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A Role-Playing Simulation Game for Shared Learning on Community Forest in Lai Nan, Nan Province, Thailand

Perspectives of Thai Youth on Reproductive Technologies

Public Participation and Environmental Problems Monitoring in Chachoengsao Province



The Making of TV Dramas for Global Consumption



Stakeholder Communication in the Research Process and Evaluation of Social and Community Innovation Project Using the CIPP Model

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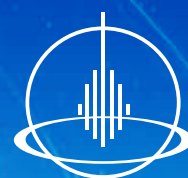
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In driving Thailand towards Thailand 4.0 to achieve stability, consistency, and sustainability, every economic sector needs to change fundamentally and adapt in order to contribute to achieving these national goals. In particular, it will be vital to facilitate and fast-track adoption of innovation, particularly the transfer of knowledge from research to the real world, in order to drive national development and global competitiveness. Change never comes easily, or even willingly; there is therefore a need to communicate to raise awareness and consciousness to change mindsets among actors in both private and public sectors, and particularly within the research community, who may be impacted by a fast-moving transformation driven by radical innovation that fundamentally changes the way we work. Furthermore, appropriate communication is necessary to ensure that research and innovation are much more closely tuned to and linked with real-world needs of business and industry, and draw lessons from similar transformations and approaches elsewhere in the world.

With a continuing and fast-moving revolution in communication taking place around us today, access to technology and knowledge is much more universal and democratized. We must embrace the use of multiple new media channels to create and share knowledge, encourage meaningful dialogue and understanding within our society. Games and other digital media will be central to such efforts. Moreover, new media are already taking centre-stage in the corporate world, to build visibility, advertise products and services, engage with the customer base and enhance the image of the organizations as well as adding value to products and services.

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A Role-Playing Simulation Game for Shared Learning on Community Forest in Lai Nan, Nan Province, Thailand

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Introduction

Community forests are designated areas to allow the local community to play a significant role in forest management. Community residents gather both timber and non-timber products from the forest. However, the size of the forest must not be too large for the community to manage. Sustainable management of community forests is driven by social sanctions and community decision-making (Royal Forest Department, 1994). Community forests thus play a crucial role in forest conservation in Thailand.

Nan province has established a total of 240,753 rai of community forests (Department of Forestry, 2019). A study of resources in the community forest area in Lai Nan subdistrict, Wiang Sa district, Nan province highlighted the forest's biodiversity and importance to food security of local people and the integrity of ecosystems. Researchers identified 59 species of birds from 29 families, and 97 species from 28 genera of fungi from 18 different families. Among the fungi, 48 species were edible, such as *Amanita* spp., *Russula* spp. and *Astraeus* sp. In addition, 13 species from 13 genera and 4 families of fish were found. In addition, 17 orders of soil insects were

identified, and one order could not be classified. Community forests in Lai Nan subdistrict were found to sequester an average of 41.84 ton-carbon ha⁻¹ year⁻¹ of atmospheric carbon. Moreover, the area's total economic value was estimated at 2.52 million baht per year (Dumrongrojwatthana et al., 2016).

However, as few studies have been conducted on community forests in Nan Province, there is scant information that would allow collection of a body of knowledge that could be passed on to the younger generation- an important force driving forest conservation in Nan Province. Therefore, the research project entitled "*Community Forestry Knowledge Management Using a Companion Modeling Approach: Case Study of Lai Nan Subdistrict, Nan Province*," aimed to create a learning innovation tool in form of gaming and simulation based on the companion modeling approach. This tool could be used for knowledge management regarding Lai Nan community forest and shared learning among youths in regard to community forest management. The study aimed to enhance community-driven natural resource conservation and sustainable community forest management.



Companion modeling approach

The modeling has been widely used as a tool for integrated renewable resource management and is acclaimed for its ability to perform scenario explorations in a short period (Bousquet & Le Page, 2004; Etienne, 2014). This characteristic allows researchers to understand the dynamics and interactions of the system under study, or predict the possible trends of the system under different resource users' behaviors by exploring different scenarios, and thus to identify collective management strategies that appropriate for the local context. There are two commonly used models: the prediction model and the learning model. The prediction model considers multiple variables to generate highly accurate predictions and is commonly used to predict complex changes such as climate change over a 50-100 years horizon. In contrast, the learning model contains a small number of core variables that are important to the system behaviors; the model is then field-tested for social validation (Moss, 2008). The learning model allows interaction and exploration among stakeholders and creates a mutual learning experience. This contrasts with the prediction model, which only predicts outcomes but ignores the '*black box*' effect that stakeholders may experience (Barreteau et al., 2001). Moreover, the learning model also helps to raise awareness and consciousness among stakeholders about impacts of their behaviors on the local social and ecological systems, prepares them for future changes and enables them to plan natural resource management more effectively and in a better-informed way (Bousquet & Le Page, 2004).

The Companion Modeling Approach (ComMod) (Bousquet & Trébuil, 2005; Etienne, 2014) is an interactive integrated model that supports the learning process through dialogue and shared learning among concerned stakeholders. Stakeholders' interests, perspectives, knowledge and experience are used to create an integrated model and simulation representing the subject matter of the system under study. The model links together local wisdom and scientific knowledge so that the stakeholders and researchers share and learn together to create practical and acceptable solutions for environmental management.

The Companion Modeling Approach (ComMod) emphasizes the study of interactions between bio-physical and the socio-economic dynamics. ComMod is a process that stimulates thoughts and decision making progressively. The process is facilitated by iterative and evolving models incorporated fieldwork (interviews, survey and group work for creating and using the model), laboratory work (data analysis and modeling) and also draws throughout from dialogue among stakeholders. Moreover, respect of diverse stakeholders' opinions is crucial for model development of an effective and workable real-world model. Therefore, the researchers responsible for this project included themselves as stakeholders and served as facilitators to facilitate shared learning among the participants.

The objective of using companion modeling was to encourage shared learning and dialogues among stakeholders and less on predicting future possibilities since most existing systems are complicated and fast-changing. Therefore, it is crucial for the stakeholders to understand interactions and trade-offs among elements that created the dynamics of the systems, as well as to plan for unpredictable situations resulting from policy and other levels of decision-making, or natural disasters. Once stakeholders gain a deeper understanding of the system and consequence of collective actions, they acquire an elevated awareness and consciousness towards natural resource conservation. This enhanced adaptive management capacity facilitates participative approaches and community-level collaboration in planning natural resource management. Community-rooted solutions are generally much more likely to succeed both in conserving natural resources and the environment, and also in enhancing social stability within the community (Figure 1).

Three different models were developed based on ComMod: a role-playing game, a computer model and a computer-assisted model. The role-playing game allowed users to role-play as resource users or as actors in decision-making scenarios where stakeholders had to make their own decisions and choices for resource allocation. This project employed a role-playing game

together with a card game in order to gather a body of knowledge from local villagers and young people. The model was thus designed to be simple and easy to use.

Study area and knowledge management process

Nan province has long suffered from rapid deforestation from expansion of agriculture. Community forests offer a means to mitigate the impacts of forest loss, while contributing to the household economy of local people. The research team selected a community forest area located in Lai Nan subdistrict due to persistent forest encroachment problems from outsiders as well as overharvesting, despite the area being frequently visited for scientific research (Dumrongrojwathana et al., 2016). Land use is rapidly changing for several reasons. Villagers who migrated to the city were increasingly returning home due to low wages or difficult conditions in their city jobs and turning back to agriculture. At the same time, some students and fresh graduates also want to stay in the area and continue with agricultural work. These demands

exacerbate conversion of forest to agriculture and increase pressure on natural resources from the forest. As a result, community forests have become increasingly under threat from encroachment and outright deforestation. The situation is exacerbated by a lack of local awareness of the critical importance of community forest preservation. Without a body of knowledge to understand the importance of community forests for livelihoods, there are few incentives to protect the forest and its ecosystem services. As a result, the community is ill-equipped to protect the forest and its resources, or plan for unforeseen economic crises or natural disasters where community forests can provide a vital safety net for the community.

The process for this participatory research comprised three stages. In the initial stage, a body of knowledge was gathered from existing literature, and field research conducted with local people to assess the ecosystem services of their community forests. Based on this knowledge, an innovative gaming and simulation was created. The second stage was to use the game through participatory field workshops for shared learning.

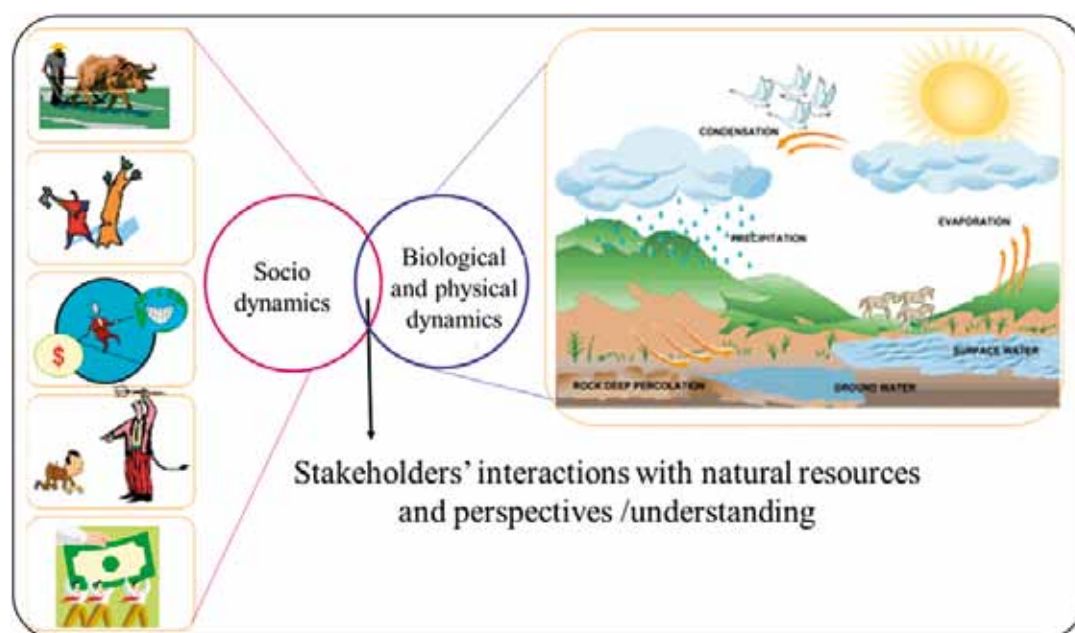


Figure 1 Companion modeling showing representatives of the systems that encourage shared learning for users to understand interactions between each system and change their behaviours regarding resource utilization

Source: adapted from Trébuil (2013)



Other learning sessions based on stakeholders' requests were also delivered to encourage knowledge sharing among local stakeholders (local residents, teachers, young people and representatives from Lai Nan Local Administration Office) as well as to create understanding of the diverse benefits of community forest ecosystem. The third stage was for knowledge transfer. Representatives from Lai Nan Local Administration Office and teachers were trained as trainers to use the gaming and simulation for sustainable community forest management.

Gaming and simulation: “Non-timber Forest Product Collection Game”

The Non-timber Forest Product Collection Game was designed to gather knowledge regarding resource utilization in the study area. Pak Waan Paa (*Melientha suavis*), larvae of Weaver ant (*Oecophylla smaragdina*)

and mushrooms were chosen as representatives of important nontimber-forest products (NTFPs). They also represented producers, consumers and decomposers of the ecosystem which were integrated into ecosystem services. The game design included a range of principles and knowledge especially on ecosystem services, ecosystem dynamics, natural disasters, overuse of scarce resources, and sustainable use and conservation of community forest via discussion process (Figure 2). The goal of using this game are improve players' understanding on the important of the ecosystem services, especially provisioning and cultural services, delivered by the community forest, and learn about sustainable use of NTFPs. The game was played in a total of 10 workshops. The game players were local villagers and young people living in the subdistrict, a teacher and students from Sa School and representatives from the local administration – a total of



Figure 2 Local people and youths playing the “Non-timber Forest Product Collection Game”

Source: Dumrongrojwattana, taken in 2018

191 participants. The game explored three different scenarios: 1) business as usual (regular resource utilization according to participant preferences); 2) forest fire (bushfire); and 3) building firebreaks and small ponds in the community forest.

The game consisted of four steps. In Step 1, the game leader explained the instructions and materials and prepare beads of different colors (green beads representing Pak Waan Paa (*Melientha suavis*), orange beads for larvae of Weaver ant (*Oecophylla smaragdina*) and yellow beads for mushrooms). The materials were placed in 25 boxes representing the community forest area for 10-15 players. In Step 2, the players followed the first scenario and harvest resources as they pleased. In Step 3, players collected data regarding their collected forest products and collectively updated the resources for the next year. Players must work together to assess whether any area was being overharvested and predict the production of all products for the coming year. In Step 4, players discussed the results and explain their choices. After Step 4, players then repeated the game, this time based on Scenario 2, in which a forest fire occurs. The players first decide on the numbers of grids where they expect the forest fire to break out. They then come together to discuss the impact of the fire on the NTFPs in each grid. They then continue to play the game following steps 2-4 as described above. The players will then play the game based on Scenario 3 where they are allowed to build firebreaks and small ponds in the forest area. The players then adjust the number of NTFPs found in the forest again and provide reasons for the changes. Once the players have played all three scenarios, the game leader conducted a debriefing session by explaining problems caused by over-harvesting that leads to degradation or destruction of the forest area. The debriefing also discusses the effects of over-utilization on the community and disasters that may affect the community forest. Each player must take part in the brainstorming and idea-sharing session aimed at sustainable utilization of the community forest to ensure its continuing abundance for future generations.

Gaming and simulation: “Diversity@Lainan Game”

The Diversity@Lainan Game is a card game, created as a learning and knowledge gathering tool covering plants, fungi, insects, birds and terrestrial fauna, using the community forest as their habitat. The card game targeted young people and was designed to elucidate the relationship between flora and fauna based on ecological principles and species diversity concepts. The game aims to increase the level of knowledge about biodiversity, the importance of the community forest and reforestation. Three gaming sessions was conducted with local youths, teachers and students from Sa School and representatives from the local administration- a total of 253 participants (Figure 3).

To play game, the players were divided into pairs or small groups of 6-10 people. Players in each group received five cards randomly and start playing game by the forest “level 1” that can support only level 1 cards, too. Players decided the first person to play by putting a “plant” card, then rotated clockwise until 20 cards were played according to the card’s skill. Thereafter, the forest quality increased to “level 2” that can support cards level 1 and 2, and then increased to forest “level 3” when 40 cards were played. Until no more card to play or the time is up, player who has highest score will win the game. Thereafter, players were invited to review and discuss different living organisms and their roles in the forest ecosystem, as well as impacts of different land uses and the importance of the forest ecosystem to organisms and human livelihoods and well-being.

Other learning activities

Apart from game-based learning, the research team also organized a bird-watching workshop for students and young people in the community. A GPS Essentials workshop and a Google Earth Pro workshop were also conducted to help create spatial database of natural resource. Moreover, a 1-rai (40 x 40 m²) permanent plot was established in the Ban Boon Rueng community forest area (Figure 4) with the teachers and student



Figure 3 Examples of the “Diversity@Lainan Game” with students from Sa School
Source: Dumrongrojwathana, taken in 2018

representatives from Sa School, representatives from Sa Subdistrict Administrative Organization and community residents. The permanent plot was designated as a future learning space for environmental education.

