รายงานวิจัยฉบับสมบูรณ์

โครงการ: การวิจัยเชิงปฏิบัติการด้านการแบ่งปันข้อมูลของปัญหาความซับซ้อนในการปลูกฝิ่นของประเทศไทย

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คณะรัฐศาสตร์และรัฐประศาสนศาสตร์ มหาวิทยาลัยเชียงใหม่

สนับสนุนโดยสำนักงานกองทุนสนับสนุนการวิจัย

และมหาวิทยาลัยเชียงใหม่

Full Report

Information sharing, action research and a wicked problem of opium cultivation in Thailand

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Acknowledgement

Opium problems are not foreign to Thailand. As part of the country's development plans Thailand is determined to rid itself of opium and its related problems. However, this goal has proven difficult to achieve until the arrival of the Center for the Resolution of Security Problems in Omkoi (CRSPO) in 2012. We have witnessed a sharp decline in the number of opium fields in Omkoi District Chiang Mai, Thailand.—from 972 rai in 2014/2015 to 26 rai in 2018/2019. I truly appreciate an opportunity to have taken part in this historic endeavor.

Opium problems in Omkoi District are extremely difficult to solve since they intertwine with many other socio-economic problems as well as several security issues ranging from poverty to transnational crimes. These problems reflect the reality of inequalities that people in rural areas frequently must endure. Therefore, in order to resolve wicked problems like these, a new approach to such problems is needed. This project would not be possible without financial support from the Thailand Research Fund (TRF) and Chiang Mai University, for which I am very grateful.

This research project represents a long journey for me, both literally and figuratively. During this project, I have traveled back and forth from Chiang Mai City to Omkoi District so many times that I lost count. However, my time spent on this project cannot compare to those who travelled this road before me. There were men and women from various organizations who have been tirelessly fighting the opium problems in Omkoi District for many decades. This project is a humble part of their achievements.

On this road I traveled, I had opportunities to work with such a great team drawn from the Centre for the Resolution of Security Problem in Omkoi (CRSPO), Office of The Narcotics Control Board (ONCB), Omkoi District Office, Local Administrative Organizations in Omkoi Districts, Omkoi Hospital and other member organizations of the CRSPO. I would like to express my very great appreciation to them for their insights, expertise, and kind cooperation. I would like to offer my special thanks to all of the people of Omkoi, both low-land and hilltribes. Their experience and their realities

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Abstract

The case of opium cultivation and consumption in Thailand is complex, involving a number of problems and interlinking many agencies—thus constituting a wicked problem. This research aims to study the efficacy of Information Communication Technologies (ICTs), such as information sharing, data governance and the utilization of social networks by multi-agency task forces when confronting wicked problems. This study consists of a detailed analysis of three major projects in this area. The first project title is "Information sharing, action research and the wicked problem of opium cultivation in Thailand." and applies multiple methodologies; the results showed that this project was effective in terms of information sharing, in turn helping to dramatically reduce the volume of opium plantation areas. The second project title is "A wicked problem and data governance: A case study of opium addicted patients' treatments." This was case study research with the addition of 'qualification data collection' methodology, analyzing five domains of data governance. The research posited that both quantifiable successes and accountabilities in data governance lead to organizational improvements; additionally, data governance can be applied to a plural network of organizations, which is ideally suited to improvements in dealing with the wicked problem of opium addiction in Omkoi district. The third project tile is "Line application and opium eradication operations in Northern Thailand: A task-technology fit perspective," with the purpose of understanding the utilization of the LINE app in the group communication between various agencies working in opium eradication in Omkoi; it was found that LINE application technology fits with the rubrics of individual users and technology should therefore be utilized in the working environment in order to achieve the highest in efficiency and effectiveness.

In conclusion, it was found that the multi-agency task force mandated with opium eradication in Omkoi has effectively applied ICTs in three separate areas, which are information sharing, data governance and the utilization of social networks. The results clearly demonstrate the utility of ICTs in solving wicked problems.

บทคัดย่อภาษาไทย

การวิจัยครั้งนี้เป็นการศึกษาโครงการแก้ไขปัญหาการปลูกและการเสพฝิ่นในอำเภออมก๋อย จังหวัดเชียงใหม่ ซึ่งปัญหาดังกล่าวนับเป็นปัญหาที่ซับซ้อนประกอบไปด้วยหลากหลายปัญหาที่มีความเกี่ยวเนื่องสัมพันธ์กัน รวมถึงมีความเชื่อมโยงกับหลากหลายหน่วยงาน ทำให้สามารถตีความได้ว่าเป็นปัญหาที่มีความซับซ้อนซ่อนเงื่อน หรือ wicked problem ดังนั้น การที่จะทำความเข้าใจปัญหาที่มีลักษณะเช่นนี้จำเป็นจะต้องแยกแยะประเด็นในการศึกษาในหลายด้านเพื่อให้ครอบคลุมและแยกประเด็นที่มีความซับซ้อนให้สามารถทำความเข้าใจได้อย่างรอบด้าน เป้าประสงค์หลักในการทำการวิจัยมีเป้าหมายเพื่อปรับใช้แนวคิดและแนวปฏิบัติของการนำเทคโนโลยีสารสนเทศและการสื่อสาร หรือ Information and Communication Technologies (ICTs) มาใช้ประโยชน์ในการปฏิบัติงานจริงของการบริหารจัดการภาครัฐในรูปแบบของการทำงานร่วมกันระหว่างหน่วยงาน ใน 3 ด้าน ประกอบด้วย การแบ่งปันและแลกเปลี่ยนข้อมูล การบริหารจัดการข้อมูลภาครัฐ และ การนำเครือข่ายสังคมออนไลน์มาใช้ประโยชน์ โดยผู้วิจัยได้ทำการศึกษาวิจัยโดยแบ่งแยกเป็น 3 โครงการตามประเด็นดังที่กล่าวมา

โครงการที่ 1 “Information sharing and a wicked problem of opium cultivation in Thailand” การวิจัยเรื่องนี้เป็นการวิจัยเชิงปฏิบัติการที่มีการปรับใช้วิธีการเก็บรวบรวมข้อมูลที่มีความหลากหลาย ประกอบด้วย การวิจัยเชิงเอกสาร การสำรวจข้อมูลแบบมีส่วนร่วม การสัมภาษณ์แบบกลุ่ม และการสัมภาษณ์เชิงลึก ผลการศึกษาพบว่า โครงการการแก้ไขปัญหาพื้นที่ปลูกฝิ่นในประเทศไทยซึ่งเป็นปัญหาที่มีความซับซ้อนซ่อนเงื่อน ได้มีการดำเนินงานอย่างมีประสิทธิผล มีการแบ่งปันข้อมูลอย่างมีประสิทธิภาพ โดยมีการเชื่อมโยงการทำงาน แบ่งปันและแลกเปลี่ยนข้อมูลระหว่างหน่วยงาน ภายใต้แผนแม่บทที่มีเป้าหมายในด้านการแบ่งปันข้อมูลอย่างชัดเจน การดำเนินงานแบ่งปันข้อมูลเกิดขึ้นทั้งช่องทางออฟไลน์และออนไลน์รวมถึงมีการจัดการเรื่องการบูรณาการการใช้ประโยชน์ของข้อมูล ทำให้การตัดสินใจในระดับนโยบายและระดับบริหารโครงการสามารถทำได้อย่างมีปะสิทธิภาพ ส่งผลถึงประสิทธิผลของการดำเนินงานโครงการอย่างชัดเจนคือ พื้นที่การปลูกฝิ่นลดลง ผู้เสพฝิ่นเข้าสู่กระบวนการรักษาเพิ่มขึ้น และจำนวนผู้เสพฝิ่นในปัจจุบันลดลง

โครงการที่ 2 “A wicked problem and data governance: A case study of opium addicted patients’ treatments” การวิจัยเรื่องนี้เป็นการวิจัยแบบกรณีศึกษาโดยใช้วิธีวิทยาในการเก็บข้อมูลเชิงคุณภาพ มีการปรับใช้แนวคิดการบรารจัดการข้อมูลภาครัฐ 5 ด้าน เป็นกรอบคิดในการวิจัย ประกอบด้วย data principles, data quality, metadata, data access and data lifecycle ผลการวิจัยพบว่า ประสิทธิภาพและความน่าเชื่อถือของการบริหารจัดการข้อมูลภาครัฐนำไปสู่การพัฒนาการทำงานร่วมกันขององค์กรภาครัฐ และสรุปได้ว่าการบริหารจัดการข้อมูลภาครัฐสามารถปรับใช้ในองค์กรที่มีลักษณะเป็นเครือข่ายความร่วมมือในการทำงานที่มีเป้าประสงค์ร่วมกัน นอกจากนั้น ผลการศึกษายังชี้ว่ากรอบคิดการบริหารจัดการข้อมูลภาครัฐที่นำมาใช้ในการศึกษามีความเหมาะสมที่จะนำมาพัฒนาเพื่อการใช้งานการแก้ไขปัญหาที่มีความซับซ้อนซ่อนเงื่อนของปัญหาเกี่ยวกับฝิ่นในพื้นที่อำเภออมก๋อย

โครงการที่ 3 “Line application and opium eradication operations in Northern Thailand: A task-technology fit perspective”

วัตถุประสงค์ของโครงการนี้คือ การศึกษาการใช้ประโยชน์ แอพพลิเคชั่น LINE ในการสื่อสารแบบกลุ่มระหว่างหลายหน่วยงานที่ทำงานร่วมกันในการแก้ไขปัญหาฝิ่น ผลการวิจัยพบว่า เทคโนโลยีและการปฏิบัติงานสามารถบูรณาการกันเป็นหนึ่งทั้งในด้านขนบธรรมเนียมและวัฒนธรรมการทำงานรูปแบบใหม่และ เทคโนโลยีของแอพพลิเคชั่น LINE มีความเหมาะสมกับการปฏิบัติงานและลักษณะนิสัยส่วนบุคคลของผู้ใช้งาน อย่างไรก็ตาม ในยุคของเทคโนโลยีการสื่อสารไร้พรมแดน ผู้คนจะต้องใคร่ควรและระมัดระวังถึงการใช้งานเทคโนโลยีอย่างเหมาะสมในสิ่งแวดล้อมของการทำงานให้มีประสิทธิผลและมีประสิทธิภาพอย่างสูงสุด

โดยสรุป การบูรณาการเพื่อการทำงานร่วมกันเพื่อแก้ไขปัญหาฝิ่นพื้นที่อำเภออมก๋อยซึ่งถือว่าเป็นปัญหาซับซ้อนซ่อนเงื่อน สามารถนำแนวคิดทางด้านเทคโนโลยีสารสนเทศและการสื่อสาร (ICTs) มาใช้ประโยชน์ได้อย่างมีประสิทธิภาพและประสิทธิผล ใน 3 ด้าน ได้แก่ ด้าน information sharing, data governance and utilization of social network โดยกรณีศึกษานี้นับว่าเป็นกรณีตัวอย่างของการทำงานร่วมกันระหว่างหน่วยงานเพื่อแก้ไขปัญหาที่เรียกว่าเป็นปัญหาซับซ้อนซ่อนเงื่อน (wicked problem) อย่างปัญหาฝิ่นได้เป็นผลสำเร็จ

Executive summary

In Thailand, most opium poppies are cultivated in the North, particularly in the poor and remote district of Omkoi in Chiang Mai province. Omkoi's scourge of opium cultivation has been identified as the wicked problem. For decades, multiple agencies have worked to eradicate opium cultivation and production in this area. Since 2016, this researcher has been working as a member of the Centre for the Resolution of Security Problems in Omkoi (CRSPO). The CRSPO have drafted The Omkoi Master Plan for eradicating opium cultivation and production in Omkoi as an item on the national agenda. Since 2017 this plan has been implemented by the CRSPO. According to the CRSPO 2019 annual report, the number of opium cultivation areas in Omkoi District has drastically declined.

Under the project heading "Information sharing, action research and a wicked problem of opium cultivation in Thailand" this work has been divided into three research projects which are interwoven. By doing this, we seek to understand the phenomenon of our opium problem in a wider context. The following research summaries present how the tenets put forth by Information and Communication Technologies (ICTs) have been applied to solve the wicked problem.

Project No.1: Information sharing and a wicked problem of opium cultivation in Thailand

The first project aimed to explore the roles of information sharing when confronting a wicked problem. A wicked problem is defined as an iconic show case developed to achieve an effective solution for a problem that has proven exceptionally difficult to combat (i.e., wicked).

The results show that the CRSPO has succeed in multi-agency management. It has been 8 years since its inauguration in 2012. Since the beginning, CRSPO has gradually interwoven agencies and personnel into a functioning multi-agency. The network members have been familiarized with each other and their missions. They have developed successful functions composed of clear goal setting, balanced benefits, constructive coordination, and adequate resources.

