed an assurance that government officials and employees contribute to efforts to mitigate the spread of COVID-19; and that they are provided with the mechanisms to seek medical help, as it covers all employees regardless of the status of their appointment. True enough, the development of the health crisis will be central to how the governments order timely policies [26].

The second enclosure is from the DOH issuing guidelines for the management of persons suspected of COVID-19 who are under home quarantine. The general guidelines specify those required to undergo home quarantine, room isolation and contacts, use of disposable and surgical masks, proper hand hygiene, respiratory hygiene, food handling, disposal, cleaning and disinfection, and reporting. The contents are similar to previously issued protocols and enhanced with some applicable guidelines and health practices.

The fourth set of policy directives includes administrative and health (medical) aspects. With the CSC memorandum, guidance on the use of leave credits among DepEd personnel is enforced. The inclusion of the CSC and DOH mandates is evidence that various government agencies are working hand in hand to relay, implement, and enforce unified policies related to COVID-19 responses.

### *4.6 Fifth set of policy directives: Towards informed, coordinated, and proportionate COVID-19 response*

The fifth and last set of policy directives highlights "heightened precautions" as an alert system has been raised by the DOH as it anticipates the influx of community transmission of the virus, thus the possible suspension of classes is expected. Guidance for school activities for March 2020 is also released: suspension of all national and regional, division and district activities (that require travel), and off-campus activities. School-based activities are allowed, if those who exhibit respiratory infections will be prohibited to attend, following previously identified health protocols. To purchase "critical logistics and supplies" needed in school operations such as thermal scanners, hand sanitizers, soap, disinfectants, and masks, authority is granted to utilize the MOOE funds for this purpose. To address issues on misinformation and fake news, DepEd personnel and learners are directed to share only verified and reliable issuances from the World

Health Organization (WHO), DepEd, and the DOH. A study by La et al. [27] revealed that in Vietnam's context, reliable sources of information came from timely communication from the government and media, and reports from the science community. Situation reports are also expected to be submitted by concerned teams and groups identified.

Enclosure No. 1 is a press release from the DOH dated March 7, 2020. The report confirms the first local transmission in the country, as the 6th case of COVID-19 positive patient is identified. Included in the statement is a section on information sharing that aims to "yield the utmost benefit and avoid unnecessary stress and stigma to individuals and institutions." As the health situation continues to escalate, improved diagnostic capacity and contact tracing updates are also shared with the public. Fisher and Wilder-Smith [28], noted that investment should be done in terms of COVID-19 testing, as contact tracing is conducted.

The second enclosure is also from the DOH regarding the Code Alert System. While it does not necessarily reflect functions of the DepEd in terms of teaching and learning, different alert levels are presented in the scheme: data gathering and advisory, interceptions in airports and seaports, contact tracing, quarantine, case management, and epidemic surge. Codes are in white, blue, and red; as triggers are classified according to the gravity of local transmission concerning Executive Order 168: Creating the Inter-Agency Task Force on Emerging and Infectious Diseases. Suspension of school or work is identified as a response as triggered by sustained community transmission beyond capacity.

The fifth set of policy directives includes social, administrative, and health (medical) aspects. The inclusion of the DOH press release shows how the policies are shaped by the current situation, relative to the development of efforts to mitigate COVID-19. Various internal and external stakeholders are tapped in the policy directives, harmonizing strategies towards informed, coordinated, and proportionate COVID-19 response.

### *4.7 Policy inputs to teaching and learning during a pandemic*

Sound and responsible policies provide avenues for sustainable delivery of services and uninterrupted operations of government agencies and entities. Not only that these mandates contribute to efficiently implement mechanisms during a health crisis, but these also provide a futuristic view of what can be expected and how impending challenges may be addressed. A responsive policy does not only provide solutions to temporal issues, but it also incorporates the participation of stakeholders involved. Furthermore, numerous contexts and aspects are emphasized in a situation such as a health crisis like COVID-19 is not merely confined as a medical or health concern.

The pedagogical context must be given a strong emphasis on crafting policies as it is central to the core functions of the DepEd. The aspects of teaching and learning must be given enough space in the realm of mandates and orders: specifically on how learning could be facilitated and how teaching could be sustained amidst the looming crisis.

In a bureaucracy as complex as the DepEd, political aspects must be explored instead of just maintaining the top-to-bottom, bottom-to-top approach. Local community leadership must be tapped in recognition of the ecology where the school belongs. Contextualizing actions and mandates through the lens of political jurisdiction would eventually gather support from entities that contribute to the successful operations of the school system. Also, it would be beneficial to consider social and cultural norms to effectively gauge the success of policy implementation. A sound policy founded on strong socio-cultural bases will most likely gather support from the stakeholder as these reflect the totality of their being concerning how a particular issue is presented. In a pandemic as the COVID-19 crisis, Filipinos are most likely to be active and aggressive individuals to uphold and advocate measures and protocols if these are rooted in their capacity to understand, believe, and act. Socio-cultural perspectives must also be considered in advancing measures related to COVID-19 response.

Future policy efforts must capture the genuine interest and participation of internal and external stakeholders. Maximizing what interest groups could contribute would lead to a more structured and coordinated strategy. More than parents and DepEd officials, local community leaders are at the forefront waiting to be tapped. As a predominantly Catholic nation, religious leaders may also be of service to the school community. The quest to combatting COVID-19 is not only confined to the gates of schools, thus it concerns everyone in the community. Keeping our schools safe is not only the sole responsibility of DepEd teachers and parents. Individuals manning the local enterprise also have their share of contribution in making the environment safe, whether it is in or out of the school premises. Missing these significant groups out of the picture is like isolating the bureaucracy on its own as it faces the pandemic.

## 5. Conclusions

Careful analysis of the data revealed that most of the directives mainly focus on health (those from the DOH and other related agencies) and administration. It is imperative to emphasize how specific aspects and contexts of teaching and learning are lack attention. It appeared that the focus points of the policy directives are mainly set on activities outside the classroom. Internal stakeholders are mostly tapped in the issuances, as teachers and school-level individuals are specifically

tasked to work on COVID-19 reports using prescribed formats and templates. Also, as COVID-19 policy directives mandate the provision of alcohol, hand sanitizers, and others, it is vital to explicate how funds may be sourced to procure said items.

This study places its limitation mainly on the period at the time of the conduct of research. It only involves those issuances from January – March 2020, which borders the inquiry to pre-pandemic experience in the Philippines. It could be suggested that future research involves during and the post-pandemic time frame to holistically navigate the issue being studied. While no one can barely predict when this health crisis ends, it is still worthy to note and study DepEd issuances related to COVID-19 response. Another limitation is the DepEd memorandum and order used as the springboard of the study. The focus of this inquiry is only on the issuances coming from the central office of the bureaucracy. Future research could include other mechanisms such as evaluation of implemented programs and policies, dialogue with stakeholders as part of policy-making attempts, or contribution from the curriculum and instruction division and school governance and operations division. DepEd memorandum and order included in the study have also manifested a top-to-bottom communication channel. It is also worthy to explore attempts that strategized the bottom-to-top approach, particularly capturing efforts from teachers and other stakeholders.

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**Interdisciplinary Research Review**
Volume 16, Number 4, Pages 9 – 15

# Comparative of conventional dot blot hybridization and CARD dot blot hybridization for *Salmonella* detection in pork

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## Abstract

Dot blot hybridization assay was evaluated with Sal3 probe for rapid detection of Salmonella from pork samples. The Sal 3 probe (-5′OH) specificity with dot-blot hybridization found a DNA positive result of all salmonella serovars (*S. typhimurium, S. enteritidis, S. vichow*): while, there was negative result from 9 DNA samples of the negative control group. The conventional dot-blot hybridization methods (method A: System probe labeled DIG at 5′-OH labeling DIG hybrids/ anti DIG-AP, detection with NBT/BCIP and method B: System probe labeled with biotin at 5′-OH labeling biotin hybrids / streptavidin-HRP, detection with DAB) were compared with an application of catalyzed reporter deposition (CARD) to dot blot platform (method C: System probe labeled with biotin at 5′-OH labeling biotin hybrids /1°streptavidin-HRP /2°streptavidin-HRP,+ system tyramide signal amplification (TSA), detection with DAB). The sensitivity of dot-blot hybridization methods for systems A, B and C were found C system has a high sensitivity for dot-blot hybridization method. The results were obtained at the lowest concentrations of $3 \times 10^4$ cfu / ml using a 2-day examination period. So, the separation processing of pathogens from meat samples is therefore essential. It is recommend that the use of appropriate DNA extraction kits or methods is critical for successful and valid CARD dot blot hybridization posed a challenge for salmonella detection on pork samples.

**Keywords:** Dot-blot hybridization method, *salmonella spp.*, pork

**Article history:** Received 31 May 2021, Revised 15 July 2021, Accepted 15 July 2021

## 1. Introduction

The prevalence of salmonellosis incidence in people of industrialized countries is often implicated severe serotypes such as *S. enteritidis, S. typhimurium* and salmonella 1,4, (5), 12. : i: - [1 – 4]. The salmonella can be adaptive in animal foods and can be transmitted to infectious agents. There is a wide range of living environments both in humans and in pigs [5]. Pork is one of the main animal products that transmit salmonella to the population in EU and USA [1], [2], [6 – 8]. In Thailand, the prevalence of salmonella in swine reported a swine carcass (27.1%), water (36.7%), workers (19.5%) and slaughterhouses (10.7%) respectively [9]. The bacteria culture is gold standard method of bacteria detection in food, which is both a time-consuming conventional culture method and labor-intensive [10]. Molecular methods used to detect organisms are reliable and rapid than traditional methods, involving culture methods or microscopy. Several researchers have developed new screening methods for alternative methods of detecting and enumerating pathogens in food within 1 day including enzyme-linked immunosorbent assay (ELISA), PCR, biosensor and nucleic hybridization technique such as fluorescence *in situ* hybridization (FISH) [11 – 16]. Recently, FISH method was developed to detect the genetic material of salmonella in pig meat. It was found that salmonella could be detected 3x $10^4$ cfu/ml of salmonella cells within 1 day, When comparing to accuracy salmonella results between FISH method and bacteria culture (ISO 6579) from pork in the slaughterhouse, both results were accuracy consistent at moderate level (Kappa Statistics = 0.46) [17]. However, these two methods are not feasible in most clinical laboratories in developing countries. Currently, strategies based on dot blot hybridization and an application using the catalyzed reporter deposition (CARD) to dot blot platform (CARD-dot blot hybridization) with rRNA-targeted oligonucleotide probes. CARD

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is a method developed to increase the signal strength of reporter molecules. CARD utilizes the property of peroxidase to catalyze the deposition of tyramide conjugates at the site of enzyme reaction [18]. It may be another alternative method that requires improved approaches to enable specific and sensitivity screening to salmonella and can be conducted using common equipment biotechnology laboratories. Therefore, we developed a dot blot platform and combined with the signal amplification method, CARD to rapidly assess for detection of salmonella in pork. Lastly, we evaluated its efficiency when compared to conventional dot blot hybridization analysis.