Results of the game and public policy drafting

The “Non-timber Forest Product Collection Game” initiated a knowledge-sharing dialogue among adults and young people in the community, in an informal, fun atmosphere. Participants all enjoyed the discovery process and knowledge-sharing and appreciated their expanded understanding of local wisdom about collecting and utilizing forest products. The participants from three adjacent villages (Moo 1, 2 and 3) from the total of six villages in the subdistrict requested the research team to conduct more gaming sessions since they realised that

the game generated discussion and strengthened the relationship between adults and the younger generation. The activity offered a great opportunity for both generations to come together to discuss practical steps to preserve their precious community forest for the future. The “Diversity@Lainan Game” also introduced new knowledge about new species to the students; they learned to differentiate edible from inedible mushrooms and about the significance of the community forest as habitats. The Diversity@Lainan game is simpler than the Product Collection game; it can be played in a short time and offers fun for players. Crookall and Thorngate (2009) found that using games and scenarios generated an atmosphere that fosters effective learning and discussion among participants.

The results from the gaming sessions and other learning activities led to the development of new learning



Figure 4 Permanent plot establishment in Ban Boon Rueng Community Forest (Moo 2), Lai Nan subdistrict
Source: Dumrongrojwattana, taken in 2018

activities brought out of the classroom to the forest. Students from Sa School conducted school projects as part of their independent study assignments. The projects included field studies of plant biodiversity, growth of seedling species in the permanent plot, bird diversity in the community forest and agricultural areas, as well as field surveys of lichen species. This opportunity sparked a new love of nature and a broad community-wide commitment to protect the forest. The project supported the Rak Pa Nan (Care for Nan Forest) project initiated by Her Royal Highness Princess Maha Chakri Sirindhorn which offered forest conservation classes in schools. A new project entitled '*Planting forests inside the hearts of Nan's future generations*' was launched for this purpose (Nan Provincial Education Office, 2018).

Recognizing the importance of continuity and sustainability of the projects, the research team drafted a public policy for the subdistrict municipality committee to contribute to and improve its 4-year development plan (2018-2021). The proposed projects include the following:

- Plant Genetic Conservation Project Under the Royal Initiative of Princess Maha Chakri Sirindhorn;
- Gaming and simulation sessions to foster natural resource conservation for young people and introduce the Rak Pa Nan (Care for Nan Forest) project;

- Enabling student activities using community forests to encourage learning in the real environment and establish a strong relationship between schools and communities;

- Supporting student independent study projects to encourage learning on sciences, technology and social sciences through the use of community forests;

- Building natural trails by involving local communities and school as stakeholders to create added value to the community forest (natural classrooms, and use of the forest for cultural and ecotourism purposes);

- Establishing more permanent plots in the community forest to create an alternative learning space for local schools and universities, and to sensitize local communities;

- Launching a "*Trial Day*," dedicated to learning about local natural resources in community forests, designed to share knowledge and local wisdom relating to local natural resources and local wisdom for forest conservation. The session was shared by local government representatives, local schools and local community residents;

- Creating a database of natural resources available in the community forest.



Conclusion

Community forests offer an important option as part of forest conservation efforts. However, in Lai Nan community forest, Wiang Sa district, Nan province, Thailand, the body of knowledge and understanding of natural resources utilization was relatively limited and was not being passed on to younger generations. This research project helped fill this gap by creating an innovative learning tool for knowledge management in this domain. The design of the learning tool was based on the Companion Modeling approach. Two gaming and simulations were produced, the “*Non-timber Forest Product Collection Game*” and the “*Diversity@Lainan Game*”. After using the models with local stakeholders, the results indicated that young people became more interested in learning more about their community forest. Students, especially at Sa School, were inspired and engaged in a range of new independent study projects.

The drafting of a proposed new public policy also helped Lai Nan subdistrict administration to ensure continuity and sustainability of the program. Moreover, follow up studies and project assessment in a long-term period will be carried out in the near future.

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References and Bibliography

- Barreteau, O., Bousquet, F., & Attonaty, J. (2001). Role-playing games for opening the black box of multi-agent systems: method and lessons of its application to Senegal River Valley irrigated systems. *Journal of Artificial Societies and Social Simulation*, 4(2), 5.
- Bousquet, F., & Le Page, C. (2004). Multi-agent simulations and ecosystem management: A review. *Ecological Modelling*, 16(3-4), 313-332.
- Bousquet, F., & Trébuil, G. (2005). Introduction to companion modeling and multi-agent systems for integrated natural resource management in Asia. In F. Bousquet, G. Trébuil, & B. Hardy (Eds.), *Companion modelling and multi-agent systems for integrated natural resource management in Asia* (pp. 1-17). Los Baños, Philippines: International Rice Research Institute.
- Crookall, D., & Thorngate, W. (2009). Acting, knowing, learning, simulating, gaming. *Simulation and Gaming*, 40(1), 8-26. doi:10.1177/1046878108330364
- Dumrongrojwattana, P., Wimolsakcharoen, W., Panyawong, K., and Huayhongthong, I. (2016). *Economic Evaluation of Non-timber Forest Products in the Plant and Genetic Conservation Project area, Wiang Sa subdistrict, Nan province*. Research Report for the 2016 Government Budget Grant.
- Etienne, M. (2014). *Companion Modelling: A participatory approach to support sustainable development*. France: Jointly published with Quæ and Springer.
- Moss, S. (2008). Alternative approaches to the empirical validation of agent-based models. *Journal of Artificial Societies and Social Simulation*, 11(1), 5.
- Nan Provincial Education Office. (2018). *Rak Pa Nan Curriculum*. Nan: Nan Offset Design & Printing.
- Royal Forest Department. (1994). *Guidelines for Community Forest Development*. Bangkok: Community Forest Unit, Reforestation Department, Royal Forest Department.
- Royal Forest Department. (2019). *Community Forest Database*. Retrieved from May 2, 2019, <http://www.forest.go.th/community-extension/category/database/>
- Trébuil, G. (2013). *Introduction to Companion Modelling: Hand-out for companion conceptual modeling training workshop*. 27-31 May 2013, GREASE network, Kasetsart University, Bangkok.



The Making of TV Dramas for Global Consumption

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Introduction

Thailand is a rich source of cultural diversity, attracting foreign visitors with its many ancient traditions, cuisines and cultural sites across the country. To highlight Thailand's unique national heritage, the Thai government has enacted various strategies, including the '*5F Strategy*' (Food, Fighting, Fashion, Festivals and Film) (Ministry of Culture, 2016).

Entertainment media such as movies and TV dramas are considered as an effective channel for publicizing these thematic cultures. Thailand's excellence in these media is already recognized across the Asian region. A study by Jiratikorn (2019) indicates that Thai TV dramas have also been popularized in neighboring countries, including China, for many years. However, success in the wider global market alongside US, Japan, and South Korea remains for the moment elusive. Preliminary research suggests that typical Thai TV dramas would struggle to be accepted by worldwide audiences for quality reasons.

Plotlines are often stereotyped and shallow, featuring repeated themes such as infidelity, patriarchy, sexual relationships or violence. Female characters are often objectified, while cultural value generally absent from the storyline. Suffice it to say that Thai TV drama in its current form would not be effective as a channel for promoting Thai culture beyond ASEAN and Chinese market unless the genre breaks from inherited convention.

Such a conclusion triggered investigations of the content of popular narratives to help address this gap to enable TV drama as a vehicle to publicize Thai culture globally. More Creative techniques in more than 100 successful TV dramas were examined, all released during from 2000 to 2010. The study used content analysis in combination with comparative studies of Thai and non-Thai TV dramas, bringing to light some essential and under-used techniques.

Characters in compliance with universal expectation

The first technique discovered to be a prerequisite to success of Thai TV drama in export markets relates to central characters. Characters of the key protagonists must be able to align with audience expectations across the globe. Lead characters must therefore be imbued with complexity and cannot be two-dimensional. Audience empathy depends upon e.g. the flawed hero who bears some relation to real-world human beings.

Leading characters could be broadly categorized in one or more of the following character types, with which audiences are generally familiar, and which confer the character with attributes such as leadership or power (Table 1).

Lead characters will likely be remembered when they incorporate the following three aspects.

1) Learning from their own mistakes in the belief that it is his/her duty to keep learning for a better tomorrow.

2) Being a tireless fighter until arriving at the destination.

3) Expressing intellectual integrity, especially in a critical situation or revealing a personal skill not to be found in other characters.

Leading characters quipped with these three qualities will help to match the worldview of global audiences because today's audiences value human abilities above destiny.

Table 2 below shows additional qualities often seen in leading characters in movies, TV dramas and animations.

Each represents a human value or trait that helps connect the audience to the story.

Though no specific guidelines exist as a formula for universal audience acceptance, it is clear that to resonate broadly, characterization must align with shared beliefs and popular expectations held by global audiences. In other words, their inherent nature must be modernized to fit a globalized multi-cultural world.

Communication with the audience as readers of texts

Communication with the audience is achieved through dialogue and nonverbal language. In popular narratives, well-presented dialogues are created in the form of subtexts in tandem with the dominant dialogue. The general dialogue provides an explicit 'face-value' meaning, while the subtext provides complexity by giving the audience indirect meanings, twists or subplots. The audience must position themselves investigatively, as readers of the subtext, in order to understand what is really going on in the story, rather than being merely passive absorbers of the main dialogue. This increased engagement stimulates and incentivizes audiences to follow the story from scene to scene, episode to episode. An example of subtext can be taken from many contemporary TV dramas, animations, or movies. One classic example is provided by the 1970s classic movie, *The Godfather*. As the lead character, Don Vito Corleone is a feared and charismatic man with tremendous influence. A subtext implying his power is given in the line:

Table 1 Categorization of lead character types in Thai TV dramas

Type	Description
Revolutionary	Courage to change the system
Detective	Determination to solve a mystery
Adventurer	Accept a new and unexpected challenge
Giver	Understand, empathize and show love towards others
Leader	Disciplined, in charge of the team, show thought leadership and rarely compromise
Ambitious Person	Have a clear goal and demonstrate ruthless determination

Source: Lopattananont & Wongkham, designed in September (2019)

Table 2 General Traits of Leading Characters in the Modern Period

1) Values freedom	2) Support equality	3) Realize legal/ethical action
4) Never loses faith in human potential	5) Adapt to change	6) Accept diversity (gender, religions, race, etc.)
7) Thirst for new knowledge	8) Have interest in technology or innovation	9) Concern about society/social issues.

Source: Lopattananont & Wongkham, designed in September 2019

“I’m going to make him an offer he can’t refuse” to mean that he is in control of everything and no one can resist him.

Aside from subtexts, nonverbal language is another element that adds complexity and maintains audience engagement. A couple in the story may communicate the state of their relationship by their proximity, eye contact or touch. An example from actual narratives could be taken from the final sequence in *Isn’t It Romantic* where Josh asks Natalie to sit on his chair. In that moment, Natalie finds out Josh keeps sitting there only to see the person in front of the window who is she herself, meaning that Josh feels deep affection for her. Nonverbal language such as this strengthens romantic feeling through action and reaction between the two characters.

Both subtext and nonverbal language are important to sustaining the audience’s interest, and empathy.

They encourage audience engagement in the plot as well as focusing on the depicted content to ensure their understanding. Without such tools to generate complexity and depth, reliance on general dialogue relegates audiences to a passive role and reduces the overall level of interest.

Themes to be shared by international audiences

As has been described for lead characters, plotlines in globally successful TV dramas are based on universal themes or, at least, on themes that can be understood by audiences from diverse cultural backgrounds.

Themes in this context mean topics, problems, or trends in areas such as politics, society, family life or the economy. Conventionally, themes in Thai TV dramas often target female audiences, and revolve around issues



Figure 1 Marlon Brando plays Don Vito Corleone in *The Godfather*

Source: Benjamin (2015)



Figure 2 *Isn't It Romantic* promotional poster
Source: Netflix (2019)

of love and passion, often involving physical or psychological abuse, retaliation, violence or rape. As a result, the title of Thai TV dramas are often repeat key words such as fire, love, lust, fury, etc., all of which connote characters as persons with uncontrolled needs. Themes like these are seen as romanticizing aggression.

Studies of themes in popular narratives indicate that themes shared by worldwide audiences are varied and can even be groundbreaking. Here there is sharp divergence from typical themes in Thai dramas. For example, culturally, Thai audiences are only tentatively beginning to accept and embrace open dialogue through drama of themes such as sexuality.

Two outstanding examples are provided by the dramas *Sex Education* and *Sky Castle* whose themes explore problems in sexual relationships among young people, and competition in education, respectively. In *Sex Education*, the theme does not set out to titillate, but to open up a serious dialogue on a variety of sexual problems faced among young people around the world, e.g. same-sex relationships, unprotected sex, online relationships and age disparity, all of which can impact

on physical and mental health, but have never been effectively addressed through formal education or other communication channels.

The theme of *Sky Castle* focuses on the emergence of competition in university admission tests. Many countries still rely on this selection method, which frequently sees extreme parental pressure on young people to perform in order to earn a place at a respected educational institution. The ensuing stress and tension can be devastating and enduring in their impact. By using these themes, *Sex Education* and *Sky Castle* are considered as having contemporary relevance to modern day social issues, creating immediate and universal resonance with global audiences due to the universality of their main themes.

Hardship

According to Hauge (2017), stories capture the audience's attention when they clearly exhibit characters, characters' desire, and problems. Good stories always show the growth of leading characters through their efforts to overcome problems and challenges that serve to test the limits of strength of character.

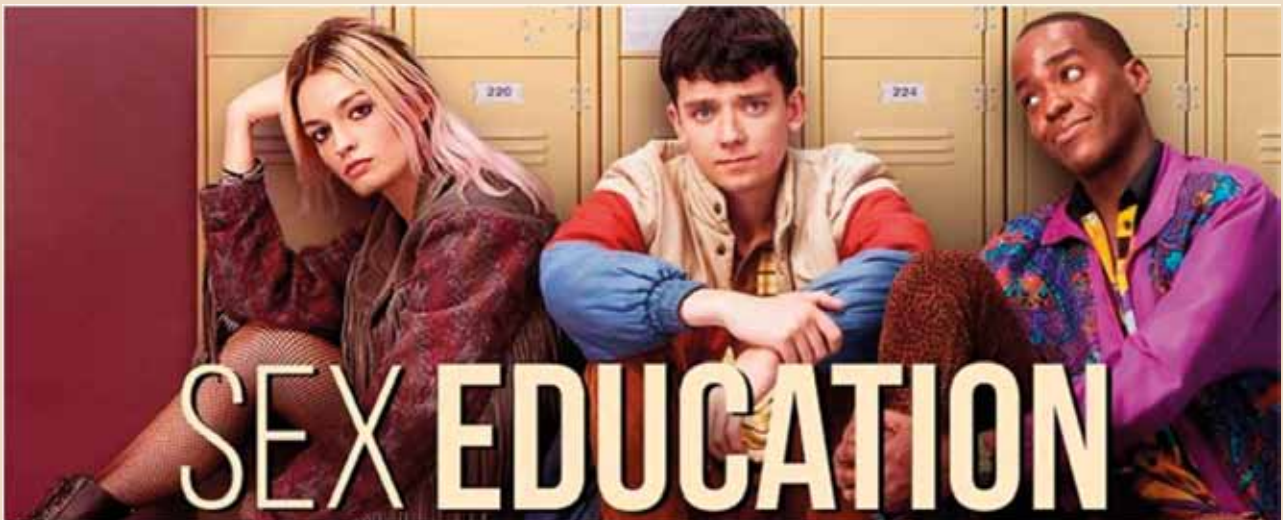


Figure 3 *Sex Education* poster
Source: Krannich (2019)



Figure 4 Twins are forced to study by their father in *Sky Castle*
Source: Warner Music Korea (2018)

An intriguing problem is, incontestably a key ingredient to a successful TV drama. Moreover, it must be somewhat unusual if it is to capture audience interest. It must also emerge as a crisis that the character must deal with. The audience will then be magnetized to the story, because they will first empathize with the character's predicament or dilemma, and second, will be eager to know how the crisis will ultimately be resolved. Two approaches used in combination, are often effective in designing such a problem as the premise for the plot. First, a problem should be designed that can lead to the growth of the leading character's personality. In other words,

the character's personality may change from weak, incompetent or indecisive to a strong, decisive leader as a result of prevailing over adversity. Secondly, the problem created must appear tough or impossible for the character to overcome at the outset.