The second key of success in this effort is integration of offline and online information sharing. This research finds that both the quality of information and dissemination of this information leads to successful and effective action. The Omkoi Master Plan viewed information as a vital part of its success. Responsible organizations were encouraged to share their information with their network counterparts. The Committee provided opportunities for agencies in the network to present, to share, as well as to initiate requests for information. There were two main channels--offline and online. Both channels are equally important. The online channel via LINE Application helped members share information in real time. Therefore, members were kept updated all the time. This Mobile Instant Message (MIM) has another strength. It allows communication that cuts across organizational hierarchies and boundaries. Whereas offline information sharing helps foster effective decision-making.

The high quality of information produced by each member based on their expertise helped CRSPO achieve its aspirational goals. Information-sharing sided each organization to develop clear and useful information and also helped them think outside their traditional organization realms.

Each organization collected not only information that is useful for themselves but also information that can be useful for other parts of the organization and also at the decision making level. This corresponds to the work of strategy plans and master plans to develop a new plan in the future which allows for adjusting the plan during implementation.

In policy level development, on the one hand, analyzed information regarding specific strategies have to be considered by the leader of each organization dealing with the CRSPO network. On the other hand, all the leaders are also members of the online information sharing group in the Line groups. Therefore, the leaders also learn about problems that happen at operational levels. Hence, policy in the future is related to occurrences at the most basic levels. This process contributes to overall improvement of the institution that is working on the opium eradication project.

Project No.2: A wicked problem and data governance: A case study of opium addicted patients' treatments

The goal of this study is to investigate how well a data governance framework explains the wicked problem of opium addiction by using a case study of opium addicted patients Treatment(s). There are five domains of data governance used in this analytical framework. These areas of governance are data principles, data quality, metadata, data access and data lifecycle. The researcher contends that, partly based upon Ferlie's et al. (2011) study, data governance as an area of investigation should be more closely integrated when civic agents deal with wicked problems.

The results found that in the area of data principles, using data as an asset in the relevant agencies is problematic and can consequently lead to uncertainty in the other four areas. The data quality domain faces language barriers, various technical difficulties and mobility problems. In the metadata domain, it requires data architecture and software that can support the needs of all relevant agencies. The lack of protocol in the data access domain creates a risk in terms of both the security of data and the anonymity of the patients. The various obstacles in the above domains affect the Data lifecycle domain in term of data update, data maintenance and long-term data usefulness.

The most important outcome of this study in terms of data governance is that among these related agencies, governance lacks a strong foundation and common understanding of the process. Moreover, communication among related agencies is hampered by the level of existing data governance. This low level of understanding of the importance of data corrupts other dimensions of data governance as well. Finally, it is our observation that because the Working Group still exists in a semi-analog world; the process of digitization has to be done by hand, which can seriously harm the governance of data. Proceeding from the national and regional level, the decision-making networks at the civic level of Omkoi further require a similar set of structures in place in order to function successfully as social networks that can coordinate to deal with this particular wicked problem. Successful achievement of the tasks envisioned by agents involved with this wicked problem will only be accomplished with optimal and effective data usage and governance. These findings argue that both quantifiable successes and accountabilities in data governance lead to organizational improvements.

We conclude also that data governance can be applied to a plural network of organizations. We further argue that this use of a data governance framework is ideally suited to an improvement in dealing with the wicked problem of opium addiction in Omkoi district.

Project No.3: Line application and opium eradication operations in Northern Thailand: A task-technology fit perspective.

The purpose of the study is to understand the utilization of the LINE application for group communication between various agencies working in Omkoi, Chiang Mai province. The study applies the analytical framework of Task-Technology Fit (TTF) of Goodhue and Thompson (1995) which posits that technology acceptance by users may happen only when it fits with the task requirements of these users thereby leading to increased efficiency. There are two important factors that inform the Task-Technology Fit: Task Characteristics and Technology Characteristics. This Task-Technology Fit leads to Utilization of technology, resulting in the effectiveness and efficiency (i.e. Performance impacts) of the performed task.

When considering the task-technology fit of the LINE app in this opium eradication effort under discussion; the findings highlight the 'Quality' aspect with regard to information being current, up-to-date, sufficient and suitable to be used in the work. The LINE app provides 'Locatability'; that is, users are able to search for information in the LINE groups with convenience – allowing for appropriate decision-making. 'Authorization' is another characteristic that allows any member of the LINE groups total access to information available in the platform as well as granting them the right to utilize the information they access.

In addition, the use of LINE app technology for communication in opium reduction has many benefits. Data transfer can be done fast and conveniently - helping to save agency resources and enhance work efficiency. The technology also helps build relationships among members, increasing familiarity with one another while inducing teamwork spirit and an integrated working environment and atmosphere. It can be concluded that LINE app technology fits with the tasks of opium eradication in Omkoi District. If users

can learn, apply, and realize these benefits for the efficiency and effectiveness of the work, they can utilize the tool in other areas of work with relevant agencies.

This research study shows that technology and task can be integrated as one under the new form of work culture and customs, which is worth watching. Not only that LINE app technology fits with the tasks, it also fits with the characteristics of the individual user who tends to be familiar with the app from his or her daily use. Especially when technology can bring about the identity of user both positive and negative aspects. In the age of borderless communication technology, people have to think and be very aware of how technology should be used in the working environment in order to achieve the highest efficiency and effectiveness, while, at the same time remaining aware of any potential negative effect and a need to find measures to counteract any negative effects.

Note: All these three research projects are in the process of submission to academic journals, any potential citation may not be appropriate at the current stage.

Project No.1:

Information sharing and a wicked problem of opium cultivation in Thailand

Information sharing, action research and a wicked problem of opium cultivation in Thailand

Abstract:

In Thailand, most opium poppies are cultivated in the North, particularly in the poor and remote district of Omkoi in Chiang Mai province. Omkoi is home to ethnic minorities, or hill tribes, primarily indigenous Karen people. The majority have no access to education, health services, or a legitimate means of living; opium poppy cultivation is their only logical choice for survival. For decades, multiple agencies have worked to eradicate opium cultivation and production in this area.

This research aims to explore the roles of information sharing when confronting a wicked problem of opium production by implementing a network of co-working agencies among various organizations. This is conceived as actionable research and has applied multiple methods of data collection including: document research, participatory observation, focus group interviews and in-dept interviews.

The results show that this wicked problem-solving project was able to develop effective information sharing and decision making, which in turn led to a dramatic reduction of opium plantation areas and opium consumption among patients. The multi-agency, information sharing work force is well managed through this master plan. The information exchange has been done via online and offline integration sharing channels and was interwoven so that all organizations worked toward the same goals. The information that has been shared was collected to be useful for the network in general instead of a specific agency. This high quality of information produced by each member and based on their expertise brought about achievement of its aspirational goals. Information-sharing helped each organization develop clear and insightful information and helped them think outside their traditional organization realms.

Keywords (3-5 words): information sharing, action research, opium cultivation, wicked problem

1. Introduction

Drug abuse is genuinely a global problem. Its effects cut across many layers of society and it is the source of a wide range of problems: from moral decline and health-related problems to instigating serious crimes such as theft, bribery, corruption and murder — all perpetrated by everyone from desperate drug users who need to finance their addiction to transnational organized gangsters who control both drug supply and distribution. Some studies indicate that drug abuse is closely related to the widespread outbreak of infectious diseases, especially HIV. UNODC notes that drug trafficking is a transnational crime diverting billions of US dollars annually from the legitimate global marketplace (Leechaianan & Longmire, 2013).

Despite an international vow to fight a "War on Drugs," the production and market for illicit drugs is growing unstoppably across the globe and Thailand is no exception. Different kinds of drugs are becoming more available in more places than ever before (Stares, 1996). Among them are opium and its processed derivatives, such as morphine, codeine, and heroin; they are among the dangerous narcotics known to humans.

During 2008-2012, opium cultivation in Southeast Asia rose because of increasing demand for heroin in China and the rest of Asia, reported UNODC (2012). Opium production in the Golden Triangle increased 21 percent between 2011 and 2012, and the region's share of the global market increased from five percent in 2008 to 23 percent in 2011 (UNODC, 2012).

In Thailand, most poppy cultivation takes place in the North, particularly in the poor and remote district of Omkoi in Chiang Mai province. Omkoi is home to ethnic minorities, or hill tribes, primarily the indigenous Karen people. The majority of these people have no access to education, health services, or a legitimate means of earning a living. Therefore, opium poppy cultivation is their only logical choice for survival.

For decades, the Thai government and international agencies have worked to combat poppy cultivation to no avail. A UNODC study shows the scale of poppy cultivation dropped in the late 1990s, but began to rebound in 2006 and has continued to climb (Laohong, 2016; UNODC, 2015). The problem eludes simple and linear problem-

solving strategies and solutions because of its complex nature and causes (Roberts, 2000).

One cannot single out a root cause of opium poppy cultivation and production in northern Thailand because many factors have contributed to its rise and persistence as a cash crop, including: culture, poverty, low education, limited access to health care (opium as a substitute for medicine), advanced transportation, and insufficient knowledge about drug laws (Cheurprakobkit, 2000). As a result of these interrelated reasons for its persistence, the organizations working on the eradication of opium production have, as yet, been unable to reach a consensus on a solution. Instead, multiple agencies work independently and unilaterally with little progress to show for all their endeavors.

Instead of working solo, Weber and Khademian (2008) suggest that concerned agencies should form a network and work across organizations to effectively combat this wicked problem. Wicked problems are complicated, multilayered, and spread across policy domains, hierarchy and authority structures within and between organizations, political and administrative jurisdictions, and, the sometimes conflicting interests of various groups. Such problems are extremely difficult to understand even with abundant manpower, money and determination. Most importantly, an effort to mend them can cause other problems in the same arena or in tangential realms (ibid).

Illegal drug trade and usage has been one the major concerns in Thailand for many decades, especially in the Northern part of the country which is known for opium production and trade. Regardless of the country's efforts to eradicate opium production and consumption such as the "Royal Project" of the late King Bhumibol Adulyadej that is well-known for its success in reducing opium production and improving the quality of life of the hilltribes people, opium production and consumption still persists in the mountainous and remote area of Omkoi District in Chiang Mai Province. As a result, the Thai government led by the Office of Narcotics Control Board of Thailand (ONCB) and the Military (Internal Security Operations Command Region 3) and its allies have been working together in order to combat opium problems which entails the eradication

of opium production, consumption, and commodification as well as rehabilitation of addicted patients.

This establishment of a multi-agency taskforce reflects the Thai government's acknowledgement of the problem's complexity and a realization that traditional bureaucratic problem-solving strategies have been ineffective. The function of this new network of agencies requires each member to cross their organizational boundaries to function in a network even as they continue to operate their bureaucratic functions inside their individual agencies. This network of multiple agencies to combat the war on drugs, especially eradication of opium cultivation and production, is a good innovation despite an unpromising outcome, said Jongruck (2015).

This paper reviews Thailand's attempt to combat opium-related problems in Omkoi District, through the theoretical lens of information-sharing. In this research, opium is seen as a wicked problem because of its complex and difficult-to-resolve nature. It, thus, cannot be disentangled single-handedly by the ONCB, the Military, provincial authorities, or local government acting independently. As a result, a multi-agency network known as the Centre for the Resolution of Security Problems in Omkoi (CRSPO) was established in 2012 in order to act as a coordination body for the eradication of opium-related problems and other, associated, security issues (Jongruck, 2015).

The information-sharing perspective is introduced in this research as a theoretical lens to analyze a multi-agency network that is working together to solve a wicked problem, i.e. opium-related problems in Omkoi District. This study aims to illustrate the importance of information and information-sharing in the work of this multi-agency network in order to overcome a wicked problem. Scholars in the field of information-sharing agree unanimously that having and disseminating information is a key to success. But how information is effectively shared, coordinated and distributed, especially in the Information and Communication Technology (ICT) era is still in question. This present study hypothesized that information is a key to success. However, right channels for information sharing are equally important. This study

proposes that both offline and online information sharing channels must be used alongside each other in order to effectively eradicate opium problems in Omkoi District.

2. Related literatures of information sharing and a wicked problems

2.1 Multiple-agency management

Information projects require multiple agencies with different backgrounds and differing goals to cooperate on one new specific goal under an information-driven approach. Some factors influencing the positive/negative outcomes of information sharing are: when agencies enroll in an information-sharing project, motivating them to work in harmony is crucial to the project's success. The literature on multi-agency management suggests that the following issues be addressed:

• Clear goal setting: Setting clear project goals is crucial for all organizations entering into an information-sharing project. Once agreed upon, project goals should be consensual among all agencies so that they understand their new roles and responsibilities as they prepare for implementation (Gil-Garcia, Chengalur-Smith & Duchessi, 2007). However, project goals should also be transformed into a detailed, comprehensive plan (Gil-Garcia, Chun & Janssen, 2009). Doing this can create a proper direction for proceeding that reduces the potential for conflict and negative consequences.