## 2. Material and Method

### *2.1 Reference strains, culture and DNA extraction*

All bacteria isolates were further clinical isolates identified and characterized from genus to species by the Kamphaengsaen Veterinary Diagnostic Center, Faculty of Veterinary Medicine, Kasetsart University, Thailand. *Salmonella enteritidis, Salmonella Typhimurium* and *Salmonella Virchow* were grow as a reference strain and campylobacter spp., *Corynebacterium* spp., *Escherichia coli*., *Klebsiella spp*., *Pseudomonas* spp., staphylococcus aureus., Aeromonas hydrophila and Enterobacter aerogenes were grown as a negative control. The reference strain of *Salmonella* spp., and negative bacteria were streaked into MAC agar plates for over-night culture at 37°C for activating bacteria. 1 – 2 colony of each bacterial were picked and inoculated each into a 5 ml nutrient broth and grew overnight at 37°C with Orbital Shaker (BIOSAN, LATVIA) before harvesting cell at logarithmic phase to obtain cells with high ribosome content for DNA extract. Genomic DNA extraction of all isolates was performed using commercially available the E.Z.N.A. Bacterial DNA Kit (Omega Bio-Tek, Norcross, GA, USA) according to the manufacturer's instructions and the concentrations of genomic DNA samples were measured using a Nano-Drop ND-2000 spectrophotometer (Thermo Fisher Scientific, Waltham, MA, United States) and the concentration was adjusted to 100 $\mu$g/ml for test specificity of Sal3 probe determined by dot-blot hybridization.

### *2.2 Oligonucleotide probe*

A specific oligonucleotide probe for dot-blot hybridization was used Sal3 primer (5′-AATCACTTC ACCTACGTG-3'), specific to target the 23S rRNA for *Salmonella spp*. [16], [19 – 23]. The Sal3 probe were all synthesized and labelled with digoxigen in (Sal3-digoxigenin) and the biotin (Sal3-Biotin) at the 5′end (Asia Pacific. Integrated DNA Technologies, Singapore).

### *2.3 Evaluation of the specificity of Sal3 probe by dot blot analysis*

The specificity of the Sal 3 probe was tested by hybridization with dot-blot hybridization assay. For this study, Sal3 probe was tested against *Salmonella* DNA 3 serovars and 9 negative controls.

The pellet DNA of each bacterium was diluted to a concentration of 100 $\mu$g/ml, DNA boiling for 5 minutes at 100°C and placing on ice for 10 minutes. Four $\mu$l volumes of DNA sample were dotted on nitrocellulose membrane and dried at 80°C for 2 hr in hot air oven. Dot-blot hybridization in this study followed with the procedure of [24]. Nitrocellulose membrane were sealed in a polypropylene bag with, per $cm^2$, 1 ml of a prehybridization mixture containing 20xSSC (3M NaCl, 0.3M Na-Critrate), 50x Denhardt,s solution, yeast tRNA, 1M $Na_2HPO_47H_2O$, 10% Dextran sulfate) that were incubated at 37°C for 2 hr in water bath. After that prehybridization mixture was removed and replaced with mixed probe/hybridization buffer solution (4 $\mu$l: 500 $\mu$l). The membranes were incubated in water bath at 37°C overnight and membrane was carefully washed away with consecutive washes in wash buffer 1 (1xSSC, 0.1%SDS, pH 7) at 37°C for 5 minutes, wash buffer 2 (0.1xSSC, 0.2%SDS, pH 7) at 37°C for 5 minutes and in wash buffer 3 (0.5x SSC, pH 7) at 37°C for 1 hr. After that blocking reagent with skim milk (5% in 1xTris-buffered saline, TBS) was added and applied to the membrane for 1 hr at room temperature and wash membrane with 1xTBS, pH 7 for 5 minutes at room temperature. In detection step, the membranes were incubated at room temperature for 1 hr with anti-digoxigenin Fab fragments conjugated to alkaline phosphatase (diluted 1:100 in 3% BSA, Roche Diagnostics, German) and washed three times with 1xTBS, each time for 5 minutes. Alkaline phosphatase substrate NBT/BCIP (nitro-blue tetrazolium and 5-bromo-4-chloro-3'-indolyphosphate, Thermoscientific) was added to membrane. The development of a dark blue positive reaction was allowed to proceed for 20 minutes at room temperature and membrane was washed for 5 minutes with 1xTBS buffer, air dried and stored in a polypropylene bag.

### *2.4 Analytical sensitivity of the methods*

The sensitivity of conventional dot-blot hybridization methods (method A: System probe labeled DIG at 5′-OH labeling DIG hybrids/ anti DIG-AP, detection with NBT/BCIP and method B: System probe labeled with biotin at 5′-OH labeling biotin hybrids / streptavidin-HRP, detection with DAB), were compared with an application of catalyzed reporter deposition (CARD) to dot blot platform (method C: System probe labeled with biotin at 5′-OH labeling biotin hybrids/ 1°streptavidin-HRP/ 2°streptavidin-HRP, + system tyramide signal amplification (TSA), detection with DAB).

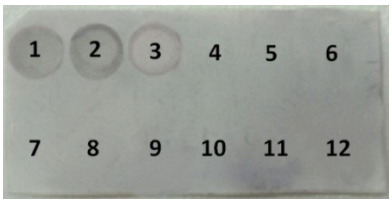



**Figure 1**: Determination of specificity of Sal3 probe by dot blot hybridization. DNA of Salmonella (1 = *S. enteritidis*, 2 = *S. typhimurium* and 3 = *S. paratyphimurim*). DNA of negative bacteria (4 = Actinomyces spp., 5 = Campylobacter jejuni., 6 = Corynebacterium spp., 7 = Escherichia coli., 8 = Klebsiella spp., 9 = Pseudomonas spp., 10 = Staphylococcus aureus., 11 = Streptococcus agalactiae and 12 = Streptococcus suis)

Method A: DNA extracted from *S. enteritidis* of each tenfold dilution sequence was tested for the sensitivity of dot blot hybridization, using a Sal 3 probe (labeled DIG at 5′-OH) and detection step according to step 2.3

Method B: DNA extracted from *S. enteritidis* of each tenfold dilution sequence was tested for the sensitivity of dot blot hybridization, by following per under step 2.3 using a Sal 3 probe (biotin at 5′-OH labeling) and detection step. 3 – 4 drops of the diluted Primary Streptavidin-HRP solution (GenPoint$^{TM}$, DAKO) were applied to cover the membrane and incubate at room temperature for 30 minutes. Membranes were rinsed in TBST wash buffer and placed in three fresh TBST wash buffer baths for 5 minutes each to remove residual primary streptavidin-HRP solution. 3 – 4 drops of diluted DAB chromogen were applied to cover the membrane and incubated at room temperature for 5 minutes, which contrasted well with the brown DAB signals and stopped the chromogen reaction by immersing membrane in water for 1 minute, air dried and storing in a polypropylene bag.

Method C: DNA extracted from *S. enteritidis* of each tenfold dilution sequence was tested for the sensitivity of dot blot hybridization, by following per under step 2.3 using a Sal 3 probe (biotin at 5′-OH labeling) and detection was performed using the Dako GenPoint$^{TM}$, 3 – 4 drops of the diluted Primary Streptavidin-HRP solution were applied to cover the membrane and incubated at room temperature for 15 minutes. Membranes were rinsed in TBST wash buffer and placed in three fresh TBST wash buffer baths for 5 minutes each to remove the residual primary streptavidin-HRP solution. Catalyzed signal amplification method (CARD) for biotinylated probes. Briefly, 3 – 4 drops of biotinyl tyramide were applied to cover the membrane and incubated at room temperature for 15 minutes. Membranes were rinsed in TBST wash buffer and placed in three fresh TBST wash buffer baths for 5 minutes each to remove residual biotinyl tyramide solution. 3 – 4 drops of secondary streptavidin-HRP solution were applied to cover the specimen and incubated at room temperature for 15 minutes. Membranes were rinsed in TBST wash buffer and placed in three fresh TBST wash buffer baths for 5 minutes each to remove residual secondary Streptavidin-HRP solution. After that, 3 – 4 drops of diluted DAB chromogen were applied to cover the membrane and incubated at room temperature for 5 minutes, which contrasted well with the brown DAB signals and stopped the chromogen reaction by immersing membrane in water for 1 minute, air drying and storing in a polypropylene bag.

#### *2.4.1 Evaluation of detection limit of dot blot hybridization of three systems (A, B and C) in pure culture*

*S. enteritidis* was the culture in 5 ml of trypic soy broth (TSB), incubate at 37°C for 18 – 24 hr., at a concentration of McFarland turbidity standard of 1 (Grantbio, U.K.), which was approximately $3 \times 10^8$ cfu/ml. Suspended cultures were diluted serially in 10-fold steps. Each serials dilution of bacteria sample were performed as DNA was extracted described previously and measurement of DNA concentration (Nanodrop, Thermoscientific) as described above to determine the sensitivity of all three different detection methods of dot blot hybridization, according to 2.3. One of the systems was chosen to detect the lowest amount of salmonella to continue for the next steps (2.4.2).

#### *2.4.2 Sensitivity of dot-blot hybridization in spiked pork*

Hygienic pork obtained from the supermarket was confirmed as without contamination of external microorganisms (Charoen Pokphand Foods PCL (CP Foods), Thailand). Pork meat spiked with different concentrations of *S. enteritidis* that made tenfold dilution according to step 2.4.1. One milliliter of each serial dilutions of *S. enteritidis* was spiked on 25 g of pork meat that was added to 25 ml BPW with 0.1% Tween 80 solution and homogenized with a stomacher (BagMixer®400W) at high speed for 90 s. The 25 ml of bacteria cells were collected by filtration through 33-$\mu$m pore-size nylon screen mesh (diameter, 25 mm) into centrifuge tubes 50 ml, and then centrifuged at 7,000 rpm for 20 minutes. The BPW solution of each serial dilution was poured and dissolved the microbial sludge with 2 ml PBS and vortex at high speed for 5 minutes. So, one milliliter of each samples was centrifuged at 8,000 rpm for 10 minutes and cell pellet was extracted DNA as previously described for exam-

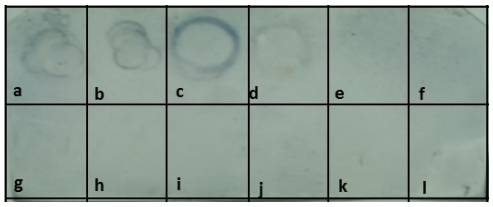
ining the sensitivity of the CARD-dot blot hybridization [17].

## 3. Results and Discussion

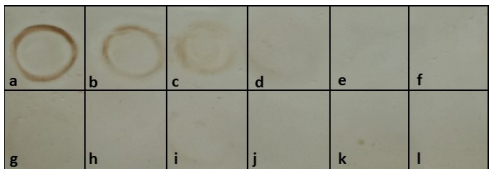
### *3.1 Evaluation of specificity of Sal3 probe by dot blot analysis*

The results of the specificity of the Sal 3 probe was tested by dot blot hybridization. The Sal 3 probe was found to be 100% specific for *S. enteritidis, S. typhimurium and S. Virchow.* (Fig.1), and can be directly determined by observing the Sal3 hybridized probes. The existence of purple dots at salmonella DNA dots at the locations was spotted. But, no cross-hybridization was observed with 9 strains of negative control. It showed that Sal 3 primer labeled with digoxigenin at the end of 5′OH was specific to all 3 *salmonella typhimurium, salmonella Virchow, salmonella enteritidis*, which are serovars important for causing gastrointestinal poisoning in Thai people [25], [26].