An outstanding example is provided by the movie *Jewel in the Palace*. Character growth can be seen resulting from a series of unexpected hurdles in which the leading female character – a powerless commoner – learns a lesson and by the end of the movie, is transformed into a noblewoman. The movie has also incorporated an array of seemingly impossible hurdles, including the following:



Figure 5 *Jewel in the Palace* poster
Source: GMA (n.d.)

- The lead character is born to parents who have been prosecuted for serious crimes. Her rights to live peacefully are vanishingly small from the outset.

- The lead character works in the palace where a patriarchal tradition overpowers the entire system, signifying that she has no hope to rise in the ranks.

- The lead character is abused at work by both male and female colleagues, and her life is filled with hardship and unfairness.

- The lead character is surrounded by corruption and her job is under constant threat.

- The lead character faces social crises, including a dangerous epidemic of contagious disease amongst villagers.

- The lead character finds it is difficult to achieve a romantic relationship with her lover because the King – the most powerful man in the Kingdom- has become obsessed with her.

These conflicts generate high levels of hardship. Most audience reactions indicate that such hardship attaches the audience to the character and her journey along the story. Characters and storylines, as a result, depend significantly on how problems are designed.

Conclusion

To export TV drama in order to promote Thai culture, it will be essential that the themes and content must be adapted to interest global audiences. Changes are required in four key areas: character development, ways of communication, themes, and problems. Recommendations on these four areas are as follows:

- Lead characters are a center of attention. The technique is to present them in a manner that is convincing, flawed and coherent with human nature in the modern world.

- Subtexts and nonverbal language can stimulate audience reaction and engagement. Used in tandem with general dialogues, these techniques deepen audience engagement and maintain interest from episode to episode.

- Themes should not be limited and formulaic as is currently the case in many Thai TV dramas, but should

reflect issues of global interest that transcend culture or language. Such themes are likely to generate universal resonance among global audiences.

- Plotlines require problems as a basic premise. Problems must appear impossible, and should support character development as the protagonist overcomes hurdles to overcome the problem.

However, the four above-mentioned techniques address only a fundamental stage in development of TV dramas for global audiences. To succeed at the global level, TV dramas require a broader, more enlightened body of knowledge and resonance with global cultures and social debates, plus updated working skills. There is no single ‘*success recipe*’. Creators must learn and apply a range of techniques in combination to construct a right work for the right audience, at the right moment.

Acknowledgement

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References and Bibliography

- Benjamin, B. (2015). *Gordon Willis Tribute - THE GODFATHER*. Retrieved September 11, 2019, from <https://ascmag.com/blog/the-film-book/gordon-willis-tribute-the-godfather>
- GMA. (n.d.). *Jewel in the Palace*. Retrieved September 12, 2019, from <http://gmaasianovelas.weebly.com/jewel-in-the-palace.html>
- Hauge, M. (2017). *Inner Conflict*. Retrieved September 11, 2019, from <https://www.storymastery.com/character-development/inner-conflict/>
- Jiratikorn, A. (2019). *Can Thai TV Drama Do Well in the Global Market?* Retrieved September 11, 2019, from <https://themomentum.co/amporn-jiratikorn-interview/>
- Krannich, B. (2019). *Sex Education: Internationale Erfolgsserie erhält zweite Staffel*. Retrieved September 11, 2019, from <https://www.fernsehserien.de/news/sex-education-internationale-erfolgsserie-erhaelt-zweite-staffel>
- Ministry of Culture. (2016). *Ministry of Culture Accepts A 5F Policy – Intensive Conferences for Cultural Tasks*. Retrieved September 11, 2019, from https://www.m-culture.go.th/mculture_th60/ewt_news.php?nid=5665&filename=index
- Netflix. (2019). *Isn’t It Romantic*. Retrieved September 11, 2019, from www.netflix.com
- Warner Music Korea. (2018). *해진 (Ha Jin) - We All Lie (SKY Castle OST) [Official Video]*. Retrieved September 11, 2019, from <https://www.youtube.com/watch?v=PdDfuWJc9dA>



Perspectives of Thai Youth on Reproductive Technologies

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Introduction

How one defines a family is a personal and unique matter, despite its being one of the most basic social units of the human race. All individuals have their own interpretation for what and who constitutes their family unit, be it in the biological, traditional, cultural, symbolic or metaphorical sense, and there is no such thing as a 'typical' family. Still, the diversity of possible forms of family continues to grow. Advancements in assisted reproductive technologies (ARTs) have also contributed to the emerging faces of the family, particularly when it comes to enabling prospective parents' decision to have a child not by natural means. These developments in reproductive science continues to transform and expand family-building decisions. It is therefore important to engage in conversations on such developments on every level, including at policy-level as well as amongst the public, youth included, as they are likely to affect the choice to build their own family and to determine what society looks like in the near future. Youth engagement offers a way to inform and stimulate discussions, which could provide valuable and insightful perspectives for the public discourse.

This article explores perspectives of Thai youth on the topic of ethical, legal and social implications (ELSI) of reproductive technologies on the futures of family, following a 3-step engagement process.

Reproductive technologies and the futures of family

There have been continuous advancements in reproductive medicine, most notably since the first baby was born from in-vitro fertilization (IVF) in 1978 (Steptoe & Edwards, 1978). Ever since, a stream of new ARTs has been introduced and made accessible to those wishing to build a family. This includes variations of IVF as well as other technologies to adapt to specific requirements of prospective parents, such as surrogacy, pre-implantation genetic diagnosis (PGD), donor conception, and gamete cryopreservation. Nowadays, the choice of whether or not to build a family outside of reproduction through sexual intercourse becomes one that many potential parents can contemplate. ARTs come with their own advantages as well as risks, and it is vital

that those who consider using the technologies are well informed of the possibilities. Furthermore, the public should be similarly aware of these technologies, as they become increasingly accountable for more births (European Society of Human Reproduction and Embryology, 2018).

Youth engagement, media and scenario-based discussions

Youth today are the ones who will experience the future consequences and outcomes of current technological advancement, ARTs included. They are the generation who will face new decisions concerning family-building, especially as more reproductive technologies become increasingly accessible to the public. Informing youth on scientific developments, which have the potential to revolutionise the way they live, is essential. Additionally,

engaging youth and enabling them to form and articulate personal opinions on ARTs are similarly crucial, especially as the world is experiencing major technological transitions. However, engagement alone does not suffice. It is important that the voice of youth is effective in the public discourse, including in regard to policy-making and its impacts. In Thailand, youth is one of several group that are often marginalized or excluded from conversations and dialogues about public policies related to science, technology and innovation.

The media offer an alternative and powerful channel for youth engagement. Using an informative medium, such as TV documentaries, can be advantageous in informing the public of recent scientific developments and how they could affect the personal lives of users of new technologies. The content of the media should be informative, entertaining as well as thought-provoking in order to stimulate interest and discussions thereafter. (Dahlstrom, 2014; F.I.L.M., n.d.).

However, it is important to enhance engagement through interactive dialogue. One approach is the inclusion of scenario-based discussions. These can be used as a platform to consolidate knowledge and interest on a certain topic. It allows participants to relate to a specific scenario in a personal way, and can enable more comprehensive understanding of a complex issue.

The event: 3-step engagement process

Two youth engagement events, titled '*Watch & Talk: Youth Engagement in the Futures of Family*' (organised by Chulalongkorn University and the Ministry of Higher Education, Science, Research and Innovation), were held at the Bangkok Screening Room in Bangkok, Thailand on the 10th December 2018 and 31st March 2019 for young Thais aged between 15 and 24 years old. The events consisted of a 3-step engagement process, comprising: 1) the screening of a documentary on the subject of reproductive technologies; 2) a summary of

technologies presented; and 3) scenario-based group discussions using scenarios inspired by the documentary.

Step 1: Documentary Screening

The documentary *Future Baby* by Maria Arlamovsky (Arlamovsky, 2016) was screened to the audience of participating young people. The film explores various reproductive technologies and how they impact individuals in their quest to build a family. Technologies that appeared or were discussed included in-vitro fertilization, surrogacy, gamete cryopreservation, artificial uterus, sex selection, pre-implantation genetic diagnosis (PGD), designer babies, gamete donation and donor conception.

Step 2: Debrief Session

A final 10-minute debriefing was provided by one of the organisers, summarising the technologies referred to in the documentary in terms of the science behind them as well as the relevant laws in Thailand.

Step 3: Scenario-based Group Discussions

Participants were divided into groups of 6-10. There were 5 groups at each event, which were each assigned one of the following topics: 1) surrogacy; 2) donor conception; or 3) PGD sex selection and designer babies. The groups were given an instruction sheet explaining the scenarios from the documentary and were asked to discuss the given scenario and note the key discussion points on a poster. At the end of the session, groups were asked to present their posters and summarize their discussion to the other participants.

Summary of perspectives

Each discussion group produced and presented its own posters. The pre-planned structure of the posters required the groups to discuss the ELSIs of the scenario as well as to propose ways to regulate the technology. The main themes of the discussion for each scenario are outlined below.

Surrogacy

The groups assigned to explore the surrogacy scenario were asked to discuss a situation in which a wealthy couple were seeking a surrogate to carry a baby to be conceived from the man's sperm and an anonymous egg donor. The intended mother would have no genetic connection to the child. The groups were asked to discuss the ELSIs of this arrangement, and to propose ways Thailand can regulate the technology. Figure 1 shows the posters for these groups.

Discussions on the ELSIs of surrogacy focused on the themes of the definition of a 'mother', the relationships between the surrogate and the child, the child's health, the child's right to know who its parents are, what happens when the child knows the truth and the child's feelings,

concerns for the health of the surrogates, the fairness of the deal between prospective parents and the surrogates, and social acceptance of the procedure.

For the suggestions of how to regulate surrogacy in Thailand, the groups considered the requirements for each party involved in the commercial arrangement of the technology. For couples seeking the use of a surrogate, it was suggested that the couple should be able to medically prove that they are not able to have children, that they should have a marriage certificate, and that the technology should extend towards homosexual couples as well (granted that Thailand passes that law in favour of same-sex marriage). For the surrogate, it was suggested that she should be able to prove that she is physically healthy, that she is emotionally stable and that she has

แรงจูงใจของผู้มีส่วนได้ส่วนเสีย		ประเด็นที่อาจทำให้เกิดความขัดแย้ง	
ฝ่ายที่ 1: ผู้หญิงที่รับจ้างอุ้มบุญ	ผู้แทนฝ่ายอื่น, ลูกสาว, พี่สาวที่มีชีวิตอยู่	- เล็กใจ ความจริง	
ฝ่ายที่ 2: คู่รักที่จ้างการอุ้มบุญ	- ลูกสาวที่มีชีวิต, ลูกสาว, พี่สาวที่มีชีวิตอยู่	- ความยากที่จะไม่อุ้มบุญได้	
ฝ่ายที่ 3: เด็กที่เกิดจากการอุ้มบุญ		- สุขภาพของเด็กไม่สมบูรณ์	
ประเด็นจากการระดมความคิด YELLOW			
แม่	การอุ้มบุญ	(-) ความเสี่ยงของแม่	
- ตั้งครรภ์	(+) คนที่อยากมีลูกได้	แม่ผู้รับบุญ	
- ความรัก	ลูกสาวที่มีชีวิต	การอุ้มบุญเชิงพาณิชย์	
- การเงิน	(-) สุขภาพของคนที่รับ-	(++) ได้ผลประโยชน์ทั้ง 2 ฝ่าย	
LDNA	ผู้รับบุญ	(--) ค่าใช้จ่ายทางการแพทย์ไม่แน่นอน	
	(-) ความรู้เกี่ยวกับเด็กในอนาคต		
กฎระเบียบที่บังคับและขั้นตอนการจัดการเชิงเทคนิคในไทย			
- ทำให้ถูกต้องตามกฎหมาย	ฝ่ายผู้รับบุญ	- จ้างแพงแรง	
- มีส่วนร่วมในการตัดสินใจ	- ภาระทางอารมณ์หนัก	- ความรู้เกี่ยวกับเด็ก	
- มีใบรับรองสุขภาพ	- ค่าใช้จ่ายสูง	- ค่าใช้จ่ายสูง	
- ควบคุมดูแลสุขภาพผู้รับบุญ	- ค่าใช้จ่ายสูง	- ค่าใช้จ่ายสูง	

(a) Event 1

นิยามของคำว่าแม่		มุมมองต่อการอุ้มบุญ (ทางสายเลือดและเชิงพาณิชย์)	
① คนที่มีไข่ที่นำไปบ่มและฝากครรภ์	แม่ผู้รับบุญ	1. ไม่ควรให้เงินตอบแทน	ไม่
② ถ้าจ้างแม่ที่ฝากครรภ์ไว้กับคนอื่น	แม่ผู้รับบุญ	2. ไม่ควรให้เงินตอบแทน	ไม่
ถ้าให้เงินตอบแทน			
ทุกฝ่ายควรมีสิทธิในการตัดสินใจ			
กฎระเบียบที่บังคับและขั้นตอนการจัดการเชิงเทคนิคในไทย			
① นิยามแม่ผู้รับบุญ: แม่ผู้รับบุญ, แม่ผู้รับบุญ, แม่ผู้รับบุญ			
② นิยามแม่ผู้รับบุญ: แม่ผู้รับบุญ, แม่ผู้รับบุญ, แม่ผู้รับบุญ			
③ นิยามแม่ผู้รับบุญ: แม่ผู้รับบุญ, แม่ผู้รับบุญ, แม่ผู้รับบุญ			
④ นิยามแม่ผู้รับบุญ: แม่ผู้รับบุญ, แม่ผู้รับบุญ, แม่ผู้รับบุญ			

(b) Event 2

Figure 1 Surrogacy group poster from events 1 and 2
Source: Kiatpongsan taken in December 2018 and March 2019

had a child before. It was also suggested that there should be an intermediary party, either public or private, to coordinate the arrangement. Furthermore, it was recommended in the groups that there should be an assessment for both parties, in terms of physical and mental health, financial status and age, prior to the arrangement. For some, it was also proposed that there should be a minimum remuneration rate for the surrogate.

Donor Conception

The groups assigned the donor conception scenario were asked to discuss a scenario in which a single woman had chosen to conceive her daughter using an anonymous sperm donor and to raise the child as a single mother. The daughter is now grown up and talks about her struggles in not knowing half of her heritage.

The groups were asked to discuss the ELSIs of this arrangement, and to come up with the ways Thailand can regulate the technology. The posters for these groups can be found in Figures 2-3.

Discussions on the ELSIs of donor conception focused on themes of the child's identity, the child's rights to know its heritage, the rights to anonymity of the donor, whether or not the agreement between the intended parent and the donor should prevail (despite the child), potential conflict between the child and the parent, the child's relationship with its donor, single parenthood, and societal awareness and acceptance of the technology.