• Balance benefits: When agencies participate in an information-sharing project, they must budget their time and effort. The benefits of cross-agency cooperation should be seen clearly and be commensurate with expectations and the anticipated expenditure of resources (Gil-Garcia, Chengalur-Smith & Duchessi, 2007). The agencies will devote themselves to the project to the extent that their expectations of results are seen as worthwhile and ultimately met.

• Constructive coordination: Multiple agencies from different cultures can be a barrier in an information- sharing project. Therefore, an agreement incorporating the how and why of working together is needed for constructive coordination (Scholl et al., 2012). Moreover, training and professional development for improving codes of practice and

information-sharing protocols can improve inter-professional trust (Richardson & Asthana, 2006).

• Adequate resources: The availability of adequate resources is another important issue that must be addressed to stabilize and maintain the roles of organizations in an information-sharing network. In becoming part of an information-sharing community, agencies will have higher workloads and pressure. Having adequate resources or the sharing of resources among agencies can enhance performance and reduce resistance to change (Gil-Garcia, Chun & Janssen, 2009).

2.2 Offline and online information sharing

Information Sharing, whatever the form, is best understood as a continuum, that simultaneously reflects behavioral, social, economic, legal, and technological influences. The mechanisms that enable, predict and catalyze sharing behavior – especially in online contexts– should be of major interest to both scholars and practitioners of knowledge systems (Rafaeli & Raban, 2005).

With the appearance of human associations on the Internet, scholars have prompted claims that online communities provide an escape from and a substitute for (traditional) offline communities. The article by Nip (2004) provided an early examination of the autonomy of online communities in relation to their offline counterparts. He concluded that online spaces are not necessarily autonomous from their offline counterparts. Rather, the autonomy of the online community is contingent upon technology and a number of conditioning factors, the most important of which is the original purpose and intention behind creating the online space.

In the field of social network literature researchers have long discussed the relations between offline and online, though it’s not clear which online interactions are affected by the existing offline relations. The findings from Matzat (2010) provide knowledge of how offline networks influence online relations. By examining a mixture of virtual and real-life interactions among members of knowledge-sharing online communities, he found that the offline network reduces the problem of sociability, and that the complete integration of the two is unnecessary to produce successful knowledge

sharing. He also discovered that trust between members of the communities reduces the "free rider" behavior problem. The latter is believed to increase risk of failure in knowledge sharing.

To illuminate how the societal impact of social network communication media such as Facebook facilitate and influence engagement of communities; Zhang et al (2011) explored scenarios where users integrate their online interaction via Facebook with offline activities. They found that Facebook heightened the visibility of users' social identities while broadly facilitating offline activities through proposing and planning activities with insights from report and commenting. Moreover, Facebook has reinforced and cultivated social identities, social engagement, and social ties.

The role of information sharing does not exist only in the social dimension. Information sharing plays a great role in social capital accumulation – which leads to various forms of engagement, participation and collaboration. Wu (2008) concluded that information sharing plays a mediating role in building social capital through building of trust, network ties, and repeated transactions – which in turn influences firm competitiveness and its improvement.

There are various reasons why people seek and share information online and their associated behaviors. The finding from Park et al (2014) highlights the sense of belonging, entertainment value and perceived usefulness as key factors for the intention to share and to seek information online. Reputation seeking enhances the intention to share and perceived knowledge reduces intention to seek. Further, intention leads to behavior for both sharing and seeking information. It is interesting to find that intention to seek information is negatively related to information sharing behavior. Their findings provide insights to help understand user participation behaviors in online communities.

To explore how political engagement among citizens has been fostered by information shared via online groups, research teams in California conducted content analysis of online political group pages and surveyed undergraduates during the 2008 election (Conroy et al, 2012). They found that participation via online political groups is strongly correlated with offline political participation. It could be inferred that political

engagement as measured through political participation is influenced by online political groups. However, such an online platform may not help with gaining political knowledge due to the low quality of information shared and exchanged via online group discussions.

Sharing and integrating knowledge and information in multi-organizational settings represent challenges of governance as well as issues for administration. Yang & Wu (2014) explored the determinants of cross-boundary information sharing in the public sector using a single case study of Taiwan e-Government. By asking what determines interagency information sharing, researchers conducted inquiry on four perspectives based on the theory of planned behavior. While the most influential factor was legislation and policy, others such as organization, technology and environment are relatively less significant but more easily addressed. All factors taken together provided a comprehensive view of the complexity of interagency information sharing.

The concept of information sharing in multi-organizational settings involves complex socio-technical interactions embodied in work processes, organizational forms, and institutional contexts (Dawes et al, 2009). Knowledge networks need some legal foundation, access to resources, supportive policies, and innovative forms of leadership to be sustainable as organizational forms. The work of Dawes and team stress the importance of building institutional, managerial, and professional capabilities to engage cross-boundary, knowledge- intensive problems. And that these information- and knowledge- sharing capabilities should be deliberately constructed into the fabric of the organizational and partnering work. This bring us to the focus of inter-organizational information sharing.

Discussed among special issues of Public Administration and reform; Vancauwenberghe et al (2011) presented debates over the role of ICTs in public sector transformation. They suggested that the most promising feature of ICTs in public administration involves the ability to share information across organizational boundaries. They conclude that a driver of change in public administration is e-government that is underpinned by these interorganizational information-sharing systems.

Allen et al (2014) highlight key technical and organizational issues in information sharing and interoperability where decisions are non-trivial and made in high-velocity environments as in the case of emergency response. Interoperability requires not only technical capacity but organizational and information capability. Hence, systems should be designed for both anomalous and routine situations with recommendations concerning harmonization of policies, procedures and working practices.

There are various roles that social software technologies can play in facilitating collaboration among agencies and organizations. Shareef et al (2012) examined such roles using a case study of the online and offline collaboration networks of agencies working to enhance road safety in Australia. Their main findings show that the ability to develop and deliver policy, involves interactions and collaboration among sub networks having different technical, context, and process requirements for the integration of social software. The design principles that they developed were used to guide agencies and stakeholders in the integration of Web 2.0 technologies in public service networks leading to transformational government.

Such development did not come without issue. The work of Liston et al (2001) shed early light onto ways to address the inability to easily and effectively share and interact with online information for collaborative decision-making. Through scenarios from many construction projects, the paper summarized existing approaches to the sharing of information and assessed their effectiveness in supporting multi-disciplinary decision-making by project teams.

Organizational use of integrated (online – offline) information sharing have expanded in both the private and public sectors in the past decade. in an effort to enhance customer services and public satisfaction of e-Government services. Lin (2007) examined the impact of online features (information quality, system quality and service quality) and offline (offline activities) features on the sustainability of virtual communities through a survey of 165 community members. The findings indicate that perceptions of usefulness, ease of use and offline activities are all determinants of sustainability of the surveyed virtual communities.

Neiger et al (2013) provided an analysis of information sharing, engagement, and action in the use of Twitter among local health departments (LHDs) in the US. Researchers examined how Twitter was used to share information, engage with followers and promote action. The finding shows that Twitter is being adopted by LHDs, but its primary use involves one-way communication on personal-health topics as well as organization-related information. As public health transitions to more dialogic conversation and engagement, Twitter's potential to help form partnerships with audiences and involve them as program participants may lead to actions for improved health. Fan & Yang (2015) found that offline service quality has a significant effect on improving citizens' perception of online service quality, which in turn effects public satisfaction of e-Government services. Features such as information clarity, system security and stability, interactive services and "one-stop" services all have a significant effect on public satisfaction of e-Government services. It highlights the fact that online and offline business has integrated influence on citizens' perception of services quality. Li et al (2018) discovered that citizens perceived online-offline integration has a significant and positive impact on the success of government social media. This is because such integration satisfies the element of content, social and process gratification as outlined in the Uses & Gratifications theory which the research team used as the theoretical framework for predicting citizens continued use.

The use of online information sharing via a social network may represent a double-edged sword as marketing opportunities come with both privacy and security concerns. With rising concern for online privacy; Kim (2016) studied the Facebook users motivation for using 'location check-in'. There are various reasons why users use Facebook check-in including commitment to Facebook, self-development and regulation as well as promotional viral communication. The study confirms that young Facebook users are relatively free from the concern of privacy during the location-based information sharing. His study also provides implications for interpersonal marketing strategies on social networking sites by looking at motivational factors that drive user behavior. Li et al (2018) discovered that citizens perceived internet censorship has negative impact on the government microblogging services continuance and social

media programs, hence presenting a challenge to this new paradigm in the communication and interaction between governments and citizens.

2.3 Outcome of information sharing

Information-sharing projects have gained significant attention from both the public and private sectors because of its positive outcome when dealing with complex problems (Gil-Garcia, Chengalur-Smith & Duchessi, 2007). Organizations that have adopted information-sharing initiatives are experiencing benefits in at least four categories:

• Effective action: Dynamic situations such as natural disasters require prompt responsiveness, and timely information is crucial whenever an outcome of life or death can be counted in minutes. When a network of responding agencies gets current information, prompt, appropriate actions can be achieved (Gil-Garcia, Chun & Janssen, 2009).

• Problem prevention: Social problems have complicated combinations that are difficult to understand and address. Information from different aspects and perspectives of these problems is important and necessary. The study by Florence et al. (2011) found that an anonymized information-sharing program had provided relevant information for developing violence prevention strategies by public organizations. This study shows evidence of the potential benefits of information-sharing partnerships among public agencies within a community.

• Business process improvement: An organization normally has its own information and operations. With cross-boundary information sharing, different agencies can duplicate and manipulate a wider range of information (Yang, Zheng & Prado, 2012). Therefore, more efficient business processes can be innovated to help reduce costs and the paperwork burden (Landsbergen & Wolken, 2001).

• Effective decision-making: In an emergency or crisis situation, (e.g., a terrorist attack or natural disaster), decision-making close to the problem is required to obtain effective and efficient results. Integrating information within a network environment can create an effective decision-making process in times of crisis by reducing administrative burdens (Yana & Maxwell, 2011; Gil-Garcia, Chun & Janssen, 2009).

2.4 Information sharing and wicked problems

A Review of literature on network approach of public administration (Dawes, 1996; Dawes and Prefontaine, 2003; Gil-Garcia, et. al., 2009; Bharosa, et. al, 2010; Peel & Rowley, 2010; Mishra, Allen & Pearman, 2011; Dawes, Gharawi, and Burke, 2012) found that a successful network relies on coordination and sharing of information. As Bharosa, Lee and Janssen (2010) suggested in their study of relief agencies in the time of disasters, an ability to access information significantly increases the likelihood of a successful outcome. Information is a key to success in the multi-agency work environments and sharing and coordinating among the members of this multi-agency is crucial. Gil-Garcia et. al. (2009) argued that an ability to exchange information across organizations is a prerequisite for a network's success because information-sharing among agencies increases the chance for making a right decision by providing more complete information and sharing databases. Furthermore, there are other benefits that arise from information sharing among government agencies including increased productivity, improved policy-making, integrated public service, and, most importantly, effectiveness (Dawes, 1996; Fedorowicz, Gogan, and Culnan, 2010; Florence, Shepherd, Brennan and Simon, 2011).