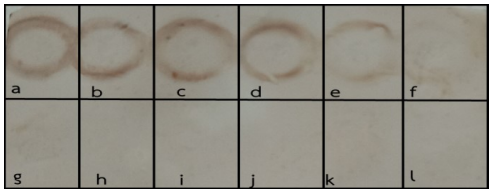
In this study, we have developed a dot blot hybridization assay for the detection of *Salmonella* using Sal3 oligonucleotide probe (5,-ATCACTTCACC TACGTG-3,). The DNA target was hybridized with the membrane immobilized probe and the hybridization was detected by chemiluminescence. 23S rRNA gene of *Salmonella* from 3 different serovars of *Salmonella* hybridized with the probes was found, whereas those of species of *Actinomyces* spp, *Campylobacter jejuni*, *Corynebacterium* spp, *Escherichia coli*, *Klebsiella* spp, *Pseudomonas* spp, Staphylococcus aureus, Streptococcus agalactiae, and Streptococcus suis failed to hybridize. The specific probe binding in this study indicated hybridized Sal3 probe of 100% all salmonella strains. No cross-reaction to other strains of the Enterobacteriaceae family was observed (Fig.1). Nordentoft [19] has been published, that Sal3 oligonucleotide probes designed from the base sequence of the 23S rRNA gene (rDNA), salmonella-specific. The rRNA region has databases from domain or other higher taxa down to a species and rRNA was a routine region used for species identification. Moreover, species-specific probes designed from these genes can be applied for the analysis of any community. They can be detected using whole cell methods in which the cell remains intact and thus also the morphology, or using cell free methods in which total nucleic acids were extracted and probes were applied directly to the nucleic acid target [27 – 29]. A previous study showed that a Sal3 probe has been used for the detection of salmonella in food, wastewater [19], [20], [30 – 32]. The sequence of Sal3 probes was complementary with the helix 63 regions of 23S rRNA gene of salmonella [19]. The region was a highly conserved region of salmonella DNA among different species [33], [34].




**1. A-DIG:** System probe labeled DIG at 5′-OH labeling / anti DIG-AP, detection with NBT/BCIP




**2. B-BIOTIN:** System probe labeled with biotin at 5′-OH labeling/ streptavidin-HRP, detection with DAB.




**3. C-CARD:** System probe labeled with biotin at 5′-OH labeling / 1°streptavidin-HRP/ 2°streptavidin-HRP, +system tyramide signal amplification (TSA), detection with DAB

**Figure 2**: Comparative dot blot analysis determining the sensitivity of three methods for the visualization of dilution factors of salmonella DNA with enhanced haptens signal as chromogen: Dilution factor of *Salmonella* cell was DNA extraction: a= Initial concentration~$10^8$cfu/ml, b = -1, c = -2, d = -3, e = -4, f = -5, g= -6, h = -7, i = -8, j = *Escherichia coli*, k = *Aeromonas hydrophila*, and l = *Enterobacter aerogenes* (negative control)

### *3.2 Evaluation of detection limit of dot blot hybridization of three methods (A, B and C) in pure culture*

To determine the lower limit of dot blot hybridization assay, ten-fold serially diluted ($10^0$ – $10^8$); then, we tested the 3 methods of detection by dot blot hybridization assay established in this study for simultaneous detection of *Salmonella* spp. As a consequence of conventional dot blot hybridization assay such as method A: System probe was labeled DIG at 5′-OH labeling DIG hybrids/ anti DIG-AP, detection with NBT/BCIP and method B: System probe was labeled with biotin at 5′–OH labeling biotin hybrids /streptavidin-HRP, detection with DAB), the detection limit in pure culture of *S. enteritidis* was determined to be $10^6$ cfu/ml (DNA concentration 22.40 $\mu$g/$\mu$l; expected cell concentration = $<\sim 3\times10^3 - 10^4$ cfu/ml). However, method C: System probe was labeled with biotin at 5′-OH labeling biotin hybrids /1°streptavidin-HRP /2°streptavidin-HRP, + system tyramide signal amplification (TSA), detection with DAB), the detection limit in pure culture of *S. enteritidis* was determined to be $10^4$ cfu/ml (DNA concentration 9.41 $\mu$g/$\mu$l; expected cell concentration = < 3cfu/ml), as shown in (Fig. 2; Table 1).

Dot blot hybridization assay is a diagnosis tool of routine use in the diagnosis laboratory. When

**Table 1.** The relationship between serial dilutions and the amount of DNA of *S. enteritidis* extracted from pure culture on dot blot hybridization assays.

| Dilution factor | Number of salmonella cell(cfu/ml) | Elute of 30 $\mu$l of DNA extraction, concentration ($\mu$g/$\mu$l) | Wavelength (A260/280) | 4$\mu$l of DNA concentration were doton membrane ($\mu$g/$\mu$l) | Expectedcell concentration (cfu/ml) | Observation of Dot blot hybridization assay | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | Method A | Method B | Method C |
| Initial | $3 \times 10^8$ | 220.9 | 1.85 | 36.81 | $\sim 10^4$ | + | + | + |
| −1 | $3 \times 10^7$ | 152.45 | 1.89 | 25.4 | $\sim 3 \times 10^3 - 10^4$ | + | + | + |
| −2 | $3 \times 10^6$ | 134.45 | 1.82 | 22.4 | $\sim 3 \times 10^3 - 10^4$ | + | + | + |
| −3 | $3 \times 10^5$ | 82.4 | 1.84 | 13.73 | $< 3$ | - | - | + |
| −4 | $3 \times 10^4$ | 56.5 | 1.88 | 9.41 | $< 3$ | - | - | + |
| −5 | $3 \times 10^3$ | 21.7 | 1.71 | 3.61 | $< 3$ | - | - | - |
| −6 | $3 \times 10^2$ | 19.2 | 1.72 | 3.2 | $< 3$ | - | - | - |
| −7 | $3 \times 10^1$ | 13.5 | 1.51 | 2.25 | $< 3$ | - | - | - |
| −8 | $3 \times 10^0$ | 14.7 | 1.6 | 2.45 | $< 3$ | - | - | - |

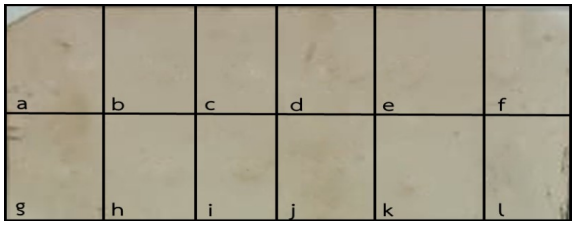



**Figure 3**: The sensitivity of the salmonella DNA detection limits of CARD dot blot hybridization. : Dilution factor of Salmonella cell: a = Initial concentration$\sim 10^8$ cfu/ml, b = -1, c = -2, d = -3, e = -4, f = -5, g = -6, h = -7, i = -8, j = Escherichia coli, k = *Aeromonas hydrophila* and l = *Enterobacter aerogenes* (negative control)

a pure culture was used, the direct detection methods of digoxigenin probe by anitigoxigenin-alkaline phosphatase conjugate (method A) and biotinylated probe by streptavidin- Horseradish peroxidase conjugate (method B) were compared with the CARD detection method (Method C). The third one proved to more sensitive than the conventional detection using homologous 23S rRNA targets of salmonella. The dot blot hybridization assay using the CARD detection method was able to minimum amount of detectable 9.41 $\mu$g/ $\mu$l of salmonella DNA corresponding approximately to $10^4$ genome copies. CARD detection method based on signal amplification by the tyramide reaction is generally considered the most sensitive of the dot blot hybridization methods; on average their sensitivity is 100 times greater than that of conventional dot blot hybridization. Corresponding, previous studies showed that CARD-FISH methods are more sensitive than the conventional FISH methods [35 – 37]. The sensitivity of the different of assays is in the range of $10^4$ – $10^8$ genome copies; therefore, even if slightly higher sensitivity can be reached with different method detection (A, B and C), dot blot hybridization assays can detect the total number of salmonella cells. Consequently, dot blot hybridization methods add a signal amplification step (method C), Using tyramide substrates in sequential horseradish peroxidase reactions that described here could be completed within 2 days and was specific for the detection of salmonellae. However, the sensitivity of the CARD dot blot hybridization that was determined uses different serial diluted salmonella cell concentrations of DNA extracted from pork samples. The CARD dot blot hybridization was not detection of all DNA range of spike concentrations of salmonella cells. This suggested that the recovery of salmonella rRNA from pork was not as good as from pure cultures.

By this assay, the method C: was possible to detect in the order of $10^4$ salmonella cell of pure culture in 16 – 18 hr. Therefore, we chose method C to test artificial contamination with *S. enteritidis* on pork meat.

### *3.3 Sensitivity of dot-blot hybridization for salmonella detection on pork spiked*

Regarding the sensitivity test for determination of the DNA content from serially diluted salmonella cells in step 2.1 that spiked on pork samples, CARD - Dot blot hybridization by Sal3 probe was not possible to hybridize both with salmonella DNA and negative control of bacterial as shown in fig.3, (Table 2).

Several other methods have been described as specificity and sensitivity of technique detection such as PCR and ELISA for salmonella detection that strongly affected by inhibitory substances which might be present in for example food [38]. For example, fat, glycogen, organic and phenolic compounds and humic acids can cause false-negative results of method detection [39]. The DNA concentration and Purity are important factors for the success of DNA base methods including dot blot hybridization. In generally, the DNA extraction kits are often designed for extracting DNA form pure culture consisting of highly concentrated cells and methods detection that are high sensitivity [40]. When we tested the meat samples diluted

**Table 2.** Serial dilutions of the relationship and the amount of DNA of *S. enteritidis* extracted from pork spike on CARD dot blot hybridization assay.

| Dilution factor | Number of salmonella cell (cfu/ml) | Elute of 30 $\mu$l of DNA extraction, concentration ($\mu$g/$\mu$l) | Wave length (A260/280) | 4$\mu$l of DNA concentration were doton membrane ($\mu$g/$\mu$l) | Expected cell concentration (cfu/ml) | Observation of CARD dot blot hybridization |
|---|---|---|---|---|---|---|
| Initial | $3 \times 10^8$ | 21.7 | 1.98 | 2.89 | < 3 | - |
| -1 | $3 \times 10^7$ | 18.8 | 1.82 | 2.51 | < 3 | - |
| -2 | $3 \times 10^6$ | 19.2 | 1.8 | 2.56 | < 3 | - |
| -3 | $3 \times 10^5$ | 29 | 1.79 | 3.87 | < 3 | - |
| -4 | $3 \times 10^4$ | 9.5 | 1.82 | 1.27 | < 3 | - |
| -5 | $3 \times 10^3$ | 14.7 | 1.82 | 1.96 | < 3 | - |
| -6 | $3 \times 10^2$ | 13.5 | 1.86 | 1.80 | < 3 | - |
| -7 | $3 \times 10^1$ | 4.5 | 1.57 | 0.60 | < 3 | - |
| -8 | $3 \times 10^0$ | 5.9 | 2.81 | 0.79 | < 3 | - |

with salmonella cell concentrations; it found that low amount of DNA extracted and low purity of DNA extracted (Table 2), which is may be caused by fat tissue from the meat samples (Minced pork with pork fat). The complexities of various food materials and the use of various extraction methods result in different DNA yields [41]. Corresponding to Laube *et al.*, [42] it reported a discrepancy in the yield of DNA extracted from various source of tissues. Fatty tissues produced a lower concentration of DNA compared to kidney, liver, heart and tendon tissues. That may be due, to high debris amounts of fatty tissue in the pork and the difficulties of removing fatty substances during the DNA extraction step. Thus, it is necessary to add steps for pretreated sample appropriate such as fat removal before DNA extraction [43]. In addition, the low DNA recovery in this study may be a loss of DNA during sample processing. This is in accordance with Zhang *et al.*, [44] which reported during samples processing of pathogen detections base on a molecular technique (eg. Filtration, centrifugation, DNA extract). So, this causes underestimated quantification of DNA to be significantly lower. However, detection of CARD dot blot hybridization can detect at a low abundance of salmonella cells in pure culture. But, it's not suitable for pork samples. In future study, we recommend that use of appropriate DNA extraction kits or methods is critical for successful and valid CARD dot blot hybridization which posed a challenge for salmonella detection on pork samples.