For suggestions on how to regulate gamete donation and donor conception in Thailand, the groups discussed the prerequisites of who should be able to receive donation,

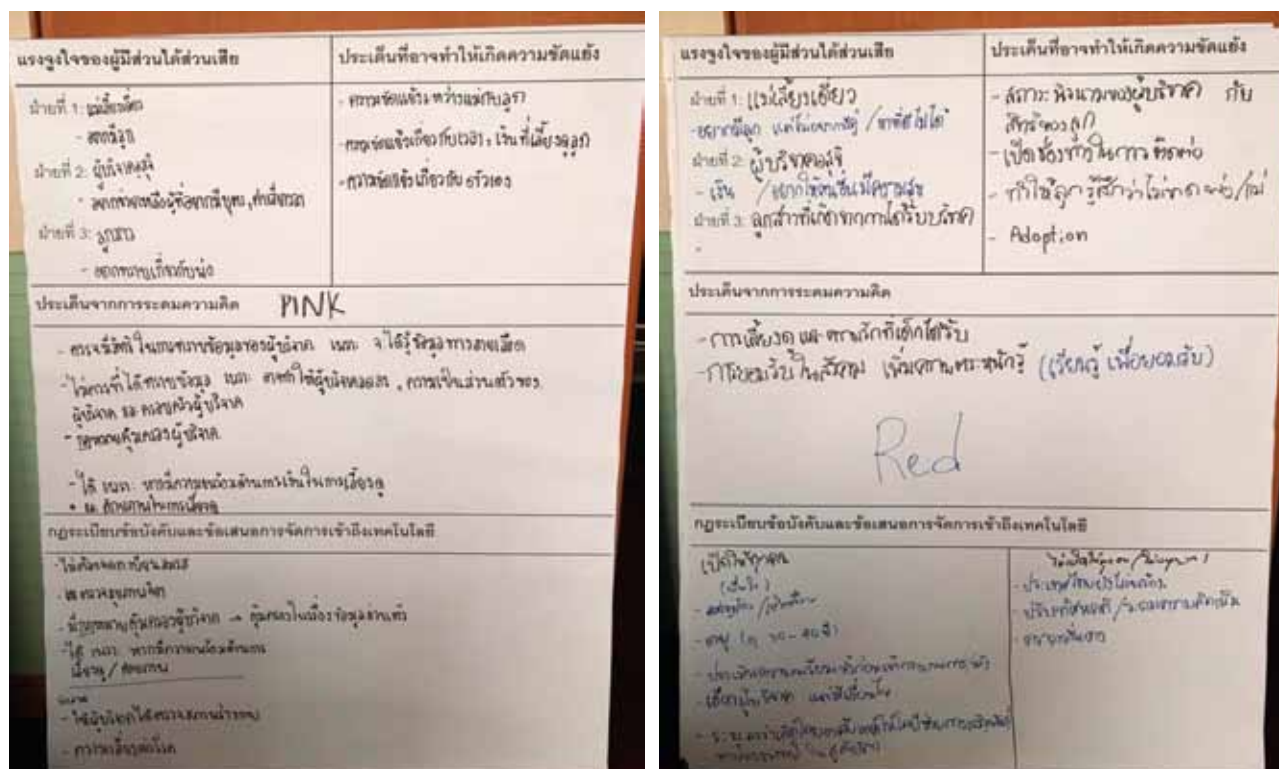


Figure 2 Donor conception group poster from event 1

Source: Kiatpongsan taken in December 2018

for instance the marital status of the intended parents (single individuals, unmarried couples, same-sex couples, etc.), the financial status of the intended parents and their ability to provide a 'loving' home for the resulting child. Similarly, the groups also considered the prerequisites of the donors, such as their physical and mental health, having low risks for genetic diseases, and being in an appropriate age range (especially for female donors). Discussions on the recommendations for the arrangement itself were also prominent in the groups, such as whether the anonymity of the donor should be applicable to all scenarios or should it be subject to the agreement between the intended parents and the donor, whether or not the payment rate should be fixed, and whether there should be an intermediary party to coordinate the arrangement and retain anonymity of the parties.

PGD, Sex Selection and Designer Baby

The groups which were assigned the designer baby scenario were asked to discuss a scenario in which a couple with two daughters decides to undergo IVF for their third child, and wants a boy. However, of the embryos created, only the female ones are deemed healthy by the doctor. The groups were asked to discuss the ELSIs of this technology (and the future of designing babies), and to propose ways Thailand can regulate it. Figures 4 and 5 show the posters for these groups.

Discussions on PGD, sex selection and designer baby focused on the themes of whether or not and what traits parents should be able to select for their unborn child, whether or not the doctor's medical advice should prevail, the rights of the unborn child, the child's feelings in the future, the rights and responsibilities of the parents

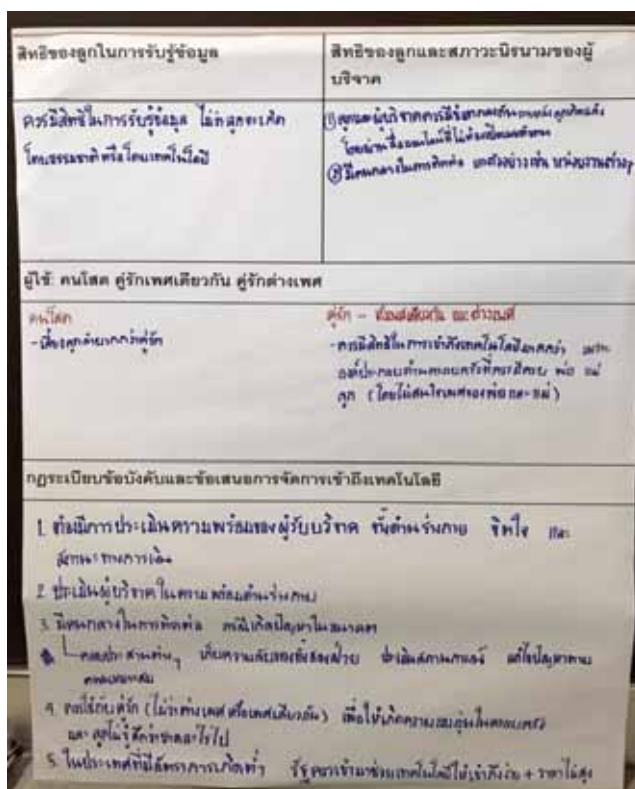
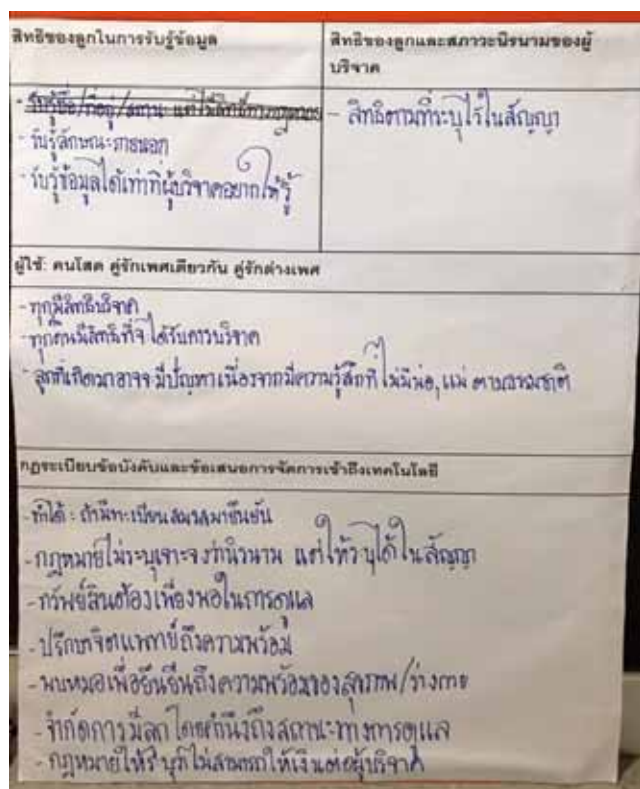


Figure 3 Donor conception group poster from event 2
Source: Kiatpongsan taken in March 2019

in creating a child, implications for diversity in society if designer babies became common, and the issue of inequality brought about by this technology.

For suggestions of how to regulate PGD, sex selection and designer babies in Thailand, there were varying opinions on which, if any, trait selection should be allowed. PGD for identifying healthy embryo was mostly accepted by the groups, while for some, sex selection should only be allowed if it was medically beneficial. For many groups, selection of non-medical traits was rejected. Other recommendations for regulating the technology included identification of who should be able to access the technology, such as that marriage certificates were not required and that it should be available to everybody. It was suggested that intended parents should also be evaluated for their suitability for the technology, including criteria such as age, finance and their emotional capacity to accept the child if they were born not as ‘designed’.

Conclusion

Engaging youth on the topic of reproductive technologies and the futures of family using the 3-step engagement process can be an illuminating process in gaining insights into their perspectives, particularly when the topic itself is novel to them. Within a short amount of time during the event, participants were able to grasp

the fundamentals of these technologies and to engage in discussions concerning the ELSIs as well as to design ways to regulate them. Although, there were no consensus, the discussions were complex and youth were able to express concerns not only from the individual point of view, but also concerns from the governmental and societal levels too. Certainly, beyond the engagement process itself, it is valuable- indeed, vital- to include young people and their perspectives in policy dialogue as new technologies become available and accessible. Their voices matter and they should be able to contribute to their futures, particularly ones that concern ‘family’.

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References and Bibliography

- Arlamovsky, M. (Director). (2016). *Future Baby*. [Motion Picture]. Austria: Nikolaus Geyrhalter Filmproduktion GmbH.
- Dahlstrom, M. F. (2014). Using narratives and storytelling to communicate science with nonexpert audiences. *Proceedings of the National Academy of Sciences*, 111(Supplement 4), 13614-13620.
- European Society of Human Reproduction and Embryology. (2018). *More than 8 million babies born from IVF since the world's first in 1978: European IVF pregnancy rates now steady at around 36 percent, according to ESHRE monitoring*. Retrieved August 30, 2019, from www.sciencedaily.com/releases/2018/07/180703084127.htm
- F.I.L.M. (n.d.). *Teaching with movies: A guide for parents and educators*. Retrieved August 30, 2019, from <http://www.heartlandfilm.org/wp-content/uploads/TeachingwithMoviesguide.pdf>
- Steptoe, P. C., & Edwards, R. G. (1978). Birth after the reimplantation of a human embryo. *Lancet*, 2(8085), 366. doi:10.1016/S0140-6736(78)92957-4

Stakeholder Communication in the Research Process and Evaluation of Social and Community Innovation Project Using the CIPP Model

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Research and dimensions of communication

Research and academic development for society are crucial to a country's development. In 1959, Field Marshal Sarit Thanarat, the ruling military regime at the time, proposed that *"in order for the city to develop rapidly and entirely, it is necessary to expedite development in all its aspects. Especially in a developing country such as Thailand, research in social sciences that provides an insight into beliefs, traditions and ideology are crucial. This can be seen as a foundation for policy development and as way to enhance the value of scientific research in the future."* (National Research Council of Thailand, n.d.).

Effective communication between communities and researchers is crucial to the success of research in driving community and social development, by facilitating adoption of newly generated knowledge within the community. Research communication can be categorized into two types: data collection and implementation. The data collection aims to collect specific data from the communities, while implementation focuses on carrying out a project to evaluate whether the research has potential to make a change in the society.

Chula Unisearch carried out a research project entitled *"Evaluating Research Outcomes of National Research in the 2018 Fiscal Year: Innovation for Society*

and Community," led by Assoc. Prof. Suthima Jamnarnwej, Ph.D. This research aimed to evaluate methodologies, outcomes and impact of social sciences research in order to inform budget allocation and future research strategy. The study analyzed 214 research projects funded by the government from 2008 to 2017 registered in the National Research Management System (NRMS) database.

The research process began by accessing secondary data from final project reports available on the NRMS database. The final reports were then evaluated by experts using survey and questionnaire completed by the researchers responsible for the projects, group discussion and in-depth interviews. Participants included researchers, funding bodies and research users, with a total of 131 projects assessed.

Evaluation Model

The CIPP Model (Stufflebeam, 1983), especially the CIPPIEST checklist (Stufflebeam, 2007), was used in this study. The CIPPIEST checklist comprises eight components of evaluation: context (C), input (I), process (P), product (P), impact (I), effectiveness (E), sustainability (S), and transportability (T). The process aimed at community development through communication, monitoring and implementation of the projects by the respective stakeholders, including funding bodies, research units such as universities, public sector bodies and private sector actors (Figure 1).

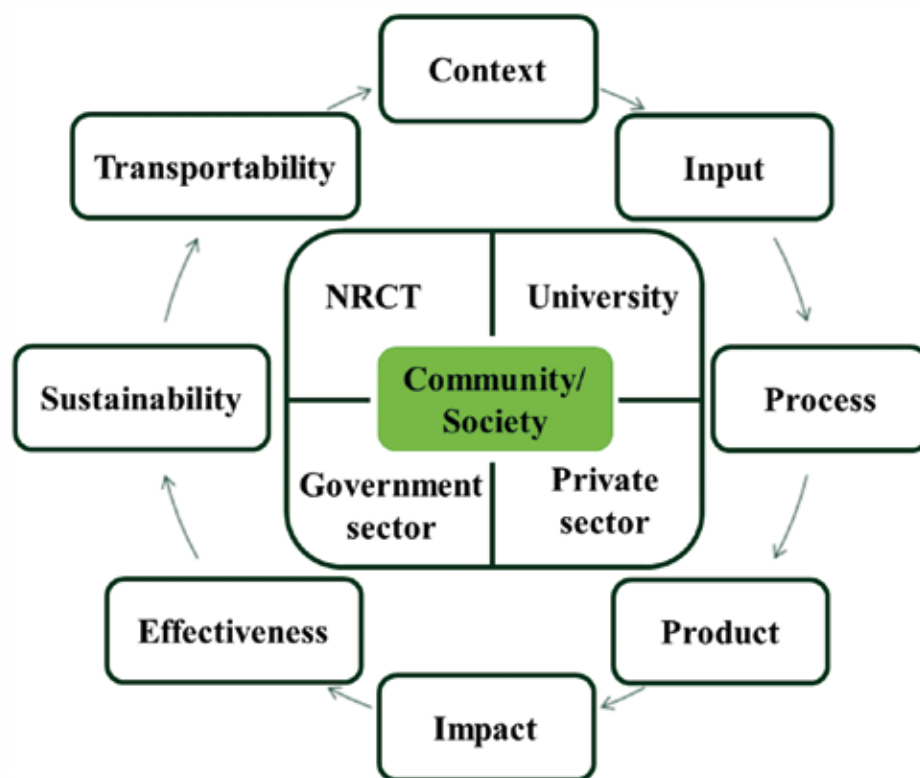


Figure 1 CIPPIEST Evaluation Model
Source: Suanpong et al., designed in July 2019

The Crucial Starting Point of the CIPP Model: Context Communication

Using the CIPP Model for research evaluation began with evaluating environmental context in terms of problems related to the setting, social surroundings and community demands in relation to the expected benefits from the research projects. This was in relation to the agencies responsible for the research projects, their policies and strategies and selection criteria from funding bodies in order to evaluate whether the research projects had utilised the strengths of the communities, resources and social surrounding to improve their research projects. These tools enabled evaluation of the research and also served as effective research communication tools (Boonchutima & Pinyopornpanich, 2013).

In order for the study to reflect actual problems while minimizing interference from the researcher's bias, participatory action research (PAR) was used (Torre et al., 2015; Bun-Long, 2019). Local stakeholders

were included as an integral part of the research in order to gain a deeper understanding of the problems and to contribute to problem-solving through dialogue.

The CIPP Model was used as a tool for communication research (Boonchutima & Pinyopornpanich, 2013) to ensure clear and effective communication between the research team and stakeholders (Funnell & Rogers, 2011). Variables or measures for the success of each step were clearly articulated, facilitating communication among researchers, direct target groups, stakeholders and donors. In addition, it also assisted with collaboration among participants, especially during collaborative learning as a key research communication tool (Boonchutima & Pinyopornpanich, 2013) to catalyse and facilitate cooperation between diverse communities (e.g. between NGOs from Israel and Palestine (Kahanoff et al., 2007)).

Design thinking was used in order to gain insights into underlying problems and needs at community level. Analysis of customer data and enabled creation of

innovative solutions to these problems and needs (Brown & Wyatt, 2010). The technique was successful because it provided a deeper understanding of the context of the community as well as a structured approach to allow diverse voices to be heard. This is akin to the use of empathy in order to reach the heart of the problem (Chou, 2018).