However, the path to successful information sharing has not always been smooth. On the contrary, there are many challenges that a network needs to overcome. These problems can be analyzed from several different perspectives. For example, Gil-Garcia et. al. (2009) proposed to see these challenges as technical, organizational, political and legal problems—from lack of political supports, lack of financial resources to issues such as citizen's privacy and inadequate technical literacy. Bharosa and his colleagues, on the other hand, saw different challenges at different levels of operations either at the level of individual organizations or at the community level. For example, information sharing at a community (network) level is often faced with a bandwidth problem when everybody reports to a single command center. At the organizational level, each agency has to deal with its own rules and regulations depending on the situation, and these regulations may differ from other organizations in the network. Information-sharing at an individual level is also problematic since workers have a tendency to be on the receiving side rather than a bi-directional sharing one (Bharosa, et. al, 2010)

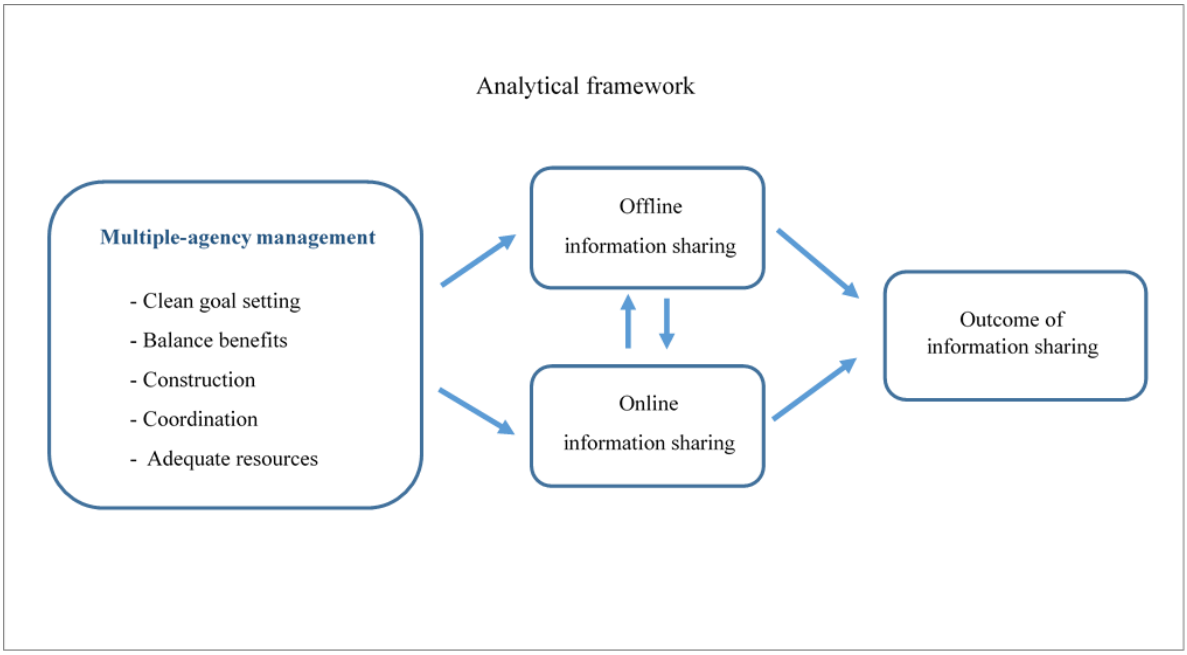
Fortunately, scholars have reported solutions to these problems. In their international study of collaboration across agencies in order to deliver services, Dawes and Prefontaine (2003) found that members are likely to share and collaborate if a formal understanding about each other's roles and responsibility is met. At the same time, organizations in the network must share a common objective to render public services. They also share risks, benefits and resources. The understanding of each other's roles and objectives as well as shared benefits was found to be a key component of successful information-sharing among organizations in a particular network.

Generally, research in the area of information sharing has focused on evaluating the performance of information-sharing communities (Gil-Garcia, Chun & Janssen, 2009; Yang, Zheng & Prado, 2012), identifying critical success factors (Florence et al., 2011), and investigating barriers to information sharing in a networked environment (Fedorowicz, Gogan & Culnan, 2010). Research that aims to explore the roles of information sharing when confronting a wicked problem is still limited. Filling this gap may give rise to a new, effective solution for any wicked problem that has proven exceptionally difficult to combat. Moreover, it can be said that most extant research adopted the cross-sectional study approach, which investigates a phenomenon at a single point in time. This approach may have difficulty identifying the causal relationship among events. Therefore, the wicked problem of opium production and the limited scope of research into effective solutions calls for a time series or longitudinal study to understand the nature of cause and effect within this information-sharing project.

This study intends to fill the research gap mentioned above by investigating the information-sharing strategy in a project that is also attempting to solve the wicked problem of opium cultivation. Detailed, action-oriented research is also planned to apply in a series of timeframe.

2.5 Analytical framework

From the literature review, all relevant notions of information sharing can be presented using a framework for exploring a wicked problem of opium cultivation as follows:



3. Research approach

3.1 Case design: Opium as a wicked problem

Opium poppy cultivation sites in Omkoi District, Chiang Mai Province, are one of the last known areas of cultivation in Thailand. The Omkoi District is in the mountainous and rural area Southwest of Chiang Mai City. It is approximately a 5-hour drive from the city, and it is poor and remote. Omkoi is the home of indigenous people, primarily the Karen hilltribes. Their villages on top of the mountains are difficult, if not impossible, to reach by car. It is not a surprise to learn that it is extremely difficult for the villagers to access education and basic healthcare. Thus, opium use plays a significant part in local remedies for illness. In the light of these facts, we can see that opium poppy growing, refinement, and consumption in Omkoi District is not a straight-forward drug problem. Instead, it is a problem of inequality, poverty, and the degraded quality of life of the people. It is a problem of imbalanced development--a problem of negligence.

Numerous unsuccessful attempts to reduce the importance of opium have been unsuccessful. The pervasiveness of opium in Omkoi District can be considered a wicked problem. By definition, wicked problems are tough. There is never an easy answer or one-size-fit-all solution to wicked problems. Opium-related problems in Omkoi District, Chiang Mai, Thailand are no exception. In the past several decades, Thai authorities have tried different approaches, none of them successful. Opium poppy plantations in Omkoi District still persist. Which makes Omkoi District one of the last opium poppy plantation areas in the country.

Viewing wicked problems as complex and persistent, some public administration scholars propose the use of a network approach to defeat wicked problems (Robert, 2000b; Weber and Khademian, 2008). This is also the case in Thailand. The latest venture to combat opium-related problems in Omkoi District established a committee comprised of a network of organizations working together to eradicate opium poppy cultivation, consumption and commodification.

The National Council on Crime and Delinquency (NCCD), an ad hoc governmental organization in Thailand, set up a special taskforce including 23 government and private organizations under the title "Center for Resolution of Security Problems in Omkoi District (CRSPO) (Jongruck, 2015). CRSPO is an area-based working group that proposes to function as an organizational-based administration. Since the government declared Omkoi a special (security) area, it appointed the Internal Security Operation Commander (3rd area) to serve as a director of CRSPO.

Table 1 List of 23 organizations

No.	Organizations	No.	Organizations
1.	Internal Security Operations Command Region 3	13.	Omkoi Village Health Volunteers
2.	Faculty of Political Science and Public Administration, Chiang Mai University	14.	Primary Educational Service Area Office 5

3.	Narcotics Control Office Region 5	15.	The secondary Education Service Area Office 34
4.	3rd Army Area	16.	Local government organizations
5.	35th and 36th Ranger Regiment Task Forces	17.	Omkoi Office of the Non-Formal and Informal Education
6.	Provincial Police Regions 5 and 6	18.	Omkoi Monk Association
7.	Provincial Police in Chiang Mai, Mae Hong Son and Tak	19.	International Farm Youth Exchange Association of Thailand
8.	Omkoi and Mae Tuen police stations	20.	Royal Project, Highland Research and Development Institution
9.	Thanyarak Chiang Mai Hospital	21.	Omkoi District Community Provincial Office
10.	Omkoi Hospital	22.	Omkoi Civil Society Network
11.	Chiang Mai Provincial Public Health Office	23.	Association of Village Chief and Headman, Omkoi
12.	Omkoi District Public Health Office		

According to the order of the NCCD, CRSPO has 8 roles and duties, which are:

1. To plan, direct, coordinate and integrate all activities with regard to the eradication of opium poppy plantations in Omkoi District;
2. To analyze strategies and budget plans of CRSPO;
3. To formulate an operational plan for eradication of opium poppy plantations in Omkoi District;
4. To oversee and look into the implementation of CRSPO's operational plans;
5. To hold the Committee's monthly meetings;
6. To compose monthly reports of Omkoi's drug situation and present to the CRSPO director;

7. To collect relevant information and produce databases to support the works of CRSPO member organizations;

8. To be in charge of other work relating to operations in Omkoi District by the order of the directing committee

CRSPO is divided into 7 working committees focusing on 1) administration and direction of CRSPO; 2) intelligence and suppression of opium planting and consumption; 3) prevention and community empowerment; 4) treatment and rehabilitation; 5) community development; 6) development of an information system; and 7) academic research. Not all organizations sit on all of these committees. Moreover, some organizations may sit on more than one committee.

From a public administration point of view, the importance of the establishment of this multi-agency taskforce is twofold. First, it reflects the Thai government's acknowledgement of the problem's complexity. Second, it shows the government's realization that traditional bureaucratic problem-solving strategies have been ineffective and it intends to leave the traditional bureaucratic administration style for a new approach. The Thai government decided to move toward a network approach, where all agencies have to work outside their bureaucratic realm but focus on the issue/area at hand. Jongruck (2015) studied the effectiveness of CRSPO, a newly established multi-organization network and concluded that although a network approach showed the government's good intention to try a new style of public administration, the actual implementation is quite troublesome since the formation of this new multi-agency network is still bureaucratically top-down in directorial style (Jongruck, 2015).

The CRSPO 2018 annual report stated that the extent of the opium cultivation area in Omkoi District has drastically decline. This number goes hand-in-hand with a lowered number of opium addicted residents in the area, and is coupled with seeing the number of patients in treatment and rehabilitation program on the rise. By following the Omkoi Master Plan, focusing on information-sharing, CRSPO was able to suppress opium plantation areas from approximately 1,000 rai in the beginning of the project to 54 Rai

in 2017, 24 Rai in 2018, and 2.5 rai in the 8th year of 2019 (CRSPO, 2019). These trends indicate success of CRSPO.

3.2 Document research

The Center for Resolution of Security Problems in Omkoi District (CRSPO) was established in 2012 with mandates to combat problems related to opium such as growing, production and consumption of opium. Its work entails planning, implementation and evaluation. CRSPO formulated an "Omkoi Master Plan" which is used as a foundation for other, more detailed plans of each sub-committee and working group. Member organizations are obligated to present their monthly work reports (of their organizations and of CRSPO) at the monthly meetings and annual evaluation meetings held by CRSPO. Hence, document research in this step means all papers and reports which have been issued as parts of CSRPO works. Information-sharing protocols among the involved institutions during the time of research investigations (2016-2019) were also reviewed. In addition to reports, researchers also reviewed 3,202 short messages that were exchanged among members via a Mobile Instant Message (MIM) platform called LINE Application. This LINE Application is a popular instant message application among Thai people (Kunaboot, Chaipoopirutana, and Combs, 2015; Simasatikul & Hsieh, 2015). CRSPO created a chatroom or "Group" on the LINE Application, allowing members to send and receive information instantly.

3.3 Participatory observation

As mentioned earlier, researchers participate in CRSPO in 2 capacities i.e. members of the Committee and researchers. Participating as members of CRSPO allows researchers to collect data from within. Participatory observation is considered an efficient and effective data collection method (Bryman, 1988, p. 45). According to Waddington (2004, p. 154), participatory observation means to observe what happened while the researchers and participants are interacting in the contexts of the research. In this case, the researcher was appointed to be a member of CRSPO. Thus, researchers have access to detailed information of the work process of CRSPO as well as access to informants, who are also members of the Committee or a member of one of the involved agencies.

In order to address the research questions, this study is designed to investigate the practices and interactions of CRSPO members as their actions are related to information and information-sharing. This study puts a focus on 2 channels of information-sharing--online and offline channels. Online information sharing includes practices and behaviors of members using LINE Application which is a Mobile Instant Message (MIM) application. CRSPO created a chatroom or "Group" using the LINE Application, which, typically, allowed members to send and receive information instantly. Since LINE can be easily accessed via a smart phone, it overcomes the constraints imposed by distance and time (Dhir, Kaur & Rajala, 2018). There are approximately 35-45 members in this chatroom, the number depends on the annual rotation of state officers. As a member of this chatroom since 2015, researchers had the opportunity to observe and monitor information flow among participants as well as contents of this information.

The second dimension of information-sharing is the offline channel. An offline channel is the traditional bureaucratic way of information-sharing including meetings and training. Information from this offline channel includes all data shared among members other than those of online information-sharing. This data may include verbal information and documents such as reports, statistics, pictures, short videos presented in the meetings, as well as personal conversations.

As a member of CRSPO, researchers acquire the role of insiders. Denzin and Lincoln (2011, p. 102) comment that "the contention that only "insiders" could study fellow insiders in ways that would be unbiased and accurate." Therefore, this research can capture the ongoing, everyday routines involving actors in the ordinary or emergency circumstances that take place while implementing the Omkoi Master Plan. Hence, these participatory practices have been involved throughout the implementation procedures of the plan.