## Acknowledgments

This work was supported in part by the National Research Council of Thailand is for funding 2018. We would like to thank the Department of Veterinary Pathology, Faculty of Veterinary Medicine, Kasetsart University, Thailand, Departmet of Veterinary Public Health, Faculty of Veterinary Medicine, Kasetsart University, Kamphaeng Saen Campus, Nakhon Pathom, Thailand, Kampangsaen Veterinary Diagnosis center, Faculty of Veterinary Medicine, Kampangsaen Campus, Nakron Pathom. Thailand and Department of Animal Sciences, Faculty of Agriculture and Technology, Phetchaburi Rajabhat University, Phetchaburi, Thailand for providing technical assistance.

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**Interdisciplinary Research Review**
Volume 16, Number 4, Pages 16 – 23

# Technology acceptance affecting purchasing behavior among online apparel consumers

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## Abstract

Electronic commerce, or e-commerce as it is commonly known, is an ultimate weapon against poverty in developing countries as it involves cheap and easy access to large markets for small and large sellers alike. The value of e-commerce in Thailand has been increasing rapidly in recent years, and has become the must-have business channel for both new e-entrepreneurs and traditional stores. This study looks at a particular market segment and explores how technology acceptance influences online apparel purchasing behavior. A Technology Acceptance Model (TAM) was developed in the apparel industry context by taking into account seven factors—usefulness, ease of use, security, time pressure, hedonic orientation, product involvement, and enjoyment. Online purchasing behavior covers three stages: pre-purchase, purchase, and post-purchase. Multistage random sampling was used to select 386 online consumers; and their responses to a range of questions were collected through a web-survey. Quantitative data were analyzed using descriptive statistic and structural equation modeling (SEM). The result revealed that the technology acceptance level has positively significant influences on consumers' online purchasing behavior, especially those who have apparel product experience and who enjoy shopping process. The government should develop policies (e.g. e-payment, e-shipment, data security) to increase the number of e-commerce users and to support expansion of the digital economy.

**Keywords:** technology acceptance, e-commerce, online apparel purchasing behavior

**Article history:** Received 5 January 2021, Revised 26 April 2021, Accepted 26 April 2021

## 1. Introduction

E-commerce has arisen from a combination of economic, social, and information technology development. It can significantly affect the economic growth of nations. If a nation's government issues effective regulations, develops online transaction security, and supports the internet infrastructure, information technology can play a vital role in the economy and can be a key success factor toward the nation achieving the sustainable economy. According to a recent report on e-commerce in Thailand, the total e-commerce market value in Thailand has been increasing rapidly in recent years, being worth around 4 billion baths in 2019 [1], because of multiple driving factors, such as significantly improved logistics, effective electronic transaction systems, improved trustability in online shopping services, and higher internet availability and smart phone usage. Approximately one-fifth of all e-commerce trade (17.27%) is fashion, which puts the sector just behind computers and cosmetics. [2] Nowadays e-commerce has become a must-have business channel, as many consumers prefer online shopping because of its convenience (anywhere, anytime), time savings, price flexibility, fast delivery, product variety, plentiful supply of information, and low transaction costs. [3] Consequently, well-known fashion brands now have to offer e-commerce options in parallel with traditional stores to meet customers' needs. In addition, there are now a lot of new e-entrepreneurs who only have an online store.

Apparel is a symbolic product that sells based on both function and aesthetics. It is a tangible product that creates an emotional experience. Above all, consumers use it as a form of self-expression to show their social status, tastes, and personality. [4] Apparel is an example of goods that depend on touch-and-feel evaluation, yet this is not possible to experience online before a purchase. Online apparel purchasing involves a form of indirect e-commerce, in which consumers make transactions over the Internet, and then get the ordered product delivery in the traditional way. [3] This can make consumers hesitant about buying apparel online, which means they may postpone buying clothes online. Previous online shopping studies have tended to focus on demographic variables, such as how gender, age, occupation, and education affect online purchasing behavior. For example, women are more likely to shop for apparel and fashion than men by considering the shop design and advertising. On

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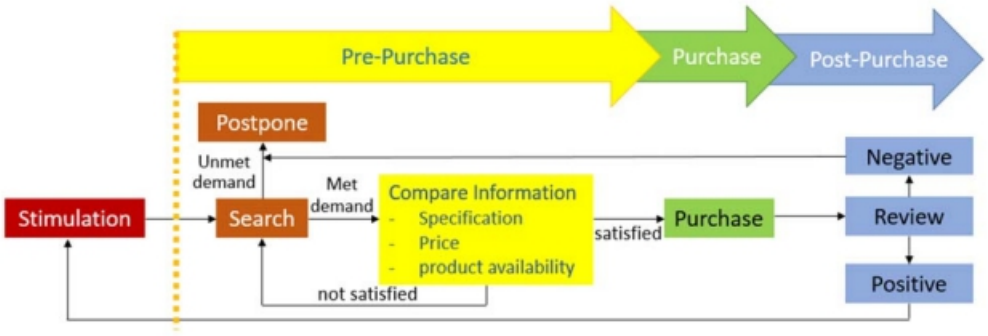


**Figure 1**: The online purchase process model.

the other hand, men consider more the up-to-date and completeness of product information. [5] Age also has an influence on the product types bought online and customer habits. Frasquet *et al*. [6] found that buyers aged 30 – 40 (Generation Y) are the main population of online shoppers. Income also has an effect on the intention to buy, especially for brand name products. [7] A number of external factors can also help explain online purchasing behaviors. For example, gaining acceptance on social media by demonstrating a high number of 'Likes' for a product and from good product experience comments left. [8] In the fashion context, the chosen apparels and accessories represent a customer's personality and trend-setting power. [9] The marketing mix (product, price, place, and promotion as the 4Ps) [10] and the role of branding [11, 12] are very popular tools used in purchasing behavior studies. This present research introduces a technology acceptance model (TAM) to explain online purchasing behavior as it is a well-known theory to describe technology phenomena. [13] However, there is still a need to determine suitable variables for the model according to the variety of users and contexts. [14] The results of this study will provide useful information to the government, entrepreneurs, and researchers for aiding the development of e-commerce business plans and strategic policies to increase the number of e-commerce users to support the expansion of the digital economy.

## 2. Research Objectives

1) To study the technology acceptance level and purchasing behavior of online apparel consumers;

2) To study the effects of the technology acceptance level on the purchasing behavior of online apparel consumers.

## 3. Conceptual Background and Model

Recent research has focused on the factors that affect the purchasing behavior of consumers in traditional commerce, such as basic consumer information [7], channels [6], shop design [5], subjective norms [15, 16], branding [11, 12], and marketing mixes [17] etc. For online apparel, the purchasing process is a form of indirect e-commerce, which an order is made online and must be paid before the goods are delivered in the traditional way, by mail or courier delivery, a few days later. That is why the confidence in e-commerce is an important factor that significantly influences the acceptance of the online purchase. [3]

### *3.1 Online purchase process*

The patterns of traditional purchasing behavior are considered to be linear, which is not appropriate for an online consumer's decision-making process, because the online shopping process model involves a complex and backward decision-making behavior pattern. [18] This transformation in the decision-making moment can be explained by ZMOT (Zero Moment of Truth). In the case of online shoppers, before the purchase process begins, they will explore as much as possible the available choices by surfing the Internet before making a final decision, which is called the "Zero Moment". In addition, the after purchase process is changed as well because the new generation of online consumers love to express their opinions regarding product satisfaction or dissatisfaction. [19] This means that for online shoppers, the online purchasing behavior can be divided into three main stages: pre-purchase, purchase, and post-purchase.

Figure 1 shows that the pre-purchase stage starts when consumers encounter an online or offline stimulus about a product information or its user experience, such as when watching television commercials, talking to family members, viewing pictures or messages from social media, or targeted advertising from search engine optimization. Consumers may then search for product information from various sources. They will compare the product details based on a set of criteria, such as the price and availability of any promotions. If the information is not enough on a particular site or they do not find a product that meets their needs, they will go back and find more information elsewhere. Experienced consumers often primarily go

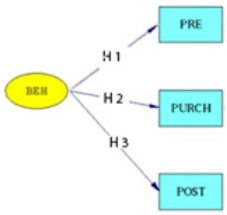


**Figure 2**: The observable indicators of purchase behavior.

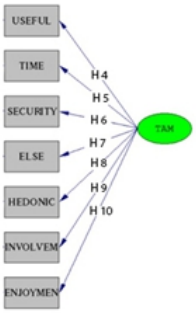


**Figure 3**: The observable indicators of Technology Acceptance.

back to their latest deals seller and will then search for a few sources of the same product group to confirm their decision. On the other hand, newcomers tend to search for product information from plenty of websites or use a search engine, but may ultimately end up postponing the purchasing. [20] The purchase stage starts when a consumer is satisfied with the product information they have found; and they are ready to place an order via the website, email, or even chat program on a mobile phone. Some of them may inquire about the product availability and the availability of any discount offers. The post-purchase stage occurs after consumers have received the product and have some experience of using it. They may want to share their product opinion on the Internet. This information can be either positive or negative, depending on their expectations before making the purchase. If their satisfaction is higher than their expectations, their feedback will likely be positive, but if it is lower than their expectations, this may lead to them leaving a negative comment and warning to other consumers. A good word of mouth recommendation is the most desired outcome for sellers because it affects the decision-making of other consumers at the pre-purchase stage.

H1 Pre-Purchase is associated with purchase behavior

H2 Purchase is associated with purchase behavior

H3 Post-Purchase is associated with purchase behavior

### *3.2 Technology acceptance model (TAM)*

TAM is recognized as an effective framework for predicting the technology usage of individuals or organizations. [13] It is widely used to study online shopping intentions in the context of both developing and underdeveloped countries. [14] The original model, which improved upon the theory of reasoned action (TRA), was proposed by Fred D. Davis in 1986. [21] The main concept is based on actual system use, which itself comes from behavioral intention to use, which is influenced by two factors: perceived usefulness (PU) and perceived ease of use (PEU). In 2000, Venkatesh and Davis developed TAM2, which added some external variables affecting PU and PEU. [22] Three years later, Vankatesh, Moris, Davis, and Davis formed the unified theory of the acceptance and use of technology (UTAUT) model from previous models. [23] This model enhanced the understanding in the actual use of technology showing that it is effected from a facilitating condition and behavioral intention. In addition, these are moderated by performance expectancy, effort expectancy, and social influence. The theory was later extended as UTAUT2 by adding new variables, including hedonic motivation, price value, and habit. [24]

Many current studies also employ TRA (the origin of TAM) alongside UTAUT. [16, 25] Furthermore, current TAM research trends are directed toward finding a moderator variable between PU and PEU [26, 27], with popular variables being attitude, which means hedonic motivation and enjoyment [28], and security, as measured by the trust levels in e-commerce [29, 30] and cybercrime information perception. [31] Frasquet *et al.* [6] applied TAM in the context of online purchasing apparel and electrical appliances, and stated that the TAM components for apparel purchasing could be classified as extrinsic motivations and intrinsic motivations, including usefulness, ease of use, security, time pressure, hedonic orientation, product involvement, and enjoyment, shown in Figure 3.