Effective communication with the community allowed researchers to understand the community's strengths in the development process, and enhanced the value of the knowledge generated. Successful projects included the design and fabrication of a continuous sugarcane polishing machine for sugarcane juice extraction, the design and development of a community-level multipurpose briquette machine and a local temple database in Phitsanulok Province.

CIPP Model in the research process

Context Evaluation (C) enables researchers to assess and understand the social linkages within the local community to carry out the research projects appropriately, starting with project inputs.

Input Evaluation (I) evaluated key methodological inputs including appropriate and sufficient literature review, sampling criteria, technology, tools, materials, equipment, the number of research staff and the research duration. The majority of the projects in this group aimed to develop, promote and design activities, processes and quality of life management or knowledge management for local wisdom. Examples of the projects included a knowledge management project to bring tertiary education to society and the development of a generator and wind turbine for community-level microgeneration. These projects were implemented by surveying users' needs, conducting empirical experiments and user testing, modifying the product to better suit needs and sharing and transferring research knowledge with the community in order for them to take ownership of the knowledge and be able to create and maintain their own generators.

Process Evaluation (P) evaluated participation of the community throughout the studies. Projects that

relied heavily on participation and exchanging of ideas (Najimi et al., 2013) included participatory action research on Thai long drums in central Thailand and participatory action research on knowledge and learning development for farmers: changing to organic farming.

Product Evaluation (P) evaluated results from preliminary research covering the body of knowledge on relevant policies, strategies, systems, databases, standards, technologies, new inventions, innovations and tools. Benefits were evaluated according to how they meet real needs and demands; this process was straightforward for product evaluation. Indicators were clearly defined, e.g. reduced costs or increased performance. Projects included development of new merchandise made from mulberry leaf by a silk farming community in Sado Phong, Khao Kho District, Phetchabun Province, Thailand, a local vegetable project (case study of direct use value and self-sufficiency from Mae Faek Sub-district, San Sai District, Chiang Mai Province) and a biogas production project from Asian palmyra palm using a swirl burner for community use.

Impact Evaluation (I) assessed the influence and impact of the project on communities and society in order to determine future directions or guidelines to solve problems identified and enhance competitiveness. Examples of projects in this category include development of skills in using computer-aided construction design programmes for construction in the Petchabun Local Administration, development of hybrid solar and electric water pumping for local farming, guidelines for managing designated areas in preparation for earthquakes in Chiang Rai Province, production of Thai handicrafts for sustainable community development (a case study in Chiang Mai Province) and the development of a prototype to transform organic waste into bio-diesel in Bang Nang Li subdistrict, Samut Songkhram Province.

Effectiveness Evaluation (E) assessed the success level of the research project in terms of achieving its stated objectives, measuring benefits, quality, implementations in the community, society and organization at a level that was higher than other projects of the same type.

Sustainability Evaluation (S) assessed the ability to transfer knowledge and technology to the community in order for them to be independent and rely as little as possible from external agencies for resources, support or leadership. The projects included development of a waste sorting process in Bang Nang Li Subdistrict, Amphawa District, Samut Songkhram Province and fabrication of a community-level semi-automatic small herbal soap production machine.

Transportability Evaluation (T) evaluated project acceptance, uptake and adaptability of to other communities. Passing on the body of knowledge to new communities or transportability is considered as a technology transfer from the researchers (transfer agent) to the stakeholder community. The stakeholder community then passes on the body of knowledge (as a sender) via a transmitter to the receiver, or a transfer recipient, who utilises the transferred body of knowledge to benefit their own respective community (Bozeman, 2000).

CIPP Model: the case studies

This case study is taken from an in-depth research regarding a packaging design project that reflects the local cultural identity of Amphawa Floating Market: “*Setting is identity: packaging design that reflects cultural identity of Amphawa Floating Market*” (Kampananon, 2016). The research was in accordance with the context (C) within the National Tourism Strategy of Thailand 2015-2017, focusing on an approach to boost the country’s unique cultural identity for tourists visiting for cultural purposes. The research also leveraged Amphawa’s rich history as its core strength. However, the local community at the time faced problems in waste management, particularly from foam and plastic packaging. The researcher and packaging design students (input) were involved in the research process. Their first steps were to understand the local context, identify and design alternative local packaging materials (process), involve the community to raise awareness about plastic problems and encourage them to change their packaging design



Figure 2 The set of 3 common design
Source: Kampananon (2016)



Figure 3 Food containers for ready-to-eat meals in Amphawa Floating Market
Source: Kampananon (2016)

into something that highlights the uniqueness of their local community. The process aimed to simultaneously increasing competitiveness and address the plastic waste problem. The researchers also worked with local authorities to design prototypes by sharing knowledge about communication art and design as well as packaging design. This resulted in a shared common graphic that represents Amphawa Floating Market (Figure 2) and packaging that to be used within the market (product). There were a few different products: packaging for ready-to-eat freshly cooked food to consume on the spot (a bowl-like package made from banana leaf held together at its four corners with small bamboo pins, a bowl-like package with two corners strengthened with coconut leaf (Figure 3) and a packaging design for desserts and souvenirs for SMEs participating in the Amphawa Chaipattananurak project (Figure 4). Impacts arising from unique identity communication allowed Amphawa Floating Market to be recognized by tourists as a unique place with distinct cultural identity, boosting tourism and reducing environmental problems that may ruin the community image. The community received positive feedback and their merchandises were perceived as having high quality and worth the price. Moreover, the products had their own unique stories, differentiating them from

similar products produced elsewhere. It also contributed to sustainability by adding value to local materials and resources to generate income as well as increased economic stability from tourism. This research also found that entrepreneurs who produced and sold their products via the Amphawa Chaipattananurak project tended to continue using the prototype packaging design such as Khanom Ja Mongkut King Rama II, palm sugar “Tao Tarn”, sea salt “Nai To” and “Hai Nam Lo” Chinese styled hat.

Research communication after project completion

The final stage of research evaluation is transportability which occurs following project completion. Transportability is part of the research evaluation in the CIPP Model (Stufflebeam, 1983). More subcriteria were added to the original CIPP Model (Stufflebeam, 1983) and the most important checklist was CIPPIEST (Stufflebeam, 2007). Transportability or “T” marks the end of the research evaluation and emphasises the importance of knowledge transfer to generate new ideas to effectively solve problems. Information diffusion is part of the communication model from senders to receivers (diffusion), focusing on acquiring lead users or beachheads than who may be



(a) Palm sugar products “Tao Tarn” from the Amphawa Chaipattananurak project

(b) Souvenirs

Figure 4 Packaging design for desserts and souvenirs for entrepreneurs and community enterprises

Source: Kampananon (2016)

receivers of the communication or those who are proactively solving the problems. These people may possess social capital or are otherwise key influencers, able to relay the communication to a wider community. Transportability focusing on the sharing of knowledge and its wider applicability beyond the original target groups.

In addition, if research communication is carried from project start, it will take into account stakeholders’ viewpoints which is a factor generating shared commitment from the outset. These projects include removing silk gum (sericin) at a community level, development of an assay for White Spot Syndrome Virus (WSSV), a study of speed reduction on highways in border areas between local communities, and the development of learning resources and activities to promote the self-sufficiency economy with participation from local youth and farmers in Ko Pho Subdistrict, Bang Phli District, Nakhon Nayok Province.

Communication and its benefits in increasing research value

Communication is a mutual exchange between recipients and senders. An open exchange is crucial for benefits to be realized and value created, particularly when there is a wide gap in literacy or understanding between researchers and their target communities. In such circumstances, success in adding value to research will depend on the ability of researchers to transport this knowledge effectively to communities. The body of knowledge must be generated from a deep understanding of the local context without over-interpretation, before being communicated to the researchers.

Therefore, this project employed the CIPP model and the CIPP-IEST model for the research evaluation to emphasise of the importance of research communication to generate new and effective ideas for problem solving. The impacts created are also sustainable and widely distributed.

To be effective, research communication should be initiated in parallel with the research project. If it is carried out from project start, it will involve stakeholders' own ideas and opinions, contributing to stakeholder understanding as well as strengthening the collaboration to endure adoption and upscaling of innovation beyond project closure.

Acknowledgments

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References and Bibliography

- Boonchutima, S., & Pinyopornpanich, B. (2013). Evaluation of public health communication performance by stufflebeam' s CIPP model: A case study of Thailand' s department of disease control. *Journal of Business and Behavioral Sciences*, 25(1), 36-53.
- Bozeman, B. (2000). Technology transfer and public policy: A review of research and theory. *Research Policy*, 29(4-5), 627-655. doi:10.1016/S0048-7333(99)00093-1
- Brown, T., & Wyatt, J. (2010). *Design Thinking for Social Innovation*. Retrieved September 29, 2019, from https://ssir.org/articles/entry/design_thinking_for_social_innovation
- Bun-Long, P. (2019). *Prof. Dr. Piyawat Bun-Long: the Pioneer of Local Research*. Retrieved September 25, 2019, from <https://engagement.mahidol.ac.th/2019/05/24/localresearch/>
- Chou, D. C. (2018). Applying design thinking method to social entrepreneurship project. *Computer Standards and Interfaces*, 55, 1339-1351. doi.org/10.1016/j.csi.2017.05.001
- Funnell, S. C., & Rogers, P. J. (2011). *Purposeful program theory : effective use of theories of change and logic models*. San Francisco, CA. : Jossey-Bass.
- Kahanoff, M., Salem, W., Nasrallah, R., & Neumann, Y. (2007). *The Evaluation of cooperation between Palestinian and Israeli NGOs: an assessment*. Retrieved September 25, 2019, from <https://pdfs.semanticscholar.org/fca2/0fb06044d90c59cff33bc969fe2caf824e1a.pdf>
- Kampananon, K. (2016). *Packaging Design to Reflect Unique Cultural Identity of the Local Community: Amphawa Floating Market*. Nakhon Pathom: Silpakorn University.
- Najimi, A., Shams, B., & Golshiri, P. (2013). The evaluation of Mothers' participation project in children's growth and development process: Using the CIPP evaluation model. *Journal of Education and Health Promotion*, 2(1), 21. doi.org/10.4103/2277-9531.112692
- National Research Office. (n.d.). *History of the National Research Office*. Retrieved October 7, 2019, from <https://www.nrct.go.th/รู้จัก-วช/เกี่ยวกับองค์กร/ประวัติความเป็นมา>
- Stufflebeam, D. L. (1983). The CIPP Model for Program Evaluation. In G. F. Madaus, M. S. Scriven, & D. L. Stufflebeam (Eds.), *Evaluation Models: Viewpoints on Educational and Human Services Evaluation* (pp. 117-141). Dordrecht, Netherlands: Kluwer Academic Publishers. doi:10.1007/978-94-009-6669-7_7
- Stufflebeam, D. L. (2007). *CIPP EVALUATION MODEL CHECKLIST [Second Edition] A tool for applying the CIPP Model to assess long-term enterprises Intended for use by evaluators and evaluation clients/stakeholders*. Retrieved September 25, 2019, from https://wmich.edu/sites/default/files/attachments/u350/2014/cippchecklist_mar07.pdf
- Torre, M. E., Cahill, C., & Fox, M. (2015). Participatory Action Research in Social Research. *International Encyclopedia of the Social & Behavioral Sciences: Second Edition*, 17, 540-544. doi:10.1016/B978-0-08-097086-8.10554-9



Public Participation and Environmental Problems Monitoring in Chachoengsao Province

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Introduction

Chachoengsao is one of the provinces located in the eastern part of Thailand. Due to its strategic location, there are new pollution sources as a result of recent developmental works in the area. The community and industrial sectors are expanding. There are planned development works and area development projects in collaboration with the Department of Industrial Works in the Eco Industrial Development Project. In accordance with the cabinet resolution on 31 March 2013, the project led to plan and activities to support the transition of the city into an eco industrial town. The city is being developed in accordance with an Eastern Economic Corridor (EEC) strategic development plan as part of the Eastern Special Development Zone Act B.E. 2561, announced on May 10, 2018. The act was enforced in order to develop the Eastern region systematically and in line with sustainable development principles. The act also aims to promote the commerce and industries that use advanced and modern technology or those that create innovation and operate under environmentally friendly conditions.

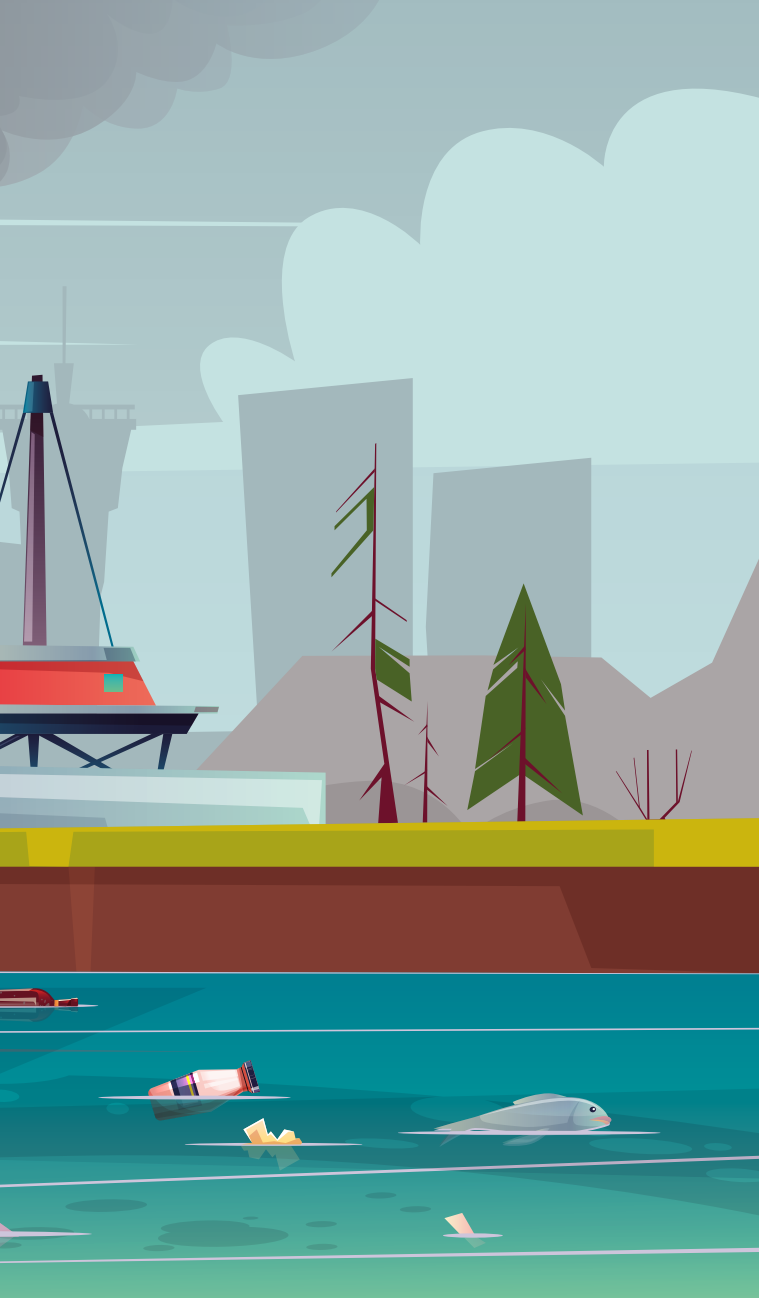
Chachoengsao Provincial Office of Natural Resources and Environment has realized that potential adverse environmental problems may occur in the future and, therefore, established integrated guidelines to monitor pollution sources and prepare for possible disasters. The guidelines followed Strategy 1 of the Chachoengsao's Strategic Plan is to increase the competitiveness of Chachoengsao's industrial and business sectors, enhance economic growth and ensure harmonious coexistence with the community. The strategies include monitoring, auditing, analysing and logging pollution sources as well as creating guidelines to prevent or resolve problems and strengthen public networks in terms of understanding and being cautious about the pollution sources in order to prepare for disasters. The rational behind this is for the city's environment to remain at an appropriate level.