In this study, researchers witnessed offline information-sharing in various forms and on various occasions. First and foremost, the stage of formulating the Omkoi Master Plan was observed. In 2016, all member organizations participated in a series of meetings and helped formulate the Master Plan in order to achieve CRSPO objectives. Secondly, the researchers attended training sessions, routine meetings, as well as monthly and

annual meetings, internal meetings of some organizations, and annual evaluation meetings both held in Chiang Mai city and Omkoi District. This allowed researchers not only to access information shared among Committee members, but also the rules and protocol of exchanging information among members. Researchers were able to investigate perspectives of information sharing methods and effectiveness of each specific unit and interaction among all units regarding their responsibility. It is important to stress that some information is sensitive and can be shared only with ORSPO members. The examples of this kind of information are records of medical patients, opium trafficking agents, and secret agents. All of these intelligences are recorded with absolute care and will not be discussed in this study.

Thirdly, researchers participated in some sub-committee/working group meetings which allows researchers to observe working groups' data sharing process, including aspects such as who is taking charge of information-sharing, and the contents of information shared among them. Lastly, researchers participated in CRSPO trainings on information-sharing. In these sessions, through group discussions, researchers learned about member organizations needs for information and gained knowledge about their concerns related to information and information sharing.

3.4 Focus group interviews

Researchers organized 3 focus group sessions on July 12, 2017, December 18, 2017 and April 11, 2019. The first focus group meeting was held at the beginning of the Omkoi Master Plan in July 2017, at Omkoi District. The purpose was to discuss various perspectives about information-sharing such as type of information, sharing processes and protocols, importance of information-sharing, problems and obstacles. This focus group sought to understand perceptions of the relevant actors about information-sharing and their practical problem-solving methods. Participants of this focus group were front-line workers in the field including military officers, Omkoi Hospital staff members, officers from local administrative organizations, officers from Omkoi District, and ONCB staff members.

The second focus group was held in Omkoi District in December 2017 with the committee members of CSRPO. The participants were representative of the 23

organizations who are key in carrying out the Omkoi Master Plan and who are also active in the LINE group correspondence. These were very fruitful exchanges: including ideas, experiences, problems, solutions and expectations.

The last focus group was held in April 2019. The participants were information technology specialists, IT designers and scholars. This event aimed to analyze the various behaviors of information sharing of the group of study, dimensions of content sharing and the specific types of information each unit has and what else is needed. The team brainstormed to find out the capacity and limitations of information sharing. This event led to designing a new information-sharing platform in order to accommodate the integration of different institutions in order to cope with the wicked problem.

These focus group meetings also allow information owners to cross check with each other. Participants served to help verify each other's information and add value to the information. These meetings also help participants learn from each other the types of information each needed and considered important. Participants had chances to share with their counterparts methods they used when information-sharing.

3.5 In-depth interview

Researchers conducted in-depth interviews with key informants from CRSPO member organizations, both administrators and front-line workers. The purposes of the in-depth interview are to understand the personal experiences, personal perspectives, and worldviews of involved actors toward information-sharing (Denzin & Lincoln, 2011). Key informants were interviewed to single out problems and obstacles faced by CRSPO in its effort to work together to amend the wicked opium problem, focusing on the issue of information and information-sharing. Furthermore, informants were also asked to explain the information sharing process that their respective organization was responsible for. The interviews were recorded for the purpose of this research only and will not be shared with others.

4. Research findings

4.1 Multi-agency management

It has been 8 years since the program's inauguration in 2012. The CRSPO still continues in its initial missions, mainly eradication of opium poppy production and consumption in Omkoi area. Since the beginning, CRSPO has gradually evolved. Agencies and personnel in the multi-agency network have been familiarized with each other and other's missions. Different new channels of communication have been created. During this time, some action plans and/or programs were more successful than others.

However, researchers noticed important changes in the network. The year 2016 was the fifth year of CRSPO and it was about to draft a new 5-year Omkoi Master Plan (2017-2021). The process of drafting started in 2016, approximately the same time that this study started. For a year, all organization members, stakeholders, and advisors came together to formulate this new Master Plan.

The drafting process had profound effects on CRSPO. Not only that these meeting brought all members and stakeholders togethers, they allowed each and every one of them to be an integral participant in developing the Master Plan. Organizations were allowed to use these opportunities to present their concerns and needs. The drafting process helped each partner to know about each other in a deeper level and helped them to see a holistic view of the project. Since the Master Plan was started from the ground up, the end product represented the shared visions and missions of all involved partners. The formulation process of a new Omkoi Master Plan overcame the shortcomings of a top-down involuntary network, CRSPO. This sharing process helped member organizations see the overall picture of the CRSPO and know where each piece of this jigsaw came from. Moreover, a new Omkoi Master Plan laid out visions, objectives, strategies, and indicators of this multi-agency network. When members have clear goals and know their priorities, it is easier for them to achieve their individual and collective goals.

Omkoi Master Plan encompasses many strategies such as monitoring and overseeing Omkoi strategy, rehabilitation and restorative strategy, prevention, and control of opium/drugs strategy. But what makes the works of this multi-agency network

outstanding is the fact that it puts the focus on information and information sharing. This study found that information is a key to success. There are certain types of information that are needed, especially information about opium plantation sites, opium addicts, dealers, list of patients in rehabilitation programs, etc. This information is constantly changing and extremely hard to find. Thus, it needs to be updated often.

Judging from CRSPO's objectives, the works of this multi-agency network is successful. The number of opium planation areas in Omkoi District decreased meaningfully from 972 rai in 2014/2015 to 26 rai in 2018/2019. The number of opium addicted was also on the downturn. The number of addicted patients who are willing to admit themselves into a rehabilitation program surged. These outcomes owed, in part, to the network's information-sharing.

The efficiency of project co-working implementation via a multi-agency network reflects the successful cooperation process between organizations. Especially since each different organization has unique and non-overlapping skills and expertise. This brings about differences of opinion and diverse working techniques. Interestingly, this study demonstrated that the organization in the network of CRSPO can work together accordingly. Additional observations on this topic concerns the attitudes of the head persons of the organizations who initiated the cooperation process in the beginning. However, after working together for some time with the area heads who were also included in the Line application information sharing groups, they came to understand more about the different agendas of the other co-working organizations. Hence their attitudes changed and they more effectively facilitated the network operations under the scheme of the Omkoi Master Plan.

Based on their experiences, the CRSPO network has now set up an agreement for information co-sharing along with an agreement to change procedures as needed according to new situations in the future. In the agreement, there are also included: goal setting, guidance for working together and balancing authority across all organizations. Whereas there is no hierarchy in the online information sharing process the officers who are in charge have full authority in the offline information sharing process. This make the practical officers co-working in the operation feel comfortable, even though there are some high ranking or managing officers in the network. In addition, the

agreement provides for a common understanding of cooperation between organizations in the network and the goals and objectives of information sharing.

The operation of the opium eradication program which is managed by the CRSPO network has three main goals. The first is decreasing opium plantation area in the target communities. The second is developing an effective opium (narcotic) control along with a monitoring system in each target community. The last is developing and promoting the quality of life in the target communities composed of making a living, and improving society, as well as developing infrastructure.

The operation of the opium eradication program needs continued cooperation from all organizations in the network. One of the keys conditions of working together is benefit balancing including both budgetary considerations and information as an outcome product.

Related to The Omkoi Master Plan, there are six strategies with the Narcotics Control Office Region 5 acting as the managerial organization. Each strategy has a number of projects or activities included within its budget. The budget will be distributed for every co-project with which each organization is taking part. In the budget of each project there will be funds for information collecting, analyzing, and sharing information. However, in the case of a budget shortfall, the Narcotics Control Office Region 5 as the managerial organization can supply extra budget.

For example, the case of collecting information on the opium plantation area project, the Narcotics Control Office Region 5 has launched the budget for the first phase to collect information from relevant organizations. After that, the second phase aimed to clarify and confirm the information, the Narcotics Control Office Region 5 collaborated with all the organizations in the CRSPO network to investigate the target areas by walk and talk with the local people. With these kinds of activities, there will be extra budget to support needed personnel. Therefore, balancing benefit vis-a-vis resources between organizations in this program is equally distributed according to the Omkoi Master Plan. Moreover, practical management of the resources is flexible to facilitate the onsite activities. Subsequently, all resources of the project such as budget, personnel, tools, facilities, and information can be accessed conveniently, as needed.

Since there are 23 organizations integrated into this project, the management of common information must be very flexible and proficient. One example, information on opium cultivation areas collected from satellites and helicopters should be promptly and quickly provided in response to the demand of all organizations in the network. Related to the exchange or sharing information between organizations, there are several conditions to be considered such as confidentiality and reliability of the information.

Accordingly, to understand and develop coordination, each organization collects information not only for themselves, but they also collect general information and some information of use to associate organizations. In addition, the task force network has solved the problem of who may access information by cutting out unnecessary processes as part of the formal requirement. Moreover, in some urgent situations the information requirement or information access can be done via the online channel. These procedures have been shared concerning the levels of confidentiality needed whenever information sharing. This content shows that the personnel in the network hold a positive attitude and are able to work constructively with associate organizations.

The CRSPO has succeed in integrating the diverse characteristics of the organization within the task force network. In the beginning, the differences of perspectives and expertise of each organization created doubt regarding information sharing and possibilities of miscommunication between them. This is because specific mandates require different forms of information. They collect and organize their data in dimensions and forms that cannot be used or doesn't benefit the recipient organizations directly. By learning through experience and over time, each organization understood each other more in the types of information each group needed to support their differing mandates. This awareness and change in procedures led to constructive coordination.

This information shows clearly the difficulty in understanding of differing job responsibilities and the limitations within which each organization must both work and share resources, while continuing to aim for achievement of common goals.

This information shows clearly understanding of job responsibility and limitations of each organization which provide the flame of working and sharing resources in coordination working aiming to the same goals.

This information shows clearly the difficulty in balancing differing internal job responsibilities as well as sharing resources to further progress toward common goals.

4.2 Integration of offline and online information sharing

Information sharing is a crucial process which can improve the quality and usefulness of information. This is because the information will be cross checked and used in different environments. In addition, when working among differing associate organizations, sharing information accelerates cooperation in areas of knowing and understanding information, planning together, working together and effective problem solving together.

Regarding the Omkoi Master Plan, the CRSPO has six working groups which are Information Plan Group, Defending Plan Group, Target Area and Person Control Group, Promoting Career and Environment Group, Healing and Rehabilitation Group and Community Empowering Group. Accordingly, the CRSPO has official monthly and annual meetings. Each working group also has their own meetings. Regarding online information sharing, the CRSPO has one chatting group in Line. Also, each working group has a separate representation in the Line application. In addition, there is the opportunity for one-on-one instant messaging as well.

One critical information safeguard has to do with sharing information associated with a single individual, especially information about his or her medical record which is a personal right violation. Therefore, safeguards that restrict some types of information access have to be clearly set up.

• Offline information sharing

In terms of information, offline channel provides opportunities for data owners to exchange information related to their respective works. In these meetings, information was shared, collected, validated, and evaluated. Moreover, all information presented in these meetings, both documents and verbal, are considered official reports, which must be documented according to official regulations such as meeting minutes as an example. This is high-quality information, specifically relative to its accuracy, completeness,

consistency, uniqueness, and timeliness. Members can be sure of the integrity of this information.

Due to the fact that all members of CRSPO are obligated to present their data and work progress to the Committee, this can be seen as an advantage of offline meetings from many perspectives. First, because official reports are compulsory, all members receive an overall, "big picture" view of information of the committees works from opium cultivation areas to dealers and addicted patient; from socio-economic status of the villagers to development needs, and all analyses of relevant data. Second, official reports enable the Committee to trace data owners if they ever need further information or want to verify a certain piece of information. Third, official records can be used in performance evaluation, i.e. to determine work progress and directions of each unit of the Committee. Last but not the least important, offline channel is needed because some information is strictly confidential and must be handled discreetly.

• Online information sharing

As the work progresses, the key agencies have to share work related information such as making reports, appointments, exchange of ideas, or assign jobs. This working group has chosen the "Line application" as their platform for information sharing.

The LINE Application is free for all. It is very easy to install onto a smartphone. With LINE, users can create a chatroom or a "Group" for multiple users to communicate with each other. According to LINE Corporation, this "LINE group" can hold up to 500 members, thus it can easily accommodate members of the CRSPO. Normally CRSPO LINE group has 47 members from 23 organizations in the network. There are Committee administrators, state officers, local politicians, academicians, medical staff, as well as military personnel in this group. However, members of the group are not fixed. Normally there are approximately 40-50 members. Like CRSPO itself, members of the LINE group keep changing due to bureaucratic rotation. However, key people remain constant.

This LINE Application is user-friendly. It is easy to use even for senior officers who are not familiar with technology. Its promptness makes information-sharing more effective. The platform allows member to share not only short message, but pictures,

short videos, and voice messages. From our study of 3,202 messages, we found that 564 were text messages, 2,479 were pictures, 47 video clips, 63 official letters or memos, 17 document files, and 87 websites that were shared in the CRSPO group. In terms of content, 412 messages were greetings, 135 letters between organizations, 1,772 work-related messages, and 863 messages exchanging information.