H4 Usefulness is associated with Technology Acceptance

H5 Time pressure is associated with Technology Acceptance

H6 Security is associated with Technology Acceptance

H7 Ease of use is associated with Technology Acceptance

H8 Hedonic orientation is associated with Technology Acceptance

H9 Product involvement is associated with Technology Acceptance

H10 Enjoyment is associated with Technology Acceptance

Previous research has focused on the traditional commerce factors which are not suitable for online purchasing behavior. The technology acceptance model (TAM), a well-known theory to describe technology phenomena, could give a further explanation

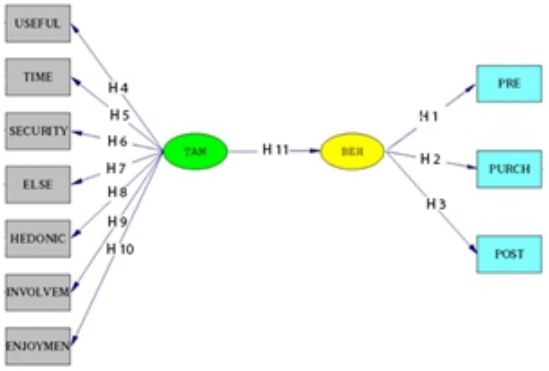


**Figure 4**: Conceptual model.

of online purchasing behavior, especially in apparel industry context. However, it still needs to determine a suitable variables for the model.

H11 Technology Acceptance has positive effect on purchase behavior

## 4. Research Method

In the present study, data were collected and analyzed from 386 online apparel consumers through the Internet. A multistage random sampling technique was employed by choosing online consumers who had more than one-year experience in online purchasing. In the next stage, half of the sample was formed by accidental sampling consumers, that is, voluntary online consumers who were motivated to participate by agreeing to donate 10 baht per questionnaire to charity. The other half was divided into four groups by age, ranging from 18 – 25, 26 – 35, 36 – 45, and more than 45 years old. The research instrument was a questionnaire based on TAM and a relevant prior study. The questionnaire comprised 3 parts seeking customer information on their demographics, online purchasing behavior, and technology acceptance. The content validity of the questionnaire was developed by three experts. The Cronbach's alpha coefficient for the questionnaire was 0.86, which is considered a high reliability. After checking the completeness of the 392 returned questionnaires, seven of them were excluded from the data analysis because of poor completeness, leaving 385 for analysis. The non-response bias test showed negligible differences in response time, but indicated that those completing the voluntary samples were younger than the quota groups. The data analysis used a descriptive statistics method and structural equation modeling (SEM) for hypotheses testing. A major benefit of using SEM is that its confirmatory factor analysis (CFA) helps in confirming the membership of the measured variable and shows the direction and size of the relationship between the latent variables in a single analysis.

## 5. Research Result

### *5.1 Demographic and purchase behavior of online apparel consumers*

The results showed that most of the participants were female (81.3%), 31.25 years old on average, and had an income of less than 15,000 baht (51.3%). In addition, the biggest influencer was social media (64.5%), the most frequently purchased item was clothes (65.8%), and the average spend was 500 – 1,000 baht for each purchase (40.4%). Facebook (36.3%) and Instagram (28.2%) were the most popular search channels. Also, two-thirds used shop websites as their main information sources (65.8 %), and they searched for apparel information every month (38.6%), as shown in Table 1. The sample had a high technology acceptance level, with ease of use as the highest requirement ($\bar{x}$ = 4.02, SD = 0.65), followed by usefulness ($\bar{x}$ = 3.87, SD = 0.73), product involvement ($\bar{x}$ = 3.86, SD = 0.61), time ($\bar{x}$ = 3.69, SD = 0.67), enjoyment ($\bar{x}$ = 3.54, SD = 0.83) and security ($\bar{x}$ = 3.40, SD = 0.69), respectively as shown in Table 2

### *5.2 Path analysis of technology acceptance level affecting online apparel consumers behavior.*

Pearson's product-moment correlation was used to test the suitability for the confirmatory factor analysis (CFA). We found that from a total of 45 pairs of variables, 33 were significant ($p < 0.05$). The correlation coefficients ranged from 0.01 – 0.56, as shown in Table 2.

The SEM method was performed to analyze the relationship between the variables. The factor covariance error relax assumption technique was selected to modify the proposed model. Table 2 and Figure 2 show non-statistical significance of the goodness of fit indices, these indicate a very good fit between the modified model and empirical data. Because of chi square to df ratio is less than two. Goodness of fit index and adjusted goodness of fit index close to one, while root mean square residual and root mean square error of approximation close to zero. Finally, the Largest Standardized Residual is less than two and Q - plot slope greater than the diagonal.

The SEM method was used to analyze the relationship between the variables. The factor covariance error relax assumption technique was selected to modify the proposed model. Table 2 and Figure 2 show the non-statistical significance of the goodness of fit indices, indicating a very good fit between the modified model and the empirical data, whereby the chi square to degrees of freedom (df) ratio was less than two ($x^2$/df = 1.496, p = 0.15), the goodness of fit index (GFI = 0.99) and adjusted goodness (AGFI = 0.96) of

**Table 1.** Demographic and purchase behavior of online apparel consumers (n = 386).

| Items | | Frequency | Valid percent |
|---|---|---|---|
| Gender | Male | 72 | 18.7 |
| | Female | 314 | 81.3 |
| Age $\bar{x}$ = 31.27, S.D. = 11.36 | | | |
| Income (Baht/month) | Less than 10000 | 127 | 32.9 |
| | 10000-less 15000 | 78 | 20.2 |
| | 15000-less 25000 | 82 | 21.2 |
| | 25000-less 35000 | 21 | 5.4 |
| | 35000 and over | 78 | 20.2 |
| Occupation | Housewife | 28 | 7.3 |
| | Private Employee | 108 | 28.0 |
| | Civil Servant | 45 | 11.7 |
| | Student | 140 | 36.3 |
| | Private Business/Freelance | 65 | 16.8 |
| Education Level | High School | 60 | 15.5 |
| | Bachelor Degree | 289 | 74.9 |
| | Master Degree | 23 | 6.0 |
| | Doctoral Degree | 14 | 3.6 |
| Purchasing Channel | Shop Website | 16 | 4.1 |
| | Search Engine | 49 | 12.7 |
| | Instagram | 109 | 28.2 |
| | Facebook | 140 | 36.3 |
| | Communication Application | 71 | 18.4 |
| Information Website | 1 website | 17 | 4.4 |
| | 2 – 3 websites | 254 | 65.3 |
| | 4-5 | 87 | 22.7 |
| | 6 and over | 25 | 6.5 |
| Apparel Type | Clothing | 254 | 65.8 |
| | Bag | 71 | 18.4 |
| | Shoes | 43 | 11.1 |
| | Accessories | 18 | 4.7 |
| Frequency of searching | Occasionally/A few time per years | 59 | 15.2 |
| | Monthly | 149 | 38.6 |
| | Weekly | 123 | 31.9 |
| | Daily | 55 | 14.2 |
| Frequency of online shopping | Occasionally/A few time per years | 309 | 80.0 |
| | Monthly | 71 | 18.4 |
| | Weekly | 6 | 1.6 |
| | Daily | 0 | 0 |
| Volume on each purchase | 1 item | 264 | 68.4 |
| | 2 – 3 items | 112 | 29.0 |
| | 4 and over | 10 | 2.6 |
| Money spent per each purchase | Less than 500 | 145 | 37.6 |
| | 500 – less 1000 | 156 | 40.4 |
| | 1000 – less 2000 | 55 | 14.2 |
| | 2000 and over | 30 | 7.8 |
| Experience Sharing | Never | 198 | 51.3 |
| | A few time | 161 | 41.7 |
| | Monthly | 42 | 10.9 |
| | Weekly | 19 | 2.1 |

fit index were close to one, and the root mean square residual (RMR = 0.012) and root mean square error of approximation (RMSEA = 0.029) were close to zero. Finally, the largest standardized residual (1.88) was less than two and the Q - plot slope was greater than the diagonal.

The validity of the observed variables revealed that the INVOLVEM variable had the maximum validity, followed by USEFUL, ENJOYMEN, SECURITY, HEDONIC, ELSE, and TIME, as the variable with the minimum validity. All seven variables showed positive values. This indicates that if consideration of the variables is taken into account, the technology acceptance will be high. When considering the factor score coefficients, it was found that all seven components had significant weights between 0.54 and 0.77, with

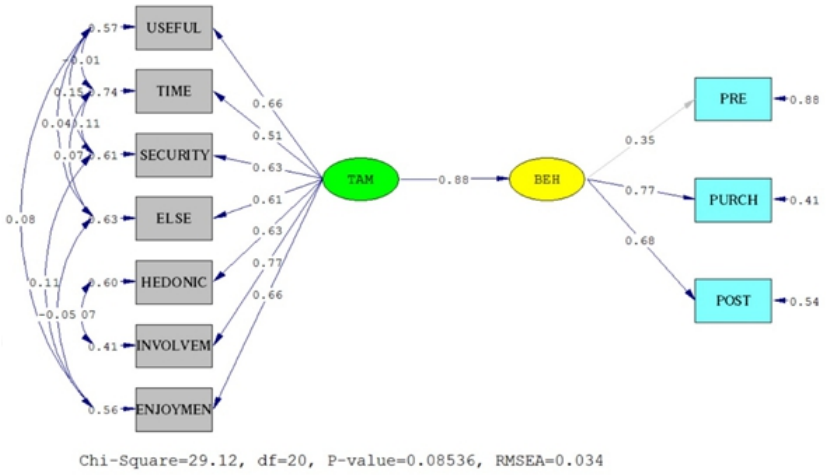


**Figure 5**: Path diagram.

**Table 2.** Correlation metric.

| | PRE | PURCH | POST | USEFUL | TIME | SECURITY | ELSE | HEDONIC | INVOLVEM | ENJOYMEN |
|---|---|---|---|---|---|---|---|---|---|---|
| PRE | 1 | | | | | | | | | |
| PURCH | 0.38 | 1 | | | | | | | | |
| POST | 0.47 | .108 | 1 | | | | | | | |
| USEFUL | 0.18 | -0.05 | -0.01 | 1 | | | | | | |
| TIME | 0.06 | 0.21 | 0.08 | 0.31 | 1 | | | | | |
| SECURITY | 0.11 | -0.11 | -0.02 | 0.56 | 0.19 | 1 | | | | |
| ELSE | 0.11 | -0.11 | 0.05 | 0.44 | 0.40 | 0.37 | 1 | | | |
| HEDONIC | 0.21 | -0.08 | 0.12 | 0.39 | 0.32 | 0.37 | 0.39 | 1 | | |
| INVOLVEM | 0.23 | -0.03 | 0.07 | 0.51 | 0.41 | 0.21 | 0.48 | 0.56 | 1 | |
| ENJOYMEN | 0.28 | -0.10 | 0.06 | 0.52 | 0.25 | 0.31 | 0.33 | 0.43 | 0.54 | 1 |
| $\bar{x}$ | 1.76 | 2.71 | 2.02 | 3.73 | 3.69 | 3.40 | 4.02 | 3.87 | 3.86 | 3.54 |
| SD | 0.97 | 0.45 | 0.48 | 0.48 | 0.67 | 0.69 | 0.65 | 0.73 | 0.61 | 0.83 |

Note: Bartlett's test of sphericity = 985.134, p = .001, Kaiser-Mayer-Okin measure of sampling adequacy = 0.845

statistical significance at 0.001 for every value. This suggests that the model was developed in accordance with the empirical data and the model results supported the research hypotheses, confirming that technology acceptance has a direct effect on purchasing behavior. The predictive coefficient (R-square) was 0.79, indicating that technology acceptance could explain 79% of the purchasing behavior, indicating that consumers with a high technology acceptance level tend to have a high involvement with e-commerce.