Rationale

Promoting and preserving the quality of the environment is an important process to ensure its conservation. Public participation is a key driving force to ensure sustainable environmental preservation (Ministry of Natural Resources and Environment, 2015). Many countries focus on public participation as key for the development of their countries. Thailand has also established a process to engage and hear from the public. Each development dimension occurring in Thailand must involve public participation of the Thai people from all sectors. This was stated as a basic right in Section 58 of the Constitution of the Kingdom of Thailand B.E. 2560 and in the Environmental Quality Act B.E. 2535.

In order to ensure the monitoring of environmental quality through the process of public participation, it is necessary for people to be involved from early stages such as receiving information, news and updates on environmental situations, sources of problems as well as initial assessment for early stage problems. This stage is to create and share knowledge and understanding with the public, to create awareness regarding environmental problems in the areas and ignite the environmental conscience of the people. This is in line with the objectives of Thailand 4.0 development plan and the Sustainable Development Goals (SDGs).



Water quality monitoring workshop for the public

The researchers organised a workshop for the public network in the target area aiming to promote the participation of the public sector in water quality monitoring. The workshop included brainstorming and analyzing water quality problems in the area together. The results of water quality analysis from the workshop will be used to assess and determine the situation of the water pollution in the 11 districts that are at risk. The learning process included the initial assessment of water quality such as acidity (pH), dissolved oxygen (DO) and ammonia content (NH_3) by using water quality test kits so that the people were involved in the assessment and analysis of the pollution risk in the area.

The workshop also included water quality monitoring in the designated area and disseminating water quality monitoring results through the Water Quality Report program in Chachoengsao province via the war room's website.

The results from the water quality monitoring workshop for the public network

The workshop was held at Nilkan conference room, Grand Royal Plaza Hotel, Chachoengsao Province on 29th January 2018. There were 128 participants from all 11 districts of Chachoengsao province. There were three main activities in this workshop: 1) sample collection and initial analysis of water quality using test kits; 2) training on using the water quality reporting program in Chachoengsao province and 3) brainstorming ideas for identifying additional quality assessing points from a total of 38 additional collection places.

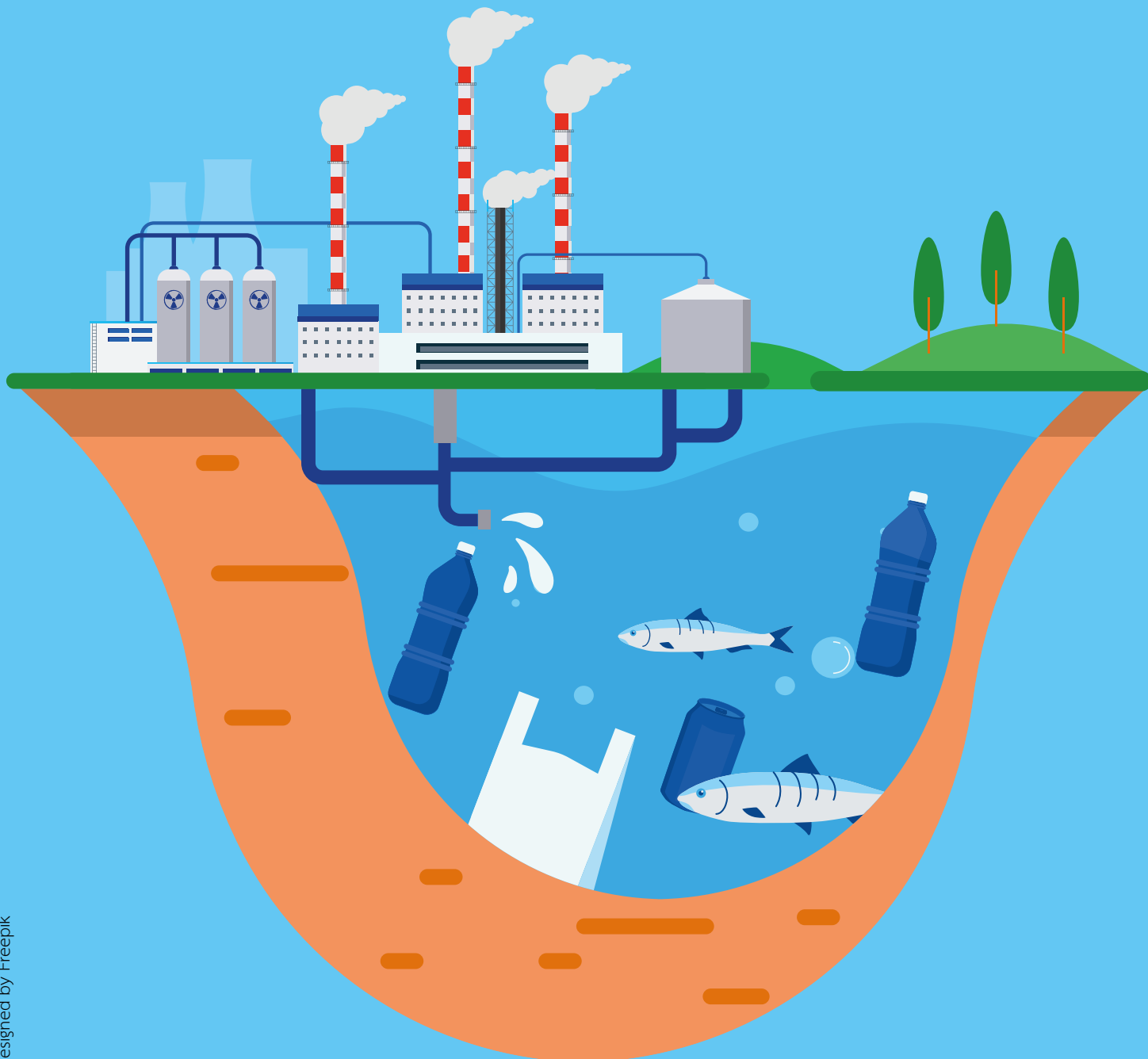
1) Water sampling and initial water quality analysis practice training

The water samples were collected using a grab sampling method at the center of the width and depth of the river as a one-time sampling at one sampling point. The samples were analyzed for water quality. The analysis results spoke for the water quality of collecting spot at that time only. The preliminary analysis of water quality analysis can be summarized as follows:

1.1) Positive potential of the hydrogen ions (pH)

pH or positive potential of the hydrogen ions is a value that represents the concentration of hydrogen ions (H^+), which represents the acid-alkalinity of the substance. The pH is the logarithm of the concentration of the hydrogen ions. pH values range from 1 to 14, with 1 to 6 showing the acidity of matter, 8 to 14 showing the alkalinity of the substance and 7 shows that the substance is neutral at 25°C.

The pH value shows the amount or concentration of hydrogen or hydronium ion (H^+ or H_3O^+), where water sources with a pH of 7 are neutral



and thus suitable for the life of most organisms. In general, fish can survive in water sources when the water has a pH between 5 and 9. Fish will die when the water has a pH less than 4 and water with pH value higher than 11 is harmful to fish.

Water emitted from industrial plants tend to have a pH lower than 7, which means that the water is acidic. The acidity level soars the lower the pH value and the water will have a higher erosion effect.

The quality standard of the surface water in Bang Pakong River and the branch canal in Chachoengsao province must have a pH range between 5 to 9.

1.2) Dissolved Oxygen (DO)

Dissolved Oxygen (DO) is the amount of oxygen dissolved in water indicating the quality of the water. DO indicates whether the water is suitable for living organisms or not. Fish can breathe when there is some oxygen dissolved in the water. The amount of

oxygen in water comes from 2 sources: 1) dissolving from the water surface which depends on the size of the water source and wind power and 2) photosynthesis of phytoplankton and aquatic plants.

Clean water has a high DO value, indicating that the water source has a high dissolved oxygen content. Living organisms in the water bodies are able to sustain life and grow well. On the other hand, water sources with pollutions will have a low DO value or a DO value of 0 indicating a very low amount or no oxygen. This will affect the living organisms in that water sources. Dead fish is often seen floating on the surface of water with low or zero DO.

Water quality standards for surface water in Bang Pakong River and canal branches in Chachoengsao province area states that the DO value of the water sources must not be less than 4.0 ppm or not be less than 4.0 mg/L.

1.3) The amount of ammonia (NH_3)

Ammonia is a nitrogen compound that is highly important for the life of aquatic animals. There are three forms for nitrogen compound: ammonia (NH_3), nitrite (NO_2^-) and nitrate (NO_3^-). All three compounds can transform through various processes. NH_3 is a unionized form and does not dissolve which makes it toxic for aquatic animals. It is easily osmosis through

cell membranes of aquatic animals. The amount of ammonia is related to the pH of the water. If the water source has high acidity, the ammonia content in the form of NH_3 will also be high. Moreover, an increased amount of ammonia results in a decreased amount of DO. Naturally, ammonia is a biproduct of the organic matter decomposition and the excretion of waste from the fish. Water quality standards for surface water in Bang Pakong River and canal branches in Chachoengsao province area states that the ammonia value of the water sources must not be more than 0.5 ppm or not be less than 0.5 mg/L.

2) Training on using the water quality reporting program in Chachoengsao Province

The training on using the water quality reporting program in Chachoengsao Province consists of the display of water quality monitoring results and the importing of water quality monitoring data from the local members of the public themselves. The program can be access via the Internet from laptops or smartphones by clicking on a banner (Figure 1) available on the website of Chachoengsao Provincial Office.

The reporting program will show the water quality data and the three parameters of the physical characteristics of the water sources that were imported and recorded by the member of the public. The parameters



Figure 1 The banner of the water quality reporting program
Source: Chula Unisearch (2018)

included pH, DO and the amount of ammonia. The analysis of the results followed the water quality reference standard announced in the Notification of The National Environmental Board No.8 (B.E. 2537) which was in accordance with the Notification of The National Environmental Board No.5 (B.E. 2535). Both announcements regarding the quality of the surface water 1 (the Notification of The National Environmental Board No.8 (B.E. 2537)) referred to the quality of the water by using three different colours: green, red and yellow. The green colour indicated that the quality of the water meets the standard in all three parameters, the red colour suggests that one out of three parameters does not meet the standard and the yellow colour shows that there was no water quality assessment at that particular monitoring spot (Figure 2).

3) Brainstorming to identify monitoring and water quality assessing points

The brainstorming on the identification of water quality monitoring and assessing points were conducted with all the participants. This activity aimed to identify additional monitoring spots across the province. There were a total of 38 additional spots identified in different districts: 5 in Mueang Chachoengsao: 3 in Plaeng Yao, 3 in Khlong Khuean, 3 in Bang Khla, 3 in Bang Nam Priao, 3 in Bang Pakong, 3 in Ban Pho, 3 in Phanom Sarakham, 3 in Ratchasan, 4 in Tha Takiap, and 3 in Sanam Chai Khet District.

Conclusion and recommendations

Public participation for environmental monitoring in Chachoengsao through workshops for the public sector

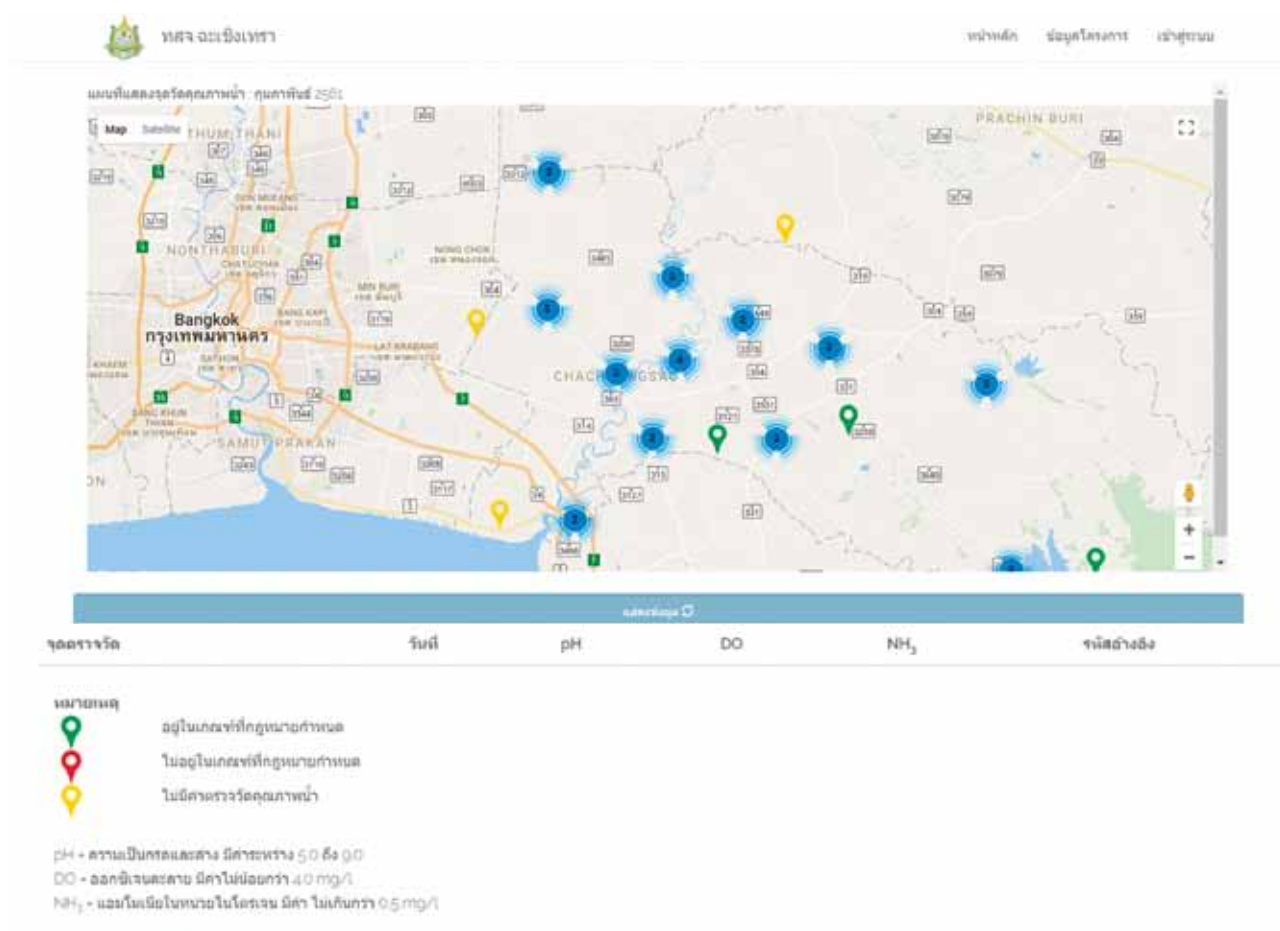
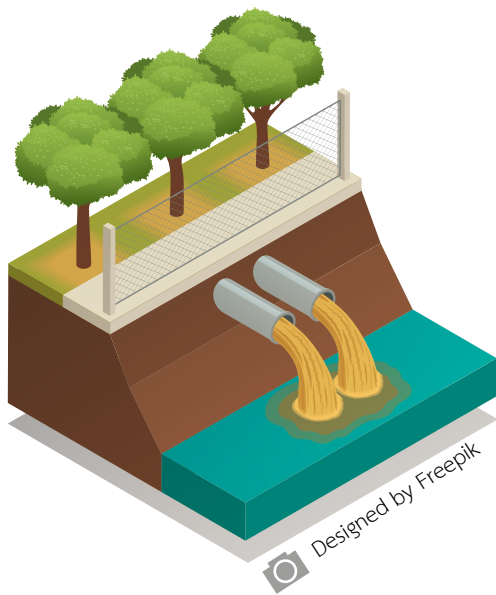


Figure 2 Interface of the water quality reporting program

Source: Chula Unisearch (2018)



network on water quality monitoring should be held on a regular basis in order to prevent environmental problems that may arise from future development. The overall guidelines and measures for preparing, preventing and solving water pollution problems in Chachoengsao Province points towards the revision of the zoning law. Permission to operate industrial factories with high pollution must be granted to factories located in industrial estates, industrial zones or designated areas. This included the drainage of wastewater from establishments

in the waterfront area. The permission must take into account the potential of the area, the carrying capacity of the water source as well as the increasing efficiency of monitoring and enforcement of laws for the control of sewerage.