Statistics show that the online platform is active on a daily basis, which helps members feel connected. Exchange of greetings has become routine for some members. Stickers (or emojis) were exchanged adding a playful flavor to a serious working group. This personalized and cheerful atmosphere within the LINE group makes members feel at ease while working together. Informal atmosphere helps make the exchange of information easier. In other words, online channel like MIM can enhance team-based working performance.

Even though this online platform helps members of CRSPO feel connected and updated, it cannot replace offline communications. The Offline channel occurs in many forms, of which a formal meeting is the most important. According to CRSPO's mandates, one of the Committee's duties is to hold a monthly meeting as well as annual evaluation meetings to assess the progress of its works. These meetings brought all responsible personnel for all member agencies together. They are good opportunities for those involved in CRSPO to get to know one another in person, creating a very important base for future cooperation and online communications. Members stressed that offline channel permits face-to-face encounters which in turn establish a real-life connection among members.

4.3 Outcomes of information sharing

The fundamental condition for sharing information is the quality of the shared information. From the study, there have been problems of information quality and with the forms of information that each organization needed. However, these obstacles have been solved by the flexible framework and the constructive co-working of the organization in the network.

One primary finding from the study points out that the issue that CRSPO has to face all the time is quality of the shared information. The criteria of quality of information are as follow.

Completeness, a set of information that is complete for one organization sometimes is not enough for other organizations. To collect complete information that is suitable for all the associate organization, the network has to communicate and exchange the requirements of the kind of information that is needed. In addition, forms of information have to be reported so that they can be reproduced as a paper document form, digital file or a multimedia form. This requirement influences information efficiency and information accessibility.

Accuracy is one of the characteristics of information quality. There is the possibility that information collected on site is not always accurate. The process of co-working on site operations between different organizations helps alleviate this issue. Moreover, communication in online groups also has a role in cross checking the information of each organization in the network.

A set of information collected from one organization may be useful for some organizations but not all. This depends on the relevance of the information to organizations. So, categorization of information attributes to drive information sharing effectively between personnel and between organizations must occur.

This research found that the quality of the information that the CRSPO has in part determines the success of any action they undertake. The new Omkoi Master Plan specifies valid and reliable information as a vital part of its success. Responsible organizations were encouraged to share their information with their network counterparts. The Committee provided opportunities for agencies in the network to present, to share, as well as to request information. There were 2 main channels, offline and online channels. An analysis found that both online and offline channels are equally important. The online channel via the LINE application helps members share information in real time. Therefore, members were kept constantly updated. This Mobile Instant Message (MIM) has another strength. It allows communication that cuts across organizational hierarchies and boundaries. MIM can be seen as more relaxed and

(perhaps) more playful compared to the traditional bureaucratic communication channels. Our findings are in congruence with Tewksbury (2013) who found that the social network platform focuses less on hierarchical leadership, but more on lateral relationships.

The CRSPO also has effective decision-making. The Network's information-sharing flow is like a bloodline in a human body. It links organizations in the network together. With information that has been shared, such as number and location of opium plantation areas, name and location of opium addicted people, name of those who participated in the rehabilitation program and their families which all helps CRSPO make correct and effective decisions. The high quality of information produced by each member based on their expertise also helps CRSPO achieve its aspirational goals. Information-sharing helps each organization have a clear and insightful picture based on the information and help them think outside their traditional organization realms.

Each organization collects not only information that is useful for themselves but also information that can be useful for others in the organization including use at the decision making-level. This corresponds to the work of strategic plans and the master plan to develop future plans including having the ability to adjust the plan during implementation.

At the policy development level, on the one hand, analyzed information related to specific strategies have to be considered by the leader of every organization dealing with the CRSPO network. On the other hand, all the leaders are also members of the online information sharing group in the Line groups. Therefore, the leaders also learn about problems that develop at lower levels. Hence, policy in the future is developed using pragmatic, field level input.

5. Discussion

5.1 Multi-agency coordination and management

1) Multi-agency approach in wicked problem solving

In the public administration discipline, a number of studies have been done relevant to finding a way to solve wicked problem including the network approach. In the early 2000s, Roberts (2000) and Van Bueren, Klijn, and Koppenjan (2003) suggested that network approaches are strategies to cope with wicked problems in interorganizational government project implementation.

However, the relevant literature in the late 2000s, became divided into two points of view. The first viewpoint stressed some barriers or challenges in many dimensions. With this, the main focus is on 'coordination' between the organizations in the network since it is, in the main concerned with working together among many agencies. Fedorowicz, Gogan, and Culnan (2010) mentioned the privacy concern issues of the relevant information, the issue which we also found in the present research result. Fedorowicz, Gogan, and Culnan (2010) pointed out that the data controller had authority to reduce and impose barriers which means that one agency owns the controlling power. Whereas in this research project the network has 6 working groups and specific confidential information will be circulated in a relevant working group which is authorized to access it. This clearly shows that this strategy does not limit the authority to one organization. Another viewpoint provided effective methods for an interagency approach in solving wicked problems. Florence et al. (2011) suggested that "cultural and political differences might affect the utility of this approach" (1405).

2) Information sharing activities

Together with the multi-agency approach some studies give credit to information sharing as the key factor of effective network operation solving wicked problems (Yang and Maxwell 2011). Bharosa, Lee, and Janssen (2010) highlighted that the ability to have information access influenced the success of operations. Hence, information sharing is a key to success in the work environment of multi-agency projects. Therefore, information sharing and coordinating among multiple agencies is crucial when they are

involved in a common project. In addition, the coordination can face obstacles at both the community, the agency and the individual level (Bharosa, Lee, and Janssen 2010). Besides, partnership activities such as sustained and continuous data capture, sharing, and use are factors influencing goal achievement (Peel and Rowley 2010a, Florence et al. 2011, Mishra, Allen, and Pearman 2011).

Subsequently, a number of scholars are focused on information sharing coordination activities as an issue of concern. Richardson and Asthana (2005) used the term 'the role of professional culture' to highlight that the different cultures of various organizations should be involved in coordinating and sharing practices. Whereas Bharosa, Lee, and Janssen (2010) introduced understanding each other during working processes and the usability of information to associated organizations.

The results point out thata professional culture understanding each other during working processes and the usability of information to associated organizations.

3) Multi-agency management

Now we come to the first argument of this research which is 'multi-agency management' as the crucial strategy that the multi-agency task force of the opium eradication project in Omkoi District has implemented with success. This paper argues beyond coordination activities and the organization body of interagency management levels.

The advantage of this case study is the project has been implemented under the Omkoi Master Plan, duration 2017-2021. On 2016, the involved organizations of this operation were gathering to initiate the Omkoi Master Plan which is the plan that institutes the issue as part of the national level agenda. Therefore, all organizations which had been familiar with and understood the problem took part in designing the plan. Subsequently, all the members understood the root of the problem very well including the plan for project implementation.. Therefore, it can be said that the plan provided a role of clear goal setting for the task force. As Dawes and Préfontaine (2003) stated, the network must share a common objective to accomplish.

Regarding the master plan, the case can overcome the concern of Gil-Garcia, Chun, and Janssen (2009b) about the challenges such as technical, organizational, political and legal problems. This is so because the Master Plan is made at the level of a national act and is not under control of political power. In addition, the plan has a clearly established organizational structure using the multi-agency task force. Moreover, it has appointed each organization in response to their technical mandates and expertise.

Another issue that Gil-Garcia, Chun, and Janssen (2009b) stressed is the lack of financial resources to support special issues. As mentioned in the plan and also practical working that the researchers have investigated is the balance of benefits. The main six strategies which compose the projects and activities are fully budgeted by the Master Plan. Every organization that is involved in the project benefit equally.

Regarding constructive coordination between organizations in the network, Dawes and Préfontaine (2003) stated that members of the network have effective collaboration if they have a formal understanding about each other's roles and responsibilities.

The Narcotics Control Office Region 5 is appointed by the plan to act as the administrative organization and has the responsibility for managing and offering support resources for any special activities that may need such ex-agenda support. This guarantees that the resources are distributed adequately.

The results with regards multi-agency management concur with the findings Weber and Khademian (2008) that the management unit or process is significant to "the capacity to solve problems, govern shared resources, create learning opportunities, and address relationships, shared goals" (334).

5.2 Integration of offline and online information sharing

1) Offline information sharing

The information sharing perspective in general focuses on offline practices in a multi-agency network. However, online, and offline channels for information sharing are equally important. There are several methods of offline communication taking place in this study including interpersonal communication, document submission and formal and informal meetings. Dewhirst (1971) stated that selection of communication

methods within and without organizations are influenced by the individual perceptions interrelated with the information sharing norms of the organizations.

In terms of information sharing within an organization, the officers who are representative of the organization are represented as a member in the network and are expected to collect information from inside the organization to share out. At the same time, the persons are expected to share information that is received from the network in order for other staff to become aware of the information and to further process, as and when required.

In terms of interagency information sharing, the offline channel provides opportunities for data owners to exchange information related to their respective works. The most important occasions of offline information sharing are the monthly meeting. In these meetings, information was shared, validated, and evaluated by other members, including, exchanges of interest and differing requirements of each organization. Therefore, the members learn to understand their associated organizations in relation to the kind of information which will be useful for them. Moreover, all information presented in these meetings are considered official reports and approved at the same time.

2) Online information sharing

Interestingly, Ferlie et al. (2011) argued on information sharing management that cross organizational information and communication technologies (ICTs) databases have little effect on management. In contrast, this research found that ICTs have a significant role in the effectiveness of information sharing which agrees with Yang and Maxwell (2011). The results show that communication in online groups brings about a number of effective factors for developing capacity of the network, for example in increasing familiarity among members from different agencies leading to constructive coordination, while participation of the executive members in the group provide opportunity for them to understand the limitations of policy implementation, and importantly, online information sharing can keep every member up to date and informed in real time. That is, the presence of an online channel can enhance team-based working performance.

Ratto (2011) stated that “devices themselves are not the ultimate goal. Instead, the sharing of results and ongoing critical analysis of materials, designs, constraints, and outcome” is the goal (253) However, this research presented here has found that the devices (mobile phone) which are accessible and the application (Line) which the participants are familiar with, increased effectiveness of sharing activities.

3) Integration in information sharing channels

This case study shows how the integration of both online and offline information sharing enhances the working capacity of the network in the present and projected future development. Weber and Khademian (2008) pointed out that transferring and receiving knowledge or information across participants effectively builds long-term collaborative problem-solving capacity. The results of this research support this statement. Besides, strong inter-organizational learning which Ferlie et al. (2011) felt was of lesser importance, whereas these research results demonstrate that it is crucial in accord with the article of Bharosa, Lee, and Janssen (2010).

The second effective factor is a shift from vertical management to lateral leadership which Ferlie et al. (2011) agued is a significant issue within information sharing management. This research also found that flattening the hierarchical statuses of information sharing member is an important key to effectiveness of information sharing in policy development. As well as Yang, Zheng, and Pardo (2012) pointed out that “hybrid forms, which mix hierarchy and network, serve as a tool helping to perceive various vertical and horizontal boundaries (s112). In addition, Ferlie et al. (2011) stressed that shifting or equalizing hierarchies in interorganizational networks brings about effective public services organizations.

Gil-Garcia, Chun, and Janssen (2009b) argued that an ability to exchange information across an organization is a prerequisite for a network’s success because information-sharing among agencies increases the chance of making a right decision due to the presence of more complete information and shared databases. Accordingly, this research found that there is a tendency for policy makers who are in the network and are developing policy on the opium issue and will provide a more effective policy

approach in the future. This is agreed by Yang and Maxwell (2011). Specifically, that information sharing has an important role in addressing policy issues.

6. Conclusion

The study of a multi-agency network, CRSPO, in their work to abolish wicked problems, more specifically, opium-related problems, in Omkoi District, Chiang Mai Province, Thailand, between 2016-2019, has found that the CRSPO has been successful. The number of opium planation areas in Omkoi District decreased significantly from more than 1,000 rai at the beginning of the project to less than 5 rai in 2019. The number of opium addicted people also was on the downturn. Related to the reduction in addiction, the number of addicted patients willing to voluntarily admit themselves into a rehabilitation program surged. These outcomes owed, in the most part, to the network's information-sharing.

Information-sharing among agencies in the network works like a bloodline in the human body. It links organizations (organs) together. With information that has been shared, such as number and location of opium plantation areas, name and location of the opium addicted people, name of those who participated in the rehabilitation program and their families help CRSPO make right and effective decisions. The high quality of information produced by each member based on their expertise helped the CRSPO achieve its aspirational goals. Information-sharing facilitates each organization helping them to have clear and insightful information to work with and to help them think outside their traditional organizational realms.