## 6. Conclusion and Discussion

E-commerce is an inevitable business model nowadays because most of today consumers are Generation Y (Gen Y), who were born during 1977 – 1994 and who have therefore grown up as digital natives and are used to having information readily available online. Consequently, they expect and need to consume plenty of information before making a decision. [32] Gen Y has different behaviors than the previous generation. Because they prefer products to serve both functional and emotional needs, they are inclined to search for information particularly on items that have received a lot of 'Likes' or that are brand names. Also, they are more addicted to convenience and tend to prefer in-house shopping than other generations. [33] That is why, they tend to be an influencer of other groups. Consumers in the present study were heavily influenced by social media, with Facebook the number one source of inspiration, following by Instagram. This concords with the findings of Napompech [8], who stated that social media is the most popular e-commerce channel in Thailand.

Analysis of the causal relationship model of technology acceptance on online apparel purchasing behavior reflects that e-commerce in the textile and apparel sector will be enhanced if the technology acceptance of the online consumers is high in term of seven dimensions: product involvement (INVOLVEM) has maximum validity, followed by usefulness (USEFUL), enjoyment (ENJOYMEN), security (SECURITY), hedonic (HEDONIC), ease of use (ELSE) and time pressure (TIME). In line with previous research, Frasquet *et al.* [6] found that perceived enjoyment influences the buying process at all stages. However, only in the case of apparel products, likely related to the nature of them being in the fashion industry, the influencer and word of mouth recommendations are as important as the functional requirements. [34] Consumers enjoy visiting online front stores and choosing the right products to develop their preferences. [35] Millan and Reynolds [4] stated that the hedonic aspect will have a positive effect on a consumer's shop

**Table 3.** Path coefficients and fit indices.

| Variable | Raw | Standard | SE | t | $R^2$ |
|---|---|---|---|---|---|
| Measurement model | | | | | |
| Matrix LX | | | | | |
| USEFUL | 0.32 | 0.66 | 0.02 | 12.85*** | 0.43 |
| ELSE | 0.39 | 0.61 | 0.03 | 11.83*** | 0.30 |
| TIME | 0.36 | 0.54 | 0.04 | 9.88*** | 0.39 |
| SECURITY | 0.43 | 0.62 | 0.04 | 12.07*** | 0.37 |
| HEDONIC | 0.46 | 0.62 | 0.04 | 12.32*** | 0.39 |
| INVOLVEM | 0.48 | 0.77 | 0.03 | 16.10*** | 0.60 |
| ENJOYMEN | 0.56 | 0.68 | 0.043 | 13.35*** | 0.46 |
| Matrix LY | | | | | |
| PRE | 0.21 | 0.35 | <–> | <–> | 0.13 |
| PURCH | 0.67 | 0.77 | 0.11 | 6.21*** | 0.57 |
| POST | 0.76 | 0.68 | 0.13 | 6.06*** | 0.48 |
| Casual Model | | | | | |
| TAM –> BEH | 0.89 | 0.88 | 0.14 | 6.21*** | 0.79 |
| $x^2$ = 29.12, df = 20, p = 0.08, GF = 0.99, AGFI = 0.96 ,RMR 0.012,RMSEA = 0.034 | | | | | |

| Variable | PRE.BEH | PURCH.BEH | POST.BEH | Useful.TAM | Ease.TAM |
|---|---|---|---|---|---|
| Validity | 0.12 | 0.59 | 0.46 | 0.43 | 0.26 |

| Variable | Time.TAM | Security.TAM | Hedomic.TAM | Involment.TAM | Enjoymen.TAM |
|---|---|---|---|---|---|
| Validity | 0.26 | 0.39 | 0.40 | 0.59 | 0.44 |

visit behavior and apparel preferences. In addition, time pressure variables affect the purchase phase. Entrepreneurs thus have to balance and manage the style of buying costumes online from the hassle of spending a lot of time shopping by transforming it into a leisurely and enjoyable experience. The advantage of online commerce is that they can use a variety of images and media to create an enjoyable experience. [36]

## 7. Study Limitations and Suggestions for Future Work

1. This study provides some insights for better understanding the casual relationship between consumers' technology acceptance and online purchase behavior. However, the effects of mediators and moderator variables were not investigated. Therefore, future research could examine the effects of these factors on consumers' online purchasing behavior.

2. Future researchers could use TAM for studying some other types of products or technology; and could also perform comparative studies on different industries. In addition, different types of cultures and countries would provide further information about the generalizability of the issues and findings.

3. The majority of online customers are Gen Y who were born and grew up as digital natives. They have a high technology acceptance level and their experience and expectations increase over time. That is why they are the perfect targets for online products. E-entrepreneurs can use this group's information and behavior patterns to plan their product development and marketing strategies.

4. The government should support the information technology infrastructure to increase the number of e-commerce users and to support expansion of the digital economy. Currently, the number of internet users in Bangkok is higher than urban areas. [10] In addition, the government should support policies to promote e-payment and e-shipment activities, and increase data security, especially for online transactions.

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**Interdisciplinary Research Review**
Volume 16, Number 4, Pages 24 – 32

# Institutional capacities and collaboration with communities of disability service centres in Thailand from the perspective of 'social model of disability'

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## Abstract

The 'Social Model of Disability' first appeared in the United Kingdom and the United States of America and became popular among persons with disabilities involved in the independent living movement worldwide. However, some critics argue that the 'Social Model of Disability' does not affect the actual lives of persons with disabilities, especially in developing countries where people have limited access to health, education, social welfare and other public services. This research aims to identify disabilities prevalent in developing countries. Thailand was selected as the target area of study as it recently introduced a country-wide administrative system called 'Disability Service Centre' to support persons with disabilities. The research methodology includes literature reviews and field interviews. Field interviews mainly focused on the opinions of persons with disabilities. This study consisted of three frameworks: 1) disabilities in regulations and institutions; 2) disabilities in people's biases and attitudes in a community; and 3) disabilities of persons with disabilities or disabled people's organisations. The major deficiencies found in regulations and institutions were budget, functions, organisational capacities and relationships among organisations. People's biases and attitudes in the examined community included non-cooperation from families and neighbours, lack of understanding at the office and competition in the market. Persons with disabilities or supporting organisations lack financial resources and administrative capacities. In conclusion, disabilities in society can be eased not only by the establishment of a system or service but also through advocacy and empowerment of disabled people's organisations. The 'Social Model of Disability' can be applied to Thai society when combined with a rights-based approach. Regarding implications of the study, the creation of workspaces offers good opportunities for persons with disabilities and non-disabled persons to communicate with each other and understand the rights of persons with disabilities. Capacity development of DPOs is crucial for their participation in society and advocacy of the rights of persons with disabilities. However, this study was limited by the short period for which the sub-district disability service centres had operated in Thailand. Further studies will be required to examine social disabilities on a long-term basis.

**Keywords:** Disability service centre, Thailand, social model of disability, persons with disabilities, disabled people's organisations

**Article history:** Received 4 January 2021, Revised 5 June 2021, Accepted 9 June 2021

## 1. Introduction

The 'Social Model of Disability', which states that disabilities do not exist in human bodies but in the society, was developed during the disability movement in the United Kingdom and the United States of America in the 1970s. This model became known among those involved in the independent living (IL) movement in East and Southeast Asian countries such as Japan and Thailand. However, the Social Model of Disability is not popular in South and South-east Asia as the perspective of disability is influenced by religious thought that links disability with misconduct in the present or a past life [1]. This model is opposed by disabled and non-disabled academics, as well as by people with disabilities worldwide who believe that it has no relevance in real life [2]. According to Shakespeare [3], one of the reasons for this is that the strong social model overstates the social creation of disability and fails to give an adequate account of the complexities of disabled people's lives.

Thailand is one of the major countries in Southeast Asia where the Social Model of Disability was gradually introduced to people with disabilities during the IL movement in the 2000s. From 2004 to 2009, 11 IL centres based on the philosophy of the Social Model of Disability were established in Thailand [4]. The major activities of the IL centres include providing information, peer counselling, skill training for independent living, rights advocacy, and the introduction of personal assistants (PAs) to persons with disabilities. At that time, persons with disabilities in Thailand played

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important roles in establishing laws and regulations to realise certain rights for all persons with disabilities. As a result of the disability movement, the government of Thailand ratified the Convention on the Rights of Persons with Disabilities in 2008, and the Persons with Disabilities Empowerment Act 2007 came into force in 2011. The Act was revised in 2013 to legally define the establishment of disability service centres (Table 1).

Such efforts to establish accessible environments through the development of laws and regulations could be regarded as introduction of the Social Model of Disability in Thailand, but in practice this model was not accessible to most people with disabilities in Thailand [5]. In rural communities, persons with disabilities are mainly taken care of by their family members, especially women, such as mothers, sisters, or daughters. Although some people can afford to recruit personal assistants, the majority of people with disabilities cannot.

Since availability of personal assistants is limited, persons with disabilities in the rural community in Thailand build a relationship with neighbours based on mutual support. For example, most persons with disabilities provide inexpensive community services such as laundry, cooking and home repairs to neighbours, in exchange for free meals [6]. In a community where people know each other, they can rely on others to some extent regardless of whether they have a disability or not. However, it is difficult for persons with disabilities in the rural community to rely on such support when their family members or neighbours need to work outside of their community. Many rural farmers in Thailand started to work away from home as temporary workers, earning more than half of their cash income from the non-agricultural sector since the mid-1990s [7]. As a result of modernisation, it is nearly impossible for modern rural communities to prioritise mutual support relationships over personal interests [8].

Provincial disability service centres (A province is called 'Jangwat' in Thai) and general disability service centres exist at the sub-district level (A sub-district is called 'Tambon' in Thai; hereafter called 'sub-district disability service centres') started providing services to persons with disabilities since 2014 [9]. Provincial disability service centres were set up at the provincial offices of the Ministry of Social Development and Human Security (hereafter called 'MSDHS'), while sub-district disability service centres were established by local administrative offices, government organisations, disabled people's organisations (DPOs) or non-governmental organisations (NGOs) for persons with disabilities. According to the functions of the provincial and sub-district disability service centres listed in Table 2, sub-district disability service centres are mainly responsible for providing direct services to individuals with disabilities while provincial disability service centres focus on inter-organisational collaboration and law enforcement.

According to Thailand's Department of Empowerment of Persons with Disabilities, MSDHS, there are 2,366 sub-district disability service centres as of 2 December 2019, of which 2,098 (88.7%), 134 (5.7%) and 134 (5.7%) centres are managed by sub-district administrative organisations (SAOs) or other local authorities, government organisations, and organisations of/for persons with disabilities, respectively[1].

## 2. Objectives

The objectives of this study are to describe the mechanism of social creation or the construction of disability in Thailand through the implementation of disability service centres and to examine the credibility of the Social Model of Disability in the social and cultural contexts of rural communities in Thailand.

## 3. Literature Review

Thai scholars have conducted valuable researches related to public service for persons with disabilities at the community level in Thailand and revealed problems of institution and people's biases in implementation of disability service centres. The remarkable role of DPOs in the service delivery for persons with disabilities was also described in the previous studies. The research by Netphanthang and Rittirod [10] on public service for persons with disabilities in the sub-district level described some issues related to human resources, financing and equipment. For example, officers in charge at SAO and community volunteers for persons with disabilities did not have adequate knowledge about the service for persons with disabilities. The number of personnel who had proper knowledge and skills on how to use equipment for persons with disabilities were also insufficient. The authors proposed utilization of network of health volunteer in Thailand in order to cover the lack of human resources. Chaiyasirintroj [11] conducted a research on public service and social welfare for older adults and persons with disabilities in Chiang Mai province. The promotion of civil engagement and the development of civil engagement mechanism were key recommendations from this research. More recent studies have been conducted after the launch of disability service centres nationwide. According to the research on system and structure for implementation of disability service centres by Siam University [12], disability service centres run by DPOs are highlighted as organisations which enable persons with disabilities to improve service for them and the quality of their life.