The participation of communities and NGOs to increase knowledge and understanding leads to an awareness of the importance of wastewater management from various types of sources. It also promotes the implementation of Reduce, Reuse and Recycle (3Rs) by reducing wastewater at the source or recycling wastewater. This also included public relations campaigns to raise awareness and participation in the conservation of water sources and rivers to ensure clean water for the community as well as raising the public awareness on not littering waste or food waste and not releasing wastewater into rivers and canals (Chula Unisearch , 2018)

Acknowledgements

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References

- Chula Unisearch. (2018). *Pollution Sources Monitoring and Preparing for Disasters Caused by Pollution Pollution*. Full Report. Bangkok: Chulalongkorn University.
- Department of Environmental Quality Promotion. (2016). *Handbook for selection of the Committee of the NHRC Network in Accordance with the Regulations of the Ministry of Natural Resources and Environment on Volunteer for Protecting Natural Resources and Village Environment B.E. 2558*. Retrieved 19 September 2017 from http://www.deqp.go.th/media/37226/c-m-cok-do-dok-board Credit-Khai-Khai-Sor_web.pdf
- Notification of the National Environment Board No. 8. (1994). issued under the National Environmental Quality Promotion and Conservation Act 1992 regarding the determination of water quality standards in surface water sources. (1994, 24 February). *Government Gazette*, 111(Section 16 D), 73-81.

Innovation in Arts and Culture

Associate Professor Yoothana Chuppunnarat, Ph.D.

Associate Professor Yoothana Chuppunnarat, Ph.D. has discussed his unique view concerning a form of cultural research which uses Thailand's cultural capital to create *"Creative Work"* as an effort to weather changes on a global scale and to drive the country towards *"Thailand 4.0"*.

The importance of art and culture in a changing world

"...In this globalized world, it is important for Thai people to understand cultural diversity in order to live in harmony..."

Universities in Thailand have agreed on four common missions: 1) to provide educational services, 2) to research and develop knowledge, 3) to provide academic services, and 4) to maintain and promote Thailand's culture, religion, morality and local wisdom. The fourth mission that aims to preserve the country's art and culture allows each university to take advantage of its location and use the cultural diversity of its location as unique cultural capital. To fulfill the mission, universities must maintain, conserve, inherit and develop this art and culture in a series of interwoven steps to success.

In this globalized world, intercultural learning is highly encouraged. Similarities and diversities of cultural identity are being shared via learning management, research processes and dynamic cultural activities. It is crucial for Thai people to understand this diversity and learn to live in harmony. Therefore, higher education institutions should act and dramatically adapt themselves to the changes as well as providing support and promoting understanding around cultural ecology, and successfully passing on the balanced diversity.



Creating “Value” and “Worth” for arts and cultural innovation as a driving force for Thailand 4.0

“...Creating or promoting the identity of cultural research and social innovation based on arts and culture need to take into account the balance between the preservation of ‘Value’ and promotion of cultural ‘Worth’...”

The balance between maintaining “value” and creating cultural “worth” must be considered when employing arts and culture in creating or developing research and social innovation to promote Thailand 4.0. In 2019, Chulalongkorn University gathered researchers in social and humanities disciplines and established a cultural research cluster entitled “*Innovation in Arts and Culture (IAC)*”. The IAC Cluster brings together researchers from multiple disciplines including art, music, dance and theatre studies, and facilitates brainstorming discussions among its members. Research studies carried out by IAC focus on blended cultural research that aims to both preserve “value” and create cultural “worth”. The research must be well-balanced in both aspects and possess the potential to be consumed

within the country as well as having broader global relevance. The research was designed to generate outputs, outcomes and impacts in accordance with Thailand’s strategies and missions under the mandate given to the universities. The results help create or drive research innovation. Innovation projects initiated by the IAC Cluster are as follows:

1) *The Innovation of Soap for Promotion of Thailand’s Cultural Industry 4.0 Project*. This project initiative generates value from Thailand’s cultural capital by creating films or soap operas based on Thailand’s cultural context, in order to attract audiences from all walks of life. Film and TV productions also form part of the responses to the Government’s Thailand 4.0 policy. The project is led by Professor Sunait Chutintaranond, Ph.D.



2) *The Cultural Ecologies of Performance: Creativity, Research and Innovation Project*. This project aims to use performance as a tool to change outlooks or form new perspectives or solutions to certain problems which can promote sustainable development. It combines daily ways of life with local cultural ecologies to achieve sustainable changes in local communities by using performance as a tool to trigger change. This project is led by Professor Pornrat Damrhung.

3) *The Arts Education and Innovation Project*. This project works on an innovation of the learning and assessment curriculum using creative tools such as arts, music and traditional Thai dance to produce “*Creative Works*”. Creative works are defined as any form of art or creation that are innovative and well-researched; they may be experimental or even derived from existing creative works. Creative works are seen as prototypes or as works with the potential to pioneer new aesthetic values or benefits that will improve quality of life. This project focuses on innovative research to generate new bodies of knowledge or innovative tools to develop human well-being following the philosophy of the arts, music and Thai dance. It is led by Associate Professor Yoothana Chuppunnarat, Ph.D.

After almost a year of promoting “*Creative Works*”, the IAC Cluster strongly believes that these projects have the potential to enhance Chulalongkorn University’s ranking under the Quality System (QS) assessment for university ranking. As well as assessing the university’s accomplishments in education and research, the QS

ranking also takes into account the University’s global standing and reputation. The IAC contributes to this by holding international conferences, delivering presentations at both national and international conferences, negotiating and collaborating in innovative research with outer agencies and/or agreeing and signing MOUs between universities to develop collaboration in new arts and cultural curricula. These activities carried out by the IAC have generated dynamic flows in creative research.

Moreover, the IAC Cluster also used its research results to benefit the University’s QS ranking assessment by reviewing societal outcomes as sources of research idea generation and implementation. The outcomes were then used to reverse-engineer and create and/or improve the existing creative works resulting in even more creative outcomes. This process also contributes to the university’s stock of intellectual property, including patents and petty patents as well as manuscripts published in highly respected journals; all these contributed to the University’s global ranking under both QS and THE assessment systems. However, this process requires researchers to adapt to perspectives that may be unfamiliar to them.

The IAC Cluster is working in collaboration with the Office of Academic Resources, Chulalongkorn University to employ the Chulalongkorn University Intellectual Repository (CUIR) as an online platform and a digital database for academic resources regarding arts and cultural research as well as creative works from faculty members, researchers and students. The database of CUIR is now operational and can be accessed by visitors



from Thailand and other countries. This collaboration has sparked interest among visitors and indicates that Chulalongkorn University is renewing its emphasis on

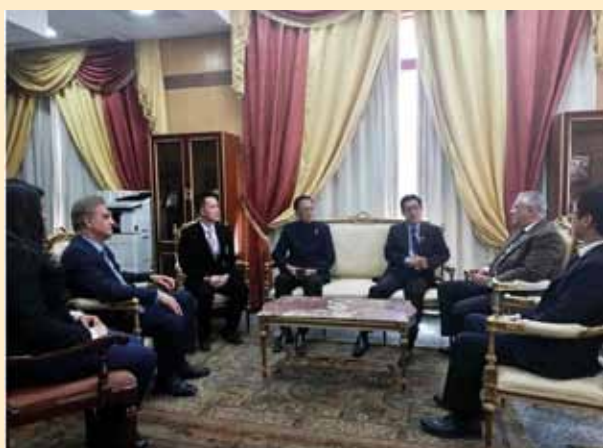
research into arts and culture. The database also makes a practical contribution to arts and cultural research as a whole.

Challenges in presenting Thailand to the world using the arts and culture

“...Apart from actually creating a piece of creative work, the challenge also lies in depicting and explaining the body of knowledge that inspired it...”

Depicting Thailand to the world using arts and culture goes beyond creating a piece of creative work. The most challenging aspect for artists and educational artists is to explain the body of knowledge of how the piece of work was conceived, including the process of generating ideas, methodology and rationale for the piece. This includes the mix of knowledge that inspired or provided a reference or touchstone for the artwork

for the audience to understand. Moreover, the world’s rapidly changing nature may influence the depth of understanding of a creative work. Therefore, highly successful artists and educational artists must embrace the changes and challenges in order to convey the meanings of their creative works of art to the wider world. This includes contemporary trends and contexts that can be incorporated into the creation of a creative work or





reduce the gap between artist and audience. Moreover, channels to distribute or showcase their work are also important; relying on conventional distribution methods might no longer serve the purpose. Creative works should be accessible to diverse audiences. Artists should change their perspectives, adapt their artistic frameworks and acquire new knowledge to narrow the gaps between themselves and their audiences in order to create creative works that correspond to the constantly changing communication trends and distribute them via multimedia and social media platforms. Artists should use a global language to depict their creative works to ensure understanding among international audiences. Using a global language will also contribute to a deeper understanding of a creative work of art as it provides direct messages from the artists and allows the creative work to reach a much wider audience.

Chulalongkorn University is proud that the Office of Research Affairs has emphasized the importance of arts and cultural research within the social sciences and humanities. This action triggered collaboration among researchers, resulting in the establishment of the IAC research cluster. The IAC Cluster members share a common purpose and are driven by common goals. Members also exchange knowledge and join hands to create creative works. Researchers in the Cluster use arts and culture as tools for human development and transfer accumulated knowledge and wisdom from senior academics to younger researchers and students. Thus, if the University's policy to strengthen research in arts and culture is being continuously implemented, this will ensure continuity in the University's excellence in the arts and cultural research.



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In rural Thailand, voice-based mass communication is still used today, especially in remote areas where local





communities receive news and information via the local village broadcasting tower. However, this is in decline, and generally now restricted to calling for community meetings or announcing important national news or emergencies. Most individuals access news themselves via telephone, television, radio or social media. Because social media channels offer powerful personalization of news, individuals receive the news they want to hear or perspectives they already support. This leads to the 'echo chamber' effect, amplifying the receiver's existing bias (confirmation bias), while leaving them vulnerable to plausible but false reports (i.e. fake news). Such unbalanced and unsupervised news coverage widens divergence in perspective within society and makes it impossible to assess a situation fairly based on an unbiased presentation of diverse views or hypotheses.

An expert group established by the European Commission offered a definition of 'Fake News' as *'...referring to presentation of stories that include "False, inaccurate, or misleading information designed, presented and promoted to intentionally cause public harm or for profit"'* (European Commission, 2018).

Unfortunately, in Thailand news received via social media is rarely subjected to critical scrutiny to establish its true credibility. We rarely ask who is the source of the news, who might be the messenger, or what is the motive behind the story. Despite legal oversight, fake news is eagerly devoured by a population addicted to social media and obsessed with *'celebrity social media influencers'*. Social media have also been abused on many occasions to inflict social sanctions- both deserved and undeserved- on individuals as an act of revenge or to expose anti-social or criminal action. Such campaigns can quickly escalate and reach viral proportions, even resulting in social exclusion, violence, suicide or death threats. All these result from a mob mentality, free from the restraints and empathy provided by face-to-face interactions. Such campaigns have the potential to cause harm not only to individuals or communities, but also at national and international level.

It is therefore important in the Thai context that news and information are presented in a balanced and

transparent way so that all audiences can themselves assess the motivation and credibility of the source as well as the legitimacy of the argument. News channels also need to take into consideration the diversity within the target audience. Currently, news presentations feature both news and creative content that are sometimes either distorted from reality, or even outright fake news. This can lead to misunderstandings and rapid negative social reactions among audiences who disseminate news further almost instantly. The consequences can be severe when incorrect information or inflammatory messages are spread widely, and reactions magnified in the social media eco-chamber.

Today, every government agency and news organization should pay greater attention to the scourge of fake news. Indeed, we often read or hear warnings from government agencies urging us to *"... be sure before you click 'Like'. Must be right before sharing."* That is to say, every citizen should thoroughly analyse new posts before adding to its credibility or spreading the news further.

Communication for national development is especially important in Thailand because nowadays, conflicting news stories abound and the government has less control over the narrative. Most people resonate to a simplistic and sometimes populist interpretation of the latest news topics and seldom resort to thorough analysis. With over 50 million registered social media users in Thailand today, spanning all sectors and levels of Thai society, Thailand represents the 8th largest Facebook market in the world, with more than 37 million daily active users. In the past year, Thai users posted more than 5.3 billion messages on social media, including more than 230 million images. The elderly in particular are increasingly adopting social media to occupy their free time and easily communicate with friends and family. In Thailand the most popular communication platforms used by the elderly are LINE, Facebook, and YouTube, respectively. LINE has emerged as the main channel for regular communication with relatives, while Facebook is used as the main source of news and general information. YouTube has been popular for a longer period among

the elderly as a source of entertainment and knowledge relating to their special interests.

Exploitation of online media began with false advertising to boost product sales but has rapidly extended to achieve other objectives, becoming much more sophisticated in the process. Although fake news preceded the advent of social media, its sophistication and impact has grown with the new capabilities to use data mining to target specific target demographics audiences, even down to the individual level. Given the global scale of operation of fallen news network, prevention and suppression present major challenges in Thailand, despite the enactment of a law to regulate social media, including clear penalties for dissemination of fake news.

Fake news can incite violence. The Child and Youth Media Institute (Workpoint News, 2019) recently revealed alarming statistics concerning hate communication via social media. This showed the level of violence

caused by social media comments inciting hatred through accusations, insults or humour on YouTube had risen by 78.5%, web boards 53% and Facebook 37.6%. Up to 42% of young people have been affected by such speech.

As a result, the Thai Health Promotion Foundation (ThaiHealth) has collaborated with various organizations to create a mechanism to combat fake news. The initiative focuses on development of people of all ages to become aware '*digital citizens*', with digital media literacy skills, including an enhanced ability to exercise good judgment in selecting, checking and screening sources, and surveillance and reporting of fake news. This is to be achieved through the following four mechanisms:

- 1) Promote media skills among the general public, including provision of guidelines to using social media in a socially responsible way, and in the use of social media as a self-care tool and to provide health information





- 2) Support for public sector monitoring and surveillance of fake news
- 3) Systematic studies and in-depth research to underpin and inform evidence-based policy proposals to combat fake news that affects the well-being of Thai society
- 4) Communicating to raise social awareness of fake news among citizens, to share the importance of communicating responsibly as an important mechanism for surveillance.

A recent event: “*International Conference on Fake News*” was organized in Thailand by a network of academics, professionals and public bodies, and announced a joint initiative to combat fake news. A Declaration was signed by the Thai Media Fund, Friedrich Naumann Foundation for Freedom (FNF), ThaiHealth, Faculty of Communication Arts, Chulalongkorn University, Faculty of Journalism and Mass Communication, Thammasat University, The National Press Council of Thailand, Society of Online News Providers (SONP), Thai Public Broadcasting Service (Thai PBS). The event was attended by speakers from Thailand and other countries including the Digital Minister from Taiwan, media scholars from the University of Hong Kong, policy proponents of the Free Democrat Party, Federal Republic of Germany (Germany) and representatives from Thomson Reuters and AFP journalists. The event provided a rich forum for sharing of information and experiences in dealing with each country’s fake news and scam issues to provide a basis and starting point for Thai society to address the issue effectively.