Information-sharing would not have been successful without effective channels. Findings found 2 types of channels, i.e. offline and online channels are both equally important and effective. Offline channels such as Committee meetings and verbal conversations are official and able to be traced back to data owners. Face-to-face interactions create trust among members, which is one of the most important foundations for information-sharing. At the same time, online information-sharing is crucial. Information and Communication Technologies (ICTs) especially Mobile Instant Message (MIM), enhances the abilities for members of the network to connect

and share information. Members of the CRSPO use chatrooms or the “Group” LINE application, and MIM applications, as platforms for exchanging information. The LINE application is easy to install on officers’ mobile phones and it is easy and convenient to use. MIM reduces times and distances for information, as well as helping officers who travel to stay in touch. This benefit is very suitable given the remoteness of the Omkoi Area. It is apparent from the study that information from both online and offline channels complement one another. This study can conclude with confidence that a multi-agency network, with adequate and efficient information-sharing systems, conquers wicked problems.

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8. References

Allen, David K., Stan Karanasios, and Alistair Norman. 2014. "Information sharing and interoperability: the case of major incident management." European Journal of Information Systems 23 (4):418-432. doi: 10.1057/ejis.2013.8.

Bharosa, Nitesh, Jinkyu Lee, and Marijn Janssen. 2010. "Challenges and obstacles in sharing and coordinating information during multi-agency disaster response: Propositions from field exercises." Information Systems Frontiers 12 (1):49-65.

Bryman, Alan 1988. Quantity and Quality in Social research. London: Routledge.

Cheurprakobkit, Sutham. 2000. "The drug situation in Thailand: the role of government and the police." Drug and Alcohol Review 19 (1):17-26.

Conroy, Meredith, Jessica T. Feezell, and Mario Guerrero. 2012. "Facebook and political engagement: A study of online political group membership and offline political engagement." Computers in Human Behavior 28 (5):1535-1546. doi: https://doi.org/10.1016/j.chb.2012.03.012.

Dawes, Sharon S. 1996. "Interagency information sharing: Expected benefits, manageable risks." Journal of Policy Analysis and Management 15 (3):377-394.

Dawes, Sharon S, Mohammed A Gharawi, and G Brian Burke. 2012. "Transnational public sector knowledge networks: Knowledge and information sharing in a multi-dimensional context." Government Information Quarterly 29:S112-S120.

Dawes, Sharon S, and Lise Préfontaine. 2003. "Understanding new models of collaboration for delivering government services." Communications of the ACM 46 (1):40-42.

Dawes, Sharon S., Anthony M. Cresswell, and Theresa A. Pardo. 2009. "From "Need to Know" to "Need to Share": Tangled Problems, Information Boundaries, and the Building of Public Sector Knowledge Networks." Public Administration Review 69 (3):392-402. doi: 10.1111/j.1540-6210.2009.01987_2.x.

Denzin, Norman K, and Yvonna S Lincoln. 2011. The Sage handbook of qualitative research: Sage.

Dewhirst, H Dudley. 1971. "Influence of perceived information-sharing norms on communication channel utilization." Academy of Management Journal 14 (3):305-315.

Dhir, Amandeep, Puneet Kaur, and Risto Rajala. 2018. "Continued use of mobile instant messaging apps: A new perspective on theories of consumption, flow, and planned behavior." Social Science Computer Review 38 (2):147-169.

Fan, Jing, and Wenting Yang. 2015. "Study on E-Government services quality: The integration of online and offline services." Journal of Industrial Engineering and Management 8. doi: 10.3926/jiem.1405.

Fedorowicz, Jane, Janis L Gogan, and Mary J Culnan. 2010. "Barriers to interorganizational information sharing in e-government: A stakeholder analysis." The Information Society 26 (5):315-329.

Ferlie, Ewan, Louise Fitzgerald, Gerry McGivern, Sue Dopson, and Chris Bennett. 2011. "Public policy networks and 'wicked problems': a nascent solution?" Public Administration 89 (2):307-324.

Florence, Curtis, Jonathan Shepherd, Iain Brennan, and Thomas Simon. 2011. "Effectiveness of anonymised information sharing and use in health service, police, and local government partnership for preventing violence related injury: experimental study and time series analysis." Bmj 342:d3313.

Gil-Garcia, J Ramon, Soon Ae Chun, and Marijn Janssen. 2009a. "Government information sharing and integration: Combining the social and the technical." Information Polity 14 (1, 2):1-10.

Gil-Garcia, J Ramon, Soon Chun, and Marijn Janssen. 2009b. "Government information sharing and integration: Combining the social and the technical." Information Polity 14 (1, 2):1-10.

Jongruck, P. (2015). From bureaucracy to (mandated) network: a changing approach to opium eradication in Northern Thailand. Paper Presented at the 15th International Research Society for Public Management Conference. Brimingham: United Kingdom.

Kim, Hyang-Sook. 2016. "What drives you to check in on Facebook? Motivations, privacy concerns, and mobile phone involvement for location-based information sharing." Computers in Human Behavior 54:397-406. doi: https://doi.org/10.1016/j.chb.2015.08.016.

Kunaboot, Warangkana, Sirion Chaipoopirutana, and Howard Combs. 2015. "A study of the factors influencing LINE stickers purchase intention in Thailand." ASBBS Proceedings 22 (1):261-268.

Landsbergen Jr, David, and George Wolken Jr. 2001. "Realizing the promise: Government information systems and the fourth generation of information technology." Public administration review 61 (2):206-220.

Laohong, King-oua (March, 5 2016). Country prepares for new poppy war. Bangkok Post. Retrieved from http://www.bangkokpost.com/print/886780/

Leechaianan, Yingyos, and Dennis R Longmire. 2013. "The use of the death penalty for drug trafficking in the United States, Singapore, Malaysia, Indonesia and Thailand: A comparative legal analysis." Laws 2 (2):115-149.

Li, Yixiao, Shuiqing Yang, Yuangao Chen, and Jianrong Yao. 2018. "Effects of perceived online–offline integration and internet censorship on mobile government microblogging service continuance: A gratification perspective." Government Information Quarterly 35 (4):588-598. doi: https://doi.org/10.1016/j.giq.2018.07.004.

Lin, Hsiu-Fen. 2007. "The role of online and offline features in sustaining virtual communities: an empirical study." Internet Research 17 (2):119-138. doi: 10.1108/10662240710736997.

Liston, Kathleen, Martin Fischer, and Terry Winograd. 2001. "Focused sharing of information for multi-disciplinary decision making by project teams." Electronic Journal of Information Technology in Construction 6.

Matzat, Uwe. 2010. "Reducing Problems of Sociability in Online Communities: Integrating Online Communication With Offline Interaction." American Behavioral Scientist 53 (8):1170-1193. doi: 10.1177/0002764209356249.

Mishra, Jyoti Laxmi, David K Allen, and Alan D Pearman. 2011. "Information sharing during multi-agency major incidents." Proceedings of the American Society for Information Science and Technology 48 (1):1-10.

Neiger, Brad, Rosemary Thackeray, Scott Burton, Callie Thackeray, and Jennifer Reese. 2013. "Use of Twitter Among Local Health Departments: An Analysis of Information Sharing, Engagement, and Action." Journal of medical Internet research 15:e177. doi: 10.2196/jmir.2775.

Nip, Joyce Y.M. 2004. "The Relationship between Online and Offline Communities: The Case of the Queer Sisters." Media, Culture & Society 26 (3):409-428. doi: 10.1177/0163443704042262.

Park, Jae Hong, Bin Gu, Alvin Chung Man Leung, and Prabhudev Konana. 2014. "An investigation of information sharing and seeking behaviors in online investment

communities." Computers in Human Behavior 31:1-12. doi: https://doi.org/10.1016/j.chb.2013.10.002.

Peel, Michelle, and Jennifer Rowley. 2010a. "Information sharing practice in multi-agency working." Aslib Proceedings.

Peel, Michelle, and Jennifer Rowley. 2010b. "Information sharing practice in multi-agency working." Aslib proceedings: New information perspectives.

Rafaeli, Sheizaf, and Daphne Ruth Raban. 2005. "Information sharing online: a research challenge." Available at SSRN 999993 1.

Ramon Gil-Garcia, J, InduShobha Chengalur-Smith, and Peter Duchessi. 2007. "Collaborative e-Government: impediments and benefits of information-sharing projects in the public sector." European Journal of Information Systems 16 (2):121-133.

Ratto, Matt. 2011. "Critical making: Conceptual and material studies in technology and social life." The information society 27 (4):252-260.

Richardson, Sue, and Sheena Asthana. 2005. "Inter-agency information sharing in health and social care services: the role of professional culture." British Journal of Social Work 36 (4):657-669.

Richardson, Sue, and Sheena Asthana. 2006. "Inter-agency information sharing in health and social care services: the role of professional culture." British Journal of Social Work 36 (4):657-669.

Roberts, Nancy. 2000. "Wicked problems and network approaches to resolution." International public management review 1 (1):1-19.

Scholl, Hans Jochen, Herbert Kubicek, Ralf Cimander, and Ralf Klischewski. 2012. "Process integration, information sharing, and system interoperation in government: A comparative case analysis." Government Information Quarterly 29 (3):313-323.

Shareef, Mahmud Akhter, Norm Archer, and Yogesh K Dwivedi. 2012. Transformational Government through eGov Practice: Socio-economic, Cultural, and Technological issues: Emerald Group Publishing.

Simasatitkul, Palida, and Ying-Jiun Hsieh. 2015. "Examining LINE Users' Behavior, Motivation, Attitudes and Factors Influencing Use and Adoption of LINE Official Accounts in Thailand."

Stares, Paul B. 1996. Global habit: the drug problem in a borderless world: Brookings Institution Press.

Tewksbury, Doug. 2013. "Online-Offline Knowledge Sharing in the Occupy Movement: Howtooccupy. org and Discursive Communities of Practice." American Communication Journal 15 (1).

The Center for the Resolution of Security Problems in Omkoi (CRSPO). 2017. The Omkoi Mater Plan, duration 2017-2021. edited by The Center for the Resolution of Security Problems in Omkoi (CRSPO). Chiang Mai: The Center for the Resolution of Security Problems in Omkoi (CRSPO).

The Center for the Resolution of Security Problems in Omkoi (CRSPO). 2019. Annual report. edited by The Center for the Resolution of Security Problems in Omkoi (CRSPO). Chiang Mai: The Center for the Resolution of Security Problems in Omkoi (CRSPO).

United Nations Office on Drugs and Crime (2012). The world drug report 2012. Retrieved from https://www.unodc.org/documents/data-and-analysis/WDR2012/ WDR_2012_web_small.pdf

United Nations Office on Drugs and Crime (2015, December 15) Southeast Asia Opium Survey 2015. Retrieved from https://www.unodc.org/documents/crop-monitoring/sea/Southeast_Asia_Opium_Survey_2015_web.pdf

Van Bueren, Ellen M, Erik-Hans Klijn, and Joop FM Koppenjan. 2003. "Dealing with wicked problems in networks: Analyzing an environmental debate from a network perspective." Journal of public administration research and theory 13 (2):193-212.

Vancauwenberghe, Glenn, Joep Crompvoets, and Geert Bouckaert. 2011. "Interorganizational information sharing as a driver of change in public administration." The NISPAcee Journal of Public Administration and Policy 3 (2):87-106.

Waddington, David 2004. "Participant Observation." In Essential Guide to Qualitative Methods in Organizational Research, edited by Catherine Cassell and Gillian Symon, 154-164. Thousand Oaks; London and New Delhi: Sage.

Weber, Edward P, and Anne M Khademian. 2008. "Wicked problems, knowledge challenges, and collaborative capacity builders in network settings." Public administration review 68 (2):334-349.

Wu, Wei-ping. 2008. "Dimensions of Social Capital and Firm Competitiveness Improvement: The Mediating Role of Information Sharing." Journal of Management Studies 45:122-146. doi: 10.1111/j.1467-6486.2007.00741.x.

Yang, Tung-Mou, and Terrence A Maxwell. 2011. "Information-sharing in public organizations: A literature review of interpersonal, intra-organizational and inter-organizational success factors." Government Information Quarterly 28 (2):164-175.

Yang, Tung-Mou, Lei Zheng, and Theresa Pardo. 2012. "The boundaries of information sharing and integration: A case study of Taiwan e-Government." Government Information Quarterly 29:S51-S60.