[1] Information was obtained through an e-mail sent by the Department of Empowerment of Persons with Disabilities, Ministry of Social Development and Human Security of Thailand.

**Table 1.** Disability laws and institutions in the 2000s and 2010s.

| | The 2000s | The 2010s |
|---|---|---|
| Laws and regulations | • 2007 Persons with Disabilities Empowerment Act<br>• Convention on the Rights of Persons with Disabilities (Thailand signed in 2007 and ratified in 2008.)<br>• The 3$^{rd}$ national plan for the empowerment of persons with disabilities (2007 – 2011) | • 2013 Revision of 2007 Persons with Disabilities Empowerment Act<br>• The 4$^{th}$ and 5$^{th}$ national plan for the empowerment of persons with disabilities (2012 – 2016, 2017 – 2020)<br>• The notice of implementation guideline and paper forms requesting support to general disability service centres (2017) |
| Institutions | 'Social Model of Disability' was introduced to Thailand through the establishment of Independent Living (IL) centres | The establishment of disability service centres is determined by the law. |

**Source**: Edited by the author based on information from the Asia Disability Information Centre (ADIC).
Available from: http://adinfo.jp/thailand/policy.html [Accessed on 4 June 2021] and United Nations Treaty Collection.
Available from: https://treaties.un.org/Pages/ViewDetails.aspx?src=TREATY&mtdsg_no=IV-15&chapter=4&clang=_en [Accessed on 4 June 2021].

**Table 2.** Functions of disability service centres.

| | Provincial disability service centres | Sub-district disability service centres (General disability service centres) |
|---|---|---|
| Laws and regulations | • Inspection, research, analysis, and monitoring of the situations and problems in the province<br>• Inspection and reporting of cases violating the rights of persons with disabilities | |
| Institutions | • Coordination, screening, referral to the government or public organisations<br>• Cooperation and integration of concerned parties<br>• Support of facilities and technical services to organisations that support persons with disabilities<br>• Operation of the provincial committee of empowerment of persons with disabilities, management of funds | • Collaboration with concerned government organisations |
| Individual support or service | • Management of registration and database, provision of information<br>• Provision of support when the service of sub-district disability service centres is not available. | • Provision of information on the rights and social welfare of persons with disabilities<br>• Advocacy on behalf of a person with disability<br>• Provision of service to support persons with disabilities to receive medical care, rehabilitation, and assistive devices<br>• Assistance for basic daily living, vocational training, and recruitment |
| Others | • Any other duties described by the law or delegated by the National Committee of Empowerment of Persons with Disabilities or provincial office of Social Development and Human Security. | • Any other duties delegated by the National Committee of Empowerment of Persons with Disabilities, the Department of Empowerment of Persons with Disabilities, or provincial disability service centre. |

**Source**: Implementation guidelines and paper forms requesting support to general service centres for persons with disabilities, issued by the Department of Empowerment of Persons with Disabilities, Ministry of Social Development and Human Security of Thailand in January 2017 (translated and categorised by the author)

Another study [13] reported some financial and human resources constraints for the case management of persons with disabilities at disability service centres.

## 4. Methodology

There are two major reasons for choosing Thailand as the research area for this study. First, although the Social Model of Disability was introduced more than a decade ago in Thailand through the movement for persons with disabilities for IL, persons with disabilities continue to face difficulties in practicing it in everyday life. In this study, social disabilities from the perspectives of persons with disabilities in Thailand were analysed. Second, Thailand started establishing sub-district disability service centres throughout the country in 2014. Detailed analysis of the effectiveness of disability service centres highlighted how environmental changes such as the establishment of laws and regulations can remove barriers in society and change the daily lives of persons with disabilities in the country from the perspective of the Social Model of Disability.

This study was conducted through literature reviews and field surveys. At the planning stage, this research qualified after an ethical review conducted by the Graduate School of Human Sciences, Osaka University. A survey of relevant literature, including academic books and articles, laws, statistical reports and newspapers was conducted from April 2017 to December 2020 in Japan and Thailand. Field surveys were conducted in Bangkok, Chiang Mai, Nakhon Pathom, Nonthaburi and Pathum Thani during 1 – 6 January 2018, 20 – 28 July 2019 and 11 – 19 January 2020.

During the field surveys, key informant interviews were conducted with 32 persons from eight disability service centres, either individually or in a group. The criteria for the selection of disability service centres were: 1) disability service centres run by DPOs or recruiting persons with disabilities or their family members, and 2) disability service centres that have been operating for more than a year. Sub-district disability service centres in Chiang Mai were selected from the list of 65 sub-district disability service centres, which was provided by the provincial disability service centres of Chiang Mai. Sub-district disability service centres in the other provinces were introduced by IL centres in Thailand. Among the 32 interviewees from eight disability service centres, 24 were persons

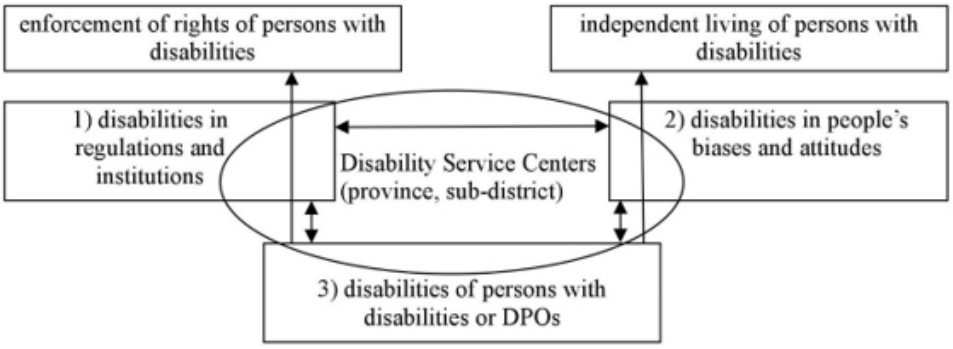


**Figure 1**: Framework of analysis.

with disabilities and eight were non-disabled persons. Apart from the interviews at disability service centres, interviews were conducted with six persons (three were persons with disabilities and three were non-disabled persons) from five organisations (two government organisations, two DPOs and one NGO) to obtain objective opinions regarding disability service centres. A total of 38 persons were interviewed (see Table 3). 27 out of 38 persons expressed willingness to cooperate with the research by signing a consent form. The remainder 11 persons gave oral agreement, which was recorded on an electronic device as evidence of consent.

According to previous studies on disability, the Social Model of Disability can be classified into two categories: the 'social creationist view of disability' focuses on the barriers in regulations and institutions within society, while the 'social constructionist view of disability' emphasises the biases and attitudes of non-disabled people in society [14, 15]. In addition, there is a relevant study on Social Model of Disability. Ryoji Hoshika [16] discussed the practice and theory of resolution of disability by categorising it into two distinct phases: 'institutional' and 'non-institutional'. Satoshi Kawashima [17] explained that disabilities are disadvantages created by the interaction between persons with impairment and social barriers. Based on these studies, three frameworks were adopted to analyse the social creation or the construction of disability in Thailand, as shown in Figure 1. The first framework is 'disabilities in regulations and institutions' for the enforcement of rights of persons with disabilities. In this category, laws and regulations issued by the government and its implementation structures are included. The second is 'disabilities in people's biases and attitudes in a community' which hamper independent living of persons with disabilities. It includes individual values and behaviour, as well as customs or culture of people in the community that are not clearly written in official documents. The third is 'disabilities of persons with disabilities or DPOs', referring to the difficulties of persons with disabilities in the implementation of DPOs, and organisational weakness of DPOs, which lie inside and outside of the organisation.

## 5. Results

The findings obtained during the field surveys concerning the disability service centres in Thailand are as follows.

### *5.1 Disabilities in regulations and institutions*

#### *5.1.1 Budget*

According to a statement by the Chiang Mai office of MSDHS, an annual budget of 30 million Thai Baht (hereinafter called 'THB', 1THB=0.03USD) is allocated for all sub-district disability service centres. It is possible to request additional funding from MSDHS during financial shortages. The upper limit of the annual budget for a sub-district disability service centre run by DPOs and NGOs is not specified. When an SAO has established a sub-district disability service centre, it receives the annual budget from the provincial office of MSDHS according to its development plan. For example, a sub-district disability service centre, Banpao SAO in Mae Taeng District (called 'Amphoe' in Thai), Chiang Mai Province, secured an annual budget of 20,000THB according to the local development plan for the period between 2018 – 2022. In addition, the SAO can receive financial support from MSDHS for the construction of a barrier-free toilet or house, job creation, identification cards, and social events for persons with disabilities. Local aid organisations such as the Red Cross of Mae Taeng District and Chiang Mai Province also provide some financial support for persons with disabilities in the district.

The Chiang Mai office of MSDHS explained that not all sub-district disability service centres of SAOs used the maximum yearly budget of the centre due to constraints of time and effort required for the implementation of projects. Sub-district disability service centres should write proposals to obtain financial support. It was discovered through interviews conducted by the author that NGOs gain approximately 1 to 2

**Table 3.** Characteristics of interviewees and interviewed organisations.

| | |
|---|---|
| Demographic characteristics of the interviewees (Number of person) | Sex:<br>- Male: 19<br>- Female: 19<br>Tribe:<br>- Thai: 30<br>- Karen: 7<br>- Lua: 1<br>Age:<br>- Below 20: 0<br>- 20-29: 5<br>- 30-39: 7<br>- 40-49: 15<br>- 50-59: 6<br>- More than 60: 5<br>Province of residence<br>- Chiang Mai: 28<br>- Bangkok: 4<br>- Nakhon Pathom: 3<br>- Pathum Thani: 2<br>- Nonthaburi: 1 |
| Interviewees by category of disability (Number of person) | Persons with disabilities:27 (71.1%)<br>- Visual: 17 (44.7%)<br>- Physical: 8 (21.1%)<br>- Hearing: 2 (5.3%)<br>Non-disabled persons: 11 (28.9%) |
| Type of interviewed organisation (Number of organisation) | Disabled people's organisation:7 (50.0%)<br>Government Organisation: 4 (28.6%)<br>NGO for Disabled People: 3 (21.4%) |
| Year of establishment of interviewed disability service centre (number of organisation) | 2014: 3<br>2015: 2<br>2016: 1<br>2017: 2 |
| Roles of interviewed disability service centre (number of organisations, multiple answers) | Vocational training: 6<br>Development of database and information provision: 3<br>Advocacy: 3<br>Networking and coordination:3<br>Support in daily living: 3<br>Medical rehabilitation: 1 |

**Source**: The author

million THB per year, while DPOs receive 0 to 2 million THB per year. In Chiang Mai, a sub-district disability service centre run by a DPO stated that it receives funds in February that should be cleared by September of the same year, which allows for only eight months for the implementation of projects. The projects should be operated sequentially, and duplication of the project period is not allowed. DPOs must conduct projects within a limited timeframe and return the remaining funds if they are unable to utilise them completely.

### *5.1.2 Functions and Organisational Capacities*

According to the guideline [18], DPOs and NGOs must pass an examination and clear a standard to register as a sub-district disability service centre. NGOs seem to have no difficulties in documentation as they have specialised administrative staff. However, there are few NGOs specialised in supporting persons with disabilities in rural areas in Thailand. SAOs have the advantage of managing sub-district disability service centres. For example, there were 65 sub-district disability service centres in Chiang Mai as of July 2019 based on the list of sub-district disability service centres provided by the Provincial Disability Service Centre of Chiang Mai, of which 55, five and five centres were managed by SAOs, government organisations and organisations of/for people with disabilities, respectively.