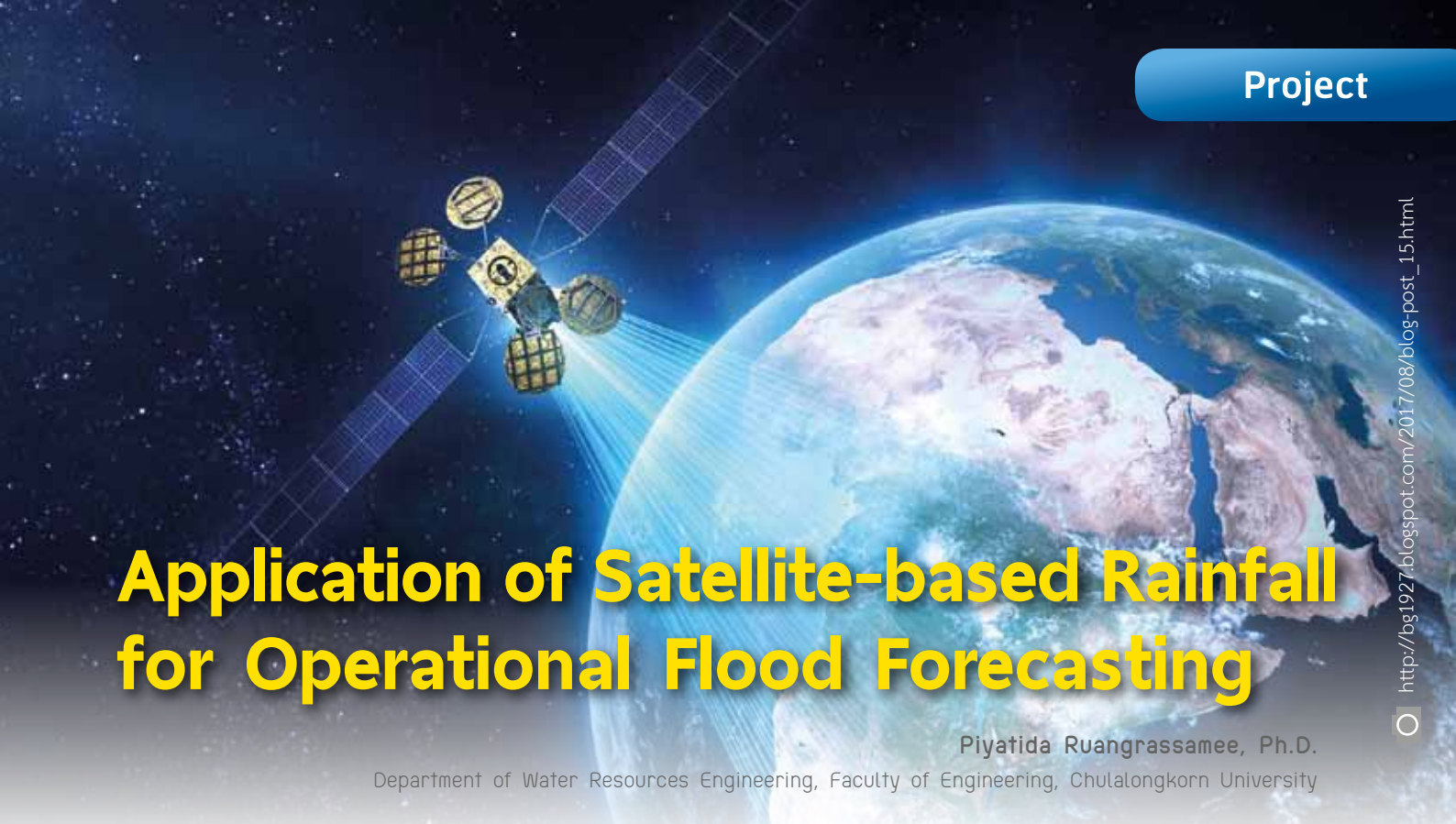
The event offered some helpful advice on how to deal with suspected fake news. Recipients of fake news can respond in three basic ways:

- 1) The best way to prepare for fake news is to ask questions. Do not simply share or click to read, because it is a trend. Ask questions first about what you find before clicking or sharing. And ask first “Are these stories even possible?” “Is this a trustworthy source?” “Are you sure it is true?” and “If I share, will this information contribute to society in any sense or not?”
- 2) Look for other references. Never trust information from a single news source. Check the reporting from other sources to corroborate the information we have received. As a rule, a single source usually cannot be trusted.
- 3) Thomson Reuters advises that we use a credible platform as our main source of information in everyday life, and use keyword searches in Google to confirm information and sources.

In conclusion, in any communication, both messengers and recipients have their own objectives and needs. When these are matched, the communication can be considered effective. On the other hand, if the objectives or needs of the parties are inconsistent or conflicting, that communication is considered as ineffective. Nevertheless, if communication is considered as the sharing of news or information with target audiences, it is considered effective especially if there is significant feedback and interaction. Even though the objectives and needs of both parties may be inconsistent, the communication is effective. This indeed is the greatest risk presented by fake news to our society today.

References

- European Commission. (2018). *A multi-dimensional approach to disinformation: Report of the independent High level Group on fake news and online disinformation*. Retrieved August 30, 2019, from <https://ec.europa.eu/digital-single-market/en/news/final-report-high-level-expert-group-fake-news-and-online-disinformation>
- Workpoint News. (2019). *Fake News The dark side in the online world Implied to break the society!* Retrieved October 10, 2019, from <https://workpointnews.com/2019/07/11/003-8-2-2/>



Application of Satellite-based Rainfall for Operational Flood Forecasting

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Thailand is one of the countries that is prone to flooding. Flood forecasting and early warning systems are important tools to help reducing flood damage and casualties. A review of the literature shows that the use of near-real-time high spatial and temporal resolution satellite-based rainfall data, combined with ground observations can be effective in reducing uncertainty and improving flood forecasts. In 2015, the Hydro and Agro Informatics Institute (Public Organization) (HAI), recently renamed as the Hydro – Informatics Institute (Public Organization) (HII), together with Chulalongkorn University through **Chula Unisearch** developed a joint project “*Application of Satellite-based Rainfall for Operational Flood Forecasting*”. The purpose of this project is: 1) to analyze the potential and uncertainty of satellite-based rainfall; 2) to perform bias correction of satellite-based rainfall; and 3) to evaluate the performance of HII’s flood forecasting system using bias-corrected satellite rainfall data and HII rainfall data from 2008 – 2015 in the Chao Phraya River Basin, Northeast Areas (Chi and Mun River Basins) and the Eastern areas of Thailand. The data used in this study include daily rainfall data from Thai Meteorological Department (TMD), HII Telemetry system, and three satellite-based rainfall products from Real-Time TRMM Multi-Satellite

Precipitation Analysis (3B42 RT version 7), Global Rainfall Map in Near Real Time (GSMaP_NRT) and Precipitation Estimation from Remotely Sensed Information using Artificial Neural Networks-Cloud Classification System (PERSIANN-CCS). The analysis of the uncertainty of the satellite-based rainfall products was assessed by evaluating the potential for rain event detection and the estimated precipitation rate and distribution. The results demonstrate that the rainfall products from all three satellite datasets have a good potential, and they can be improved with bias correction procedure. The bias correction consists of two main processes. The first process is to adjust the rainfall from HII telemetry system using observed rainfall from TMD by Quantile Mapping method with Cumulative Distribution Function (CDF) generated from daily rainfall data throughout the years. The second process is to use the adjusted HII rainfall data to adjust the satellite-based rainfall using the Spatial Bias Correction method. The adjusted rainfall data can then be input into the operational flood forecasting system of HII. The results of the study show that the bias-corrected satellite-based rainfall data can help improve the accuracy and timeliness of flood forecasting for the study areas. In further development, the study area can be expanded to cover the whole of Thailand

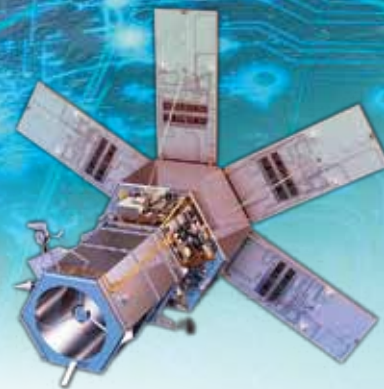


and the spatial and temporal resolution of the flood forecasting simulation can be at a higher resolution.

The project “*Application of Satellite-based Rainfall for Operational Flood Forecasting*”, Phase 2 aims to build upon the outcomes of Phase 1 to expand the geographical coverage, develop an algorithm for bias correction of three-hourly satellite-based rainfall, and combine radar rainfall together with rain gauge and telemetry system, as well as reviewing and studying the possibility of using other data such as temperature and humidity to adjust the bias of satellite-based rainfall, and reviewing the algorithms of satellite-based rainfall estimation (GSMaP) to study the possibility to implement local calibration using observations in Thailand.

This collaborative project aims to develop a satellite-based rainfall database that includes the algorithm to adjust the bias of satellite-based rainfall and links with the operational flood forecasting system of HII, as well as provide capacity building. The project is implemented via the following steps:

- 1) Improve and expand the automatic system between the satellite rainfall database and the bias correction algorithm developed in Phase 1 to cover the whole of Thailand by using the Global Rainfall Map in Near Real Time (GSMaP_NRT), and the Precipitation Estimation from Remotely Sensed Information using Artificial Neural Networks-Cloud Classification System (PERSIANN_CCS);
- 2) Develop the algorithm for bias correction of 3-hour GSMaP_NRT in the Lower Chao Phraya River Basin using rainfall data from radar combined with rain gauges and telemetry system;
- 3) Test the linkage between the bias-corrected satellite-based rainfall database and the operation flood forecasting system of HII;
- 4) Review and study the possibility of using other data such as temperature and humidity to adjust the bias of satellite-based rainfall. This is a preliminary study in the Lower Chao Phraya River Basin;



- 5) Review the algorithms of satellite-based rainfall estimation (GSMaP) to study the possibility to implement local calibration using observations in Thailand

The project’s quantitative and qualitative indicators are as follows

- 1) Quantitative indicators: the automatic system linking between the daily bias-corrected satellite-based rainfall database and HII’s operational flood forecasting system covering the whole of Thailand and the automatic system linking between the three-hourly bias corrected satellite-based rainfall data based and HII system in the Lower Chao Phraya River Basin.
- 2) Qualitative indicator: improvement of efficiency and accuracy of HII’s operational flood forecasting system with the automatic system of the bias-corrected satellite-based rainfall database.

It is expected that this study will provide the automatic system of the bias-corrected satellite-based rainfall database which are linked to the rainfall-runoff simulation using the NedborAfstromnings Model (NAM). The outcomes of this study are the algorithm to adjust the bias of three-hourly satellite-based rainfall using rain gauge, telemetry system, as well as rainfall data from radar, and guidelines for using temperature and humidity to adjust the bias of satellite-based rainfall and suggestions for the local calibration of the algorithms of satellite-based rainfall estimation (GSMaP) using observations in Thailand.

SDG11: Partnerships for the Sustainable City in Action

On 9 January 2019, the International Institute for Trade and Development, **Chula Unisearch**, Ministry of Education, Office of the Higher Education Commission, KNIT-Knowledge Network Institute of Thailand and Business Region Göteborg held an academic seminar on the 3rd session for the “*SDG11: Partnerships of the Sustainable City in Action*” at the Sukosol Hotel. Assoc. Prof. Vithaya Kulsomboon, Ph.D., Assistant to the President for Research, Development and Innovation, Chulalongkorn University, presided over the opening ceremony and Supichai Tangjaitrong, Ph.D., and Assist. Prof. Saowanee Wijitkosum, Ph.D., Deputy Managing Director of Chula Unisearch welcomed delegates.

The event provided a forum for brainstorming among delegates on several topics. Assoc. Prof. Noppanan Tapananon, Ph.D. and Nattapong Punnoi, Ph.D., both lecturers in the Department of Urban and Regional Planning, Faculty of Architecture, Chulalongkorn University, participated in the brainstorming sessions and shared ideas, insights, and perspectives to stimulate the discussions.



The 3rd “Core-to-Core RENSEA Seminar on Coastal Ecosystems in Southeast Asia”

Chulalongkorn University’s Department of Marine Science, Faculty of Science, together with the University of Tokyo, jointly convened the 3rd “*Core-to-Core RENSEA Seminar on Coastal Ecosystems in Southeast Asia*”, to report on a collaborative project between Thailand – Japan under the sponsorship of the National Research Council of Thailand (NRCT), and the Japan Society for the Promotion of Science (JSPS), and managed by **Chula Unisearch**. The conference was also supported by the Chula Global Network. The meeting was held from 20 - 22 February 2019 at the Chaloe Rajakumari 60 Building, Chulalongkorn University, which attracted a total of 87 participants from various countries in Southeast Asia and Japan.



MOU pilot project of using leg wellhead petroleum platform as artificial coral

The Department of Marine and Coastal Resources, Chevron Thailand Exploration and Production, Ltd., and Chulalongkorn University, represented by **Chula Unisearch**, held a ceremony on 30 April 2019 on the occasion of the signing of a memorandum of cooperation on a pilot project to use leg wellhead petroleum platforms as artificial coral anchors to conserve marine resources in the area of Ko Phangan, Surat Thani. Mr. Jatuporn Buruspat, Director General of the Department of Marine and Coastal Resources, Mr. Pairoj Kaweeyanun, President, Chevron Thailand Exploration and Production, Ltd., and Assoc. Prof. Thavivongse Sriburi, Ph.D., Managing Director of Chula Unisearch together signed the MOU at the Lampan meeting room, Department of Marine and Coastal Resources.



Visit by Maha Chakri Sirindhorn Clinical Research Center Under Royal Patronage



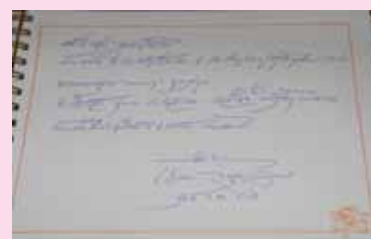
Assoc. Prof. Thavivongse Sriburi, Managing Director of Chula Unisearch and Assist. Prof. Saowanee Wijitkosum, Ph.D., Deputy Managing Director of Chula Unisearch welcomed Prof. Yingyos Avihingsanon, M.D., Assistant

to the President for Research, Development and Innovation (Health Sciences and Technology), Sarawut Siwamogsatham, M.D., Director of Maha Chakri Sirindhorn Clinical Research Center Under the Royal Patronage, under the Research Services Unit, Faculty of Medicine, Chulalongkorn University and his team, visited **Chula Unisearch** on Wednesday 6 February 2019 to study the organizational model and aspects of the administrative system to benefit the operations, academic services and research work of Maha Chakri Sirindhorn Clinical Research Center as well as to explore future cooperation between the two agencies.

33 years of established Chula Unisearch

On Thursday 14 February 2019, **Chula Unisearch** celebrated the 33rd anniversary of its founding day. The event was attended by the Chairman of Chulalongkorn University Council, President of Chulalongkorn University, representatives from university faculties and various institutions, who participated to congratulate **Chula Unisearch** on its ground-breaking accomplishments over the past 33 years.

The event featured a Buddhist merit-making ceremony, including offerings dedicated to the monks who blessed the agency and its future success.



Chula Unisearch Seminar

Chula Unisearch this year conducted an annual seminar on personnel management. **Chula Unisearch** is committed to encourage staff to enhance the knowledge and skills of its staff in the digital era, and foster exchange of experiences and methods of operational excellence with overseas agencies. Such interchange and earnings will be vital to revitalize Thailand's education and research infrastructure, and to improve the efficiency of the academic services provided by **Chula Unisearch**. The seminar was divided into 2 parts: A journey to study research and academic services in higher education, held from 1 - 4 March 2019 at the National Taiwan University and Academia Sinica, followed on Friday 8 March 2019 by a seminar on personnel under the topic "*HR and Service Transformation in the Digital Era*", at meeting room 201, Chulalongkorn University Research Building.





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