A community development officer of a SAO explained that distributing assistive devices directly to persons with disabilities is not allowed. When it is necessary to provide assistive devices such as wheelchairs or walking canes to residents, the SAO communicates with the provincial office of MSDHS, companies or hospitals, and thus indirectly provides these devices to the residents. Due to this regulation, the main role of a sub-district disability service centre

managed by SAOs is to conduct training programs or seminars to disseminate information and knowledge. When the budget is 20,000THB per year, it is able to organise approximately four training sessions a year.

The functions, activities and projects of sub-district disability service centres are determined according to the guidelines of the Department of Empowerment for Persons with Disabilities [18]. Therefore, many activities or projects of sub-district disability service centres are limited due to the constraints of law and regulations.

#### *5.1.3 Relationship among organisations*

During the interview survey, an officer of the SAO said that one of the advantages of registering as a sub-district disability service centre was to have a regular connection with the upper organisation: a provincial disability service centre. Whenever a new project is initiated, the provincial disability service centre informs all the sub-district disability service centres in the province. The provincial disability service centre of Chiang Mai said that it occasionally conducts seminars or trainings to establish a network of persons or organisations related to disability issues in the targeted district. Members of the sub-district disability service centres in the targeted district are invited to the training organised by the provincial disability service centre. Contrary to the expectations of DPOs, opportunities for the provincial disability service centre to conduct an on-site visit at sub-district disability service centres are limited, as the provincial disability service centre has approximately ten people to supervise of 65 sub-district disability service centres.

Sub-district disability service centres run by DPOs are organisations authorised by MSDHS, which means that centres have little influence on matters related to other ministries such as the Ministry of Education. During the field interview, one of the sub-district disability service centres run by DPOs explained his desire to open a school for adults with visual impairment to teach them Braille. He said that he consulted the district and provincial offices of the Ministry of Education regarding technical and financial support, but his efforts failed because they lacked curricula, human resources, and the budget to provide education for persons with visual disabilities who are over 18 years old.

### *5.2 Disabilities in People's Biases and Attitudes*

Under the system of the disability service centre, there are two major activities related to the community: vocational trainings[2] and recruitment by subcontracting. People's biases and attitudes regarding the implementation of a disability service centre are detrimental to persons with disabilities and can be observed at home, in the neighbourhood, and at the workplace.

#### *5.2.1 Non-cooperation from Families and Neighbours*

Several members of DPOs stated during the interview that most persons with disabilities in Thailand stay at home without going to study or work due to a lack of support from families and neighbours. The behaviour of families and neighbours is rooted in the general false understanding of disabilities which is 'a person with disability cannot do anything'. Not only persons with disabilities but DPOs also suffer from bias and similar attitude in their neighbourhoods. One of the DPOs purchased land in the city to relocate the office of the DPO. However, the construction of the building was blocked by the neighbours as they were afraid of noise and smells that may ensue from the DPO's office. In another case, an organisation of persons with visual disabilities was accused that a part of its signboard encroached on the road, although there were several other signboards encroaching on the same road that did not face similar accusations.

Sub-district disability service centres provide vocational trainings to the target group. Sub-district disability service centres use a list of registered persons with disabilities at a SAO to contact and invite a person with a disability in a community to a vocational training program. Some participants were introduced by their neighbours. In the mountainous area of northern Thailand, the lack of an ID card is an additional barrier to access. In some of the hill tribes, some individuals over 40 years do not even have a Thai citizen ID card, as it was difficult to apply for previously. Without an ID card, it is difficult to apply for a disability certificate. The factors that affect access to public service for persons with disabilities include: 1) whether a family of persons with disabilities has interest and money to send them for registration [3]; 2) whether there are neighbours or organisations who can connect a person with disability to a sub-district disability service centre; and 3) whether a family of persons with disabilities has the intention or understanding to send them for training or any other service.

#### *5.2.2 Lack of Understanding at Offices*

In accordance with the 33rd and 35th Articles of the 2007 Persons with Disabilities Empowerment Act, companies can have employees with disabilities not only in their offices but also somewhere outside their offices. Persons with disabilities conclude a contract

[2]For example, a SAO and an NGO in Mae Taeng District, Chiang Mai Province provide trainings on growing vegetables and raising chickens. A DPO in the same district provides training on traditional Thai massage, how to make brooms and mats, and the usage of smartphones.

[3]According to the interview with a SAO in Mae Taeng District, Chiang Mai Province, the process of creating a disability certificate in Chiang Mai is 1) examination at the hospital, 2) preparation of an ID photo, and 3) application of a disability certificate at Chiang Mai Provincial Office of Ministry of Social Development and Human Security (MSDHS).

with a company and work at government organisations near their home with a salary paid by the company. As of 2019, 38,688 persons with disabilities work under the 33rd Article and 12,811 work under the 35th Article nationwide in Thailand [19]. Some persons with disabilities work at provincial or sub-district disability service centres in rural areas under this system. It helps persons with disabilities to have income sources and social participation. However, there are some cases where employers do not allow an employee with disabilities to come to work, fail to pay a full salary to employees with disabilities, or do not give rights equal to other non-disabled employees [20].

#### *5.2.3 Competition in the Market*

As opportunities to work for a company or at a government office are limited, some persons with disabilities establish their own businesses after completing a vocational training provided by sub-district disability service centres. MSDHS offers an initial investment for persons with disabilities to start a small business in their community. However, it is not easy to make a living from personal business according to interviews with persons with disabilities who are working at a sub-district disability service centre. For example, persons with disabilities can participate in a training program on how to raise chickens, but they cannot sell chickens after the training because many other people sell chickens at the market. Persons with visual disabilities who receive an order of embroidery products at home can earn only 25 THB per item (10cm × 10cm), as most of the earnings are deducted for materials, transportation, and sales, which are often managed by non-disabled people.

### *5.3 Disabilities of Persons with Disabilities or DPOs*

DPOs are struggling to prepare documents for application and few DPOs pass the standard required to establish a sub-district disability service centre. Some DPOs refrain from applying because of the enormous amounts of paperwork required. Another problem is the implementation cost of a sub-district disability service centre. During the interview survey, it was found that the expenses that were not allowed as cost of maintaining a sub-district disability service centre were a burden on DPOs. Regular incomes for DPOs that are required to cover the extra costs include membership fees of 100 THB which is not always achievable as most of their members are poor and thus unable to pay. DPOs are also unable to collect the membership fee when new members has joined.

## 6. Discussion

### *6.1 Disabilities in Regulations and Institutions*

Service delivery for persons with disabilities at the community level has been strengthened through various policies and regulations in Thailand including the revision of the 2007 Persons with Disabilities Empowerment Act in 2013 which legally defined the establishment of disability service centres [21]. As sub-district disability service centres implemented by SAOs account for 88.7% of the total number of sub-district disability service centres, delegation of sufficient roles and responsibilities to a SAO implementing a disability service centre can become a particularly important means for effective service delivery to persons with disabilities. At the same time, simplifying the procedure of application and easing the regulation for implementation of disability service centres would be necessary to increase the number of disability service centres run by DPOs and NGOs.

### *6.2 Disabilities in People's Biases and Attitudes*

People's biases and attitudes towards disabilities make persons with disabilities unable to exercise their rights and address their needs. The result of interviews revealed that some persons with disabilities in rural areas did not apply for a disability certificate at the local government office or did not have the opportunity to study and work due to the lack of understanding of families and neighbours. Therefore, they could not access to the public service and missed the chance of social participation for long period. In Thailand, raising awareness of persons with disabilities, their families and people in the community has been achieved through the implementation of activities for income generation or independent living [21]. For example, Thai massage salons managed by persons with visual disabilities can play an important role in developing communication between persons with visual disabilities and non-disabled persons. Some disability service centres have persons with disabilities who work under the contract of a big company according to the 33rd and 35th Article of the 2007 Persons with Disabilities Empowerment Act. Recruiting persons with disabilities at a sub-district disability service centre of an SAO can have a positive effect in spreading awareness about the rights of people with disabilities among people living in the community. A previous study [22] suggested the possibility of developing mutual support among various types of people in the community including persons with disabilities, children, older adults by creating a place/space for joint activities or work so as to be able to communicate with each other.

### *6.3 Disabilities of Persons with Disabilities or DPOs*

Major challenges of DPOs in the implementation of disability service centres are a shortage of funds and administrative capacities. Many sub-district disability service centres run by DPOs rely on funds from the provincial disability service centre of MSDHS. When DPOs come up with projects or any other activities in line with the regulation or guideline of the disability service centre, projects that are not covered by the MSDHS fund are unlikely to be implemented. Lack of

administrative capacities can be covered by increasing the number of members, volunteers, or external supporters. However, some persons with disabilities are not interested in joining DPOs when they start working in the community [23]. Therefore, some DPOs are trying to find external supporters by themselves and successfully working with influential figures such as academics and religious leaders [24].

## 7. Conclusion

As a result of the establishment of disability service centres in Thailand, the level of awareness has increased among concerned people regarding the rights of people with disabilities through seminars and training programs implemented by these centres. Recognition of persons with disabilities among local people improved as persons with disabilities started working at disability service centres established in government offices. Generally the confidence of people with disabilities has improved regardless of whether they are working for government agencies, at home, or in the private sector. However, prejudice and discrimination toward persons with disabilities remain in many aspects of society. This research revealed that disabilities in the society can be eased by not only the establishment of a system or service but also by advocacy and empowerment of DPOs. The Social Model of Disability can be accepted and applied to Thai society when it is implemented along with a rights-based approach.

## 8. Implications

The findings of this research suggest that the creation of workspaces such as Thai massage salons managed by persons with visual disabilities and SAOs employing staff with disabilities offer good opportunities for persons with disabilities and non-disabled persons to communicate with each other and understand the rights of persons with disabilities. These activities in both the public and private sectors should be encouraged to spread awareness in society to achieve the rights and independent living by persons with disabilities.

Capacity development of DPOs is crucial for their participation in society and advocacy of the rights of persons with disabilities. The capabilities of DPOs in Thailand have improved through the experience of working with people in the community, government organisations and the private sector. However, it is important for DPOs to have a multi-sector network focusing on not only social welfare but also public health, education, labour, industry, and local administration. The administrative capacities and financial sustainability of DPOs must be enhanced through opportunities to learn marketing, sales and finance. Some DPOs are not ready to register as sub-district disability service centres. Oliver and Sapey [25] explained that partnership with service users has been emphasised and the value of the support that DPOs can provide has been recognised since Seebohm's report in 1968 in the United Kingdom. Moreover, Fiedler [26] argued that involvement of service users within social services could range from information through consultation and partnership with delegated control. In the future, sub-district disability service centres of SAOs in Thailand can contract out a portion of their services to local DPOs to support the initiative and capacity building of DPOs.

## 9. Limitations

This research focuses on the identification of the current situation of disabilities in the regulations and within communities and determines the impact on persons with disabilities and DPOs in the context of the implementation structure of the disability service centres in Thailand. The sub-district disability service centres where this research was conducted had only been in operation between two and five years; therefore, the relationships among 1) disabilities in regulations and institutions, 2) disabilities in people's biases and attitudes in a community, and 3) disabilities of persons with disabilities or DPOs cannot be completely explained. Further studies are needed to determine these relationships over time and actual changes in disabilities in society on a long-term basis.

## 10. Acknowledgment

I am deeply grateful to Prof. Masato Kawamori, a professor at the Graduate School of Social Sciences, Osaka University, for his academic advice and comments on my research. Dr. Kamolpun Punpuing of the National Science and Technology Development Agency of Thailand has also been a great help in understanding the local situation and history of persons with disabilities in Thailand. This research was conducted with the financial and technical support of the Graduate School of Human Sciences, Osaka University, Japan and Graduate School of Asian and African Area Studies, Kyoto University, Japan.

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