Yang, Tung-Mou, and Yi-Jung Wu. 2014. "Exploring the determinants of cross-boundary information sharing in the public sector: An e-Government case study in Taiwan." Journal of Information Science 40 (5):649-668. doi: 10.1177/0165551514538742.

Zhang, S., H. Jiang, and J. M. Carroll. 2011. "Integrating online and offline community through facebook." 2011 International Conference on Collaboration Technologies and Systems (CTS), 23-27 May 2011.

Project No.2:

A wicked problem and data governance:

A case study of opium addicted patients' treatments

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Abstract

The goal of this study is to investigate how well a data governance framework explains the wicked problem of opium addiction by using a case study of opium addicted patients Treatment(s). There are *five domains* of data governance used as an analytical framework. These areas of governance are data principles, data quality, metadata, data access and data lifecycle. The researcher contends that, partly based upon Ferlie's et al. (2011) study, data governance is an area of study that should be more closely methodologically integrated when civic agents deal with wicked problems. It has also been found that in an accompanying and extensive research review, a dearth of research has hitherto been instanced with regards opioid addiction. This constitutes a large research gap. Moreover, in terms of the research methodology, this study adopts a qualitative approach by integrating various methods, which include: documentary research, participant observation and in-depth interviews. The results found that in the area of data principles, using data as an asset in the relevant agencies is problematic and can consequently lead to uncertainty in the other four areas. The data quality domain faces language barriers, various technical difficulties and mobility problems. In the metadata domain, it requires data architecture and software that can support the needs of all relevant agencies. The lack of protocol in the data access domain creates a risk in terms of both the security of data and the anonymity of the patients. The various obstacles in the above domains affect the Data lifecycle domain in term of data update, data maintenance and long-term data usefulness.

Keywords: wicked problem, data governance, opium, opium addicted patients

1. Introduction

What follows is an analysis of a wicked problem; one that is not regionally specific but one that has a long history in Northern Thailand: opium addiction. In this particular examination, a case study was made of opium-addicted patients and their particular treatment regimen, and we assessed the impact and use of data governance as a heuristic device to illustrate and explain this particular wicked problem. By utilizing five domains of data governance, it has been hypothesized that these domains can be used as an analytical framework for study and assessment. The areas of data governance in this instance are as follows: Khatri and Brown (2010) *data principles, data quality, metadata, data access* and *data lifecycle*.

In recent years, Thailand has almost eliminated opium cultivation by the continuous application of the Royal Project approach (Jongruck, 2019); however, a study by the Narcotics Crops Survey and Monitoring Institute (NCSMI) shows that *Omkoi* District in Chiang Mai Province is still one of the most problematic areas. The NCSMI study reveals that the number of opium cultivation areas in Omkoi District between 1997-2016 has become amongst the highest in the country (Office of the Narcotics Control Board [ONCB], n.d.). It is equally alarming that the number of opium addicts in the area is also very high.

Omkoi District is special in the sense that it is one of the poorest districts of Chiang Mai Province. It is located in the southernmost area of the Province, bordered by the provinces of Tak and Mae Hong Son, and close to the Myanmar border. Omkoi District is distant, remote, and mountainous. Most of its area is classified as either national parks and/or reservation areas. The majority of the Omkoi population are members of various Hilltribes, mostly the Karen People. People in Omkoi have been living with a sub-standard of living, including limited access to public health care services, no access to pipe water or electricity, bad road conditions, lack of clean drinking water, lack of modern toilets and limited access to basic education. These obstacles and their accompanying poverty have led to the continuing problem of opium poppy cultivation and opium use in Omkoi (Jongruck, 2015).

From an academic perspective, this study is very challenging. First of all, we desire to answer the question concerning the wicked problem of opium addiction, through assessment of the level of data governance practice in a developing country, where information and communication technologies (ICTs) facilities and literacy lag behind. These kinds of countries have struggled with the consistent failures of government ICTs projects (Gunawong & Gao, 2017). However, it is hoped that we will be able to shed light upon how various Thai government agencies handle data governance. Furthermore, we seek to understand how the nature of this wicked problem has become either an obstacle or an asset in terms of data governance.

The present study focuses on how a network of organizations have worked together in order to combat the opium problem—a "wicked" problem in Thailand and especially in Omkoi. The main objective of this article is to investigate how data governance as an analytical framework can be used to describe and illustrate the reality of this wicked problem. Therefore, we have chosen to evaluate the data taken from opium-addicted patients for this case study. The analysis specifically aims to investigate how these multiple-agency networks handle data/information. In other words, how data governance has been employed in this network. The ultimate goal is to provide suggestions to improve the future work of these agencies in order to better handle their opium-addicted patient treatments.

The remainder of this paper is structured as follows: the next section reviews the concept of "a wicked problem" and elaborates upon many questions and procedural definitions associated with this concept; following on from this it elaborates upon the wicked problem as defined in the current context as the problem of opium addiction in *Omkoi District*. It then goes on to explain the data governance framework and discusses how data governance can contribute to an overall improvement in organizational performance in dealing with a particular wicked problem such as this one. Next, the paper presents our rationalization for a case study. It illustrates the challenge of opium production as a wicked problem that Thailand has long been struggling with for many years and it also explains why *Omkoi District* was chosen as an area of study. Following this, there is a discussion of *the efficacy of data governance as an analytical framework*, which is then followed by the research findings. The last part of this paper presents

conclusions and a discussion. This article ends with further recommendations arising from this study.

2. Understanding wicked problems

2.1 Concepts of wicked problems

The concept of "wicked problems" is not new for policy researchers. Rittel and Webber (1973) introduced this idea as a critique of rational-technical approaches to complex issues in social planning and public policy (Alford & Head, 2017). Contrary to the scientific mood or the belief of social engineering scholars of that time, Rittel and Webber (1973) argued that a wicked problem does not have a single, definitive formulation nor a definitive solution. In other words, there is no correct answer to the wicked problem. Moreover, wicked problems involve many individuals and/or organizations. Multiple stakeholders usually have their own agenda or preference to solving the problem and tend to conflict with each other. Therefore, sometimes, behavioral change among those working to solve the problem can be a part of solution (Ferlie, Fitzgerald, McGivern, Dopson, & Bennett, 2011).

Alford and Head's argument concurs with Roberts (2000) that any solution to a wicked problem is not conclusive. Since the nature of a wicked problem is constantly changing. Partners or agencies involved in the problems may change over time, which also influences the solution. Finally, solutions most often depend on the viewpoint or agenda of the various stakeholders. Stakeholders will determine the problems as well as attempt to specify the solutions the way they see fit. Therefore, it is possible that stakeholders might be in a conflict with one another over the solution to the same problem.

As a prime example of a wicked problem, opium growth and use in Thailand has multiple facets; ranging from the cultivation of poppy seeds, to a source of income, and ultimately to the actual problem of addiction. Contributory factors to this particular wicked problem are a lack of public health care systems and other public services in rural areas, a lack of acceptance by the community of the basic/standard human rights of indigenous people, continuing opium addiction, and the involvement of transnational organized crime,. These issues are intertwined, and it is very difficult to pinpoint the

root cause of the generally termed “opium problem.” However, the focus of this particular project focuses mainly on the treatment of opium addiction patients, using a chemical substitution substance called Methadone, in conjunction with efforts to promote alternative occupations to replace opium poppy cultivation.

2.2 More general characteristics of wicked problems

Rittel and Webber (1973, pp.161-167) identified ten properties of wicked problems that indicate ways in which such problems are inherently open-ended and controversial. These ten properties of wicked problems are as following:

1) *There is no definitive formulation of a wicked problem*. In order to understand the wicked problem sufficiently, the knowledge of all conceivable solutions is required. Solving a wicked problem is not as straightforward as is presupposed by the classical system approach, which signals that one can understand the problem and then solve it. When engaging with wicked problems, one needs to know the particular context and the orientation of solutions.

2) Wicked problems have no stopping rule. It is hard to tell if the problem has been solved because the problem-solvers can always try to do better and there are no ends in the causal chain of interactions in such an open system.

3) Solutions to wicked problems are not true-false, but good-bad. The judgement of the wicked problem solution is not so clear cut that one can evaluate if it is a true or false answer. The judgment of solutions involves personal interests and values.

4) There is no immediate and no ultimate test of a solution to a wicked problem. Each solution of the wicked problem cannot be controlled and tested because every single action of the solution creates waves of consequences over a period of time.

5) Every solution to a wicked problem is a “one-shot operation”; because there is no opportunity to learn by trial-and-error, every attempt counts significantly. Every trial cannot be undone, and it leaves subsequent outcomes of the action.

6) Wicked problems do not have an enumerable (or exhaustively describable) set of potential solutions, nor is there a well-described set of permissible operations that may be incorporated into the plan. Empirically, all the solutions of the wicked problems have to be identified and considered.

7) Every wicked problem is essentially unique. There are no classes of wicked problem whereby the same normative solutions can apply unilaterally to all members of the class.

8) Every wicked problem can be considered a symptom of another problem. Removal of one cause of the problem can still pose another higher-level problem.

9) The existence of a discrepancy representing a wicked problem can be explained in numerous ways. The choice of explanation determines the nature of the problem's solution. Since there is no true or false answer in wicked problems, one chooses the explanation of the problem according to their interests and any available action-prospects.

10) The planner cannot be incorrect. Although according to the principle of science the solution to problems are hypotheses that can be contested and are refutable, this is not the case when dealing with real-life problems that affect people's lives.

Burge and McCall (2015) expanded the theory from Rittel's definition by identifying ten causes of wickedness and by describing how they could be used along with the ten properties to identify wicked problems—in cases where not all of the ten properties apply. They argued that Rittel's properties should be used along with a contextual assessment of the cause of the problem's wickedness, to distinguish between problems that are inherently wicked and those that are technically more difficult to define.

Kreuter, De Rosa, Howze, and Baldwin (2004, pp.443-444) summarized the differences between *tame and wicked* problems according to four main characteristics. The characteristics of *wicked problem* in their studies are described as follows:

1) Disagreement about problem definition

2) Involvement of multiple stakeholders

3) Lack of a stopping rule

4) The Unique nature of the wicked problems

In public policy, Sullivan and Skelcher (2002) pointed out that wicked problems often need 'cross cutting themes' in public policy, which go beyond the remit of one agency.

With evidence of a mushrooming of literatures on wicked problems, Alford and Head (2017) argue that the label of 'wicked' has come to be applied indiscriminately, and have proposed a typology and framework to recognize, understand and tackle them. While the greater salience of wicked problems could be attributed to the fact that such problems have increased in intensity and/or number, the term 'wicked problem' has become inflated and over-used. The generalization of the concept has given rise to a 'one best way' to tackle problems - potentially creating a mismatch between the proposed 'solutions' and specific wicked problem situations. Their studies seek to distinguish different types of wicked problems in a more finely grained manner as the basis for a typology, enabling further insight into the nature of the problem. They proposed the broad matrix of the complexity of problems and the actors involved to define different types of the complex problem. According to the typology established in Alford and Head (2017), wicked problems are where neither the problems nor the solutions are known, and where both relevant knowledge and interests are fragmented. There are both multi-stakeholders and multi-sectors involved in these problems. There are also several conflicting knowledge-holders, who have substantial power to influence the problems; both the perceptions and the solutions.

They also proposed a more finely grained typology to consider the underlying factors within these broadly identified problems. The problem is more likely to be wicked if several or most of these conditions are presented. The conditions to consider in order to determine the degree of wickedness are as follows (Alford & Head, 2017, p.407):

- *Structural complexity:* the intractability of the technical aspect(s) of the problem
- *Knowability*: the nature and the solution of the problem is unknowable.

- *Knowledge fragmentation*: the available knowledge is fragmented among stake holders.
- *Knowledge-framing*: some of the knowledge receives too much or too little attention thus distorting any understanding of the problem.
- *Interest-differentiation*: various stakeholders have conflicting interests or values.
- *Power-distribution*: there is power asymmetry between actors.

2.3 Solutions for wicked problems

Identifying solutions to wicked problems has been paradoxically challenging, with modern day approaches of rational evidence-based policymaking, policy evaluation, and performance-based public management. According to Rittel's theory, a wicked problem is one "with no definitive formulation, no stopping rule, and no test for a solution, one that cannot be separated from issues of values, equity and social justice" (Berkes, 2004, p.624). Policy analysts, academic researchers, and planning practitioners continue debates that conventional scientific-technical approaches might be insufficient to pursue and they may even be misleading as a basis for understanding and responding to complex social issues. In fact, Alford and Head (2017) suggested a contingency framework constructed on the foundations of the typology that they established. To make 'progress', rather than 'solutions', to the wicked problems, they urge more focus be put on the perspectives and actions of public managers or policy-makers i.e. implementation managers, instead of the broad political processes of public debate and coalition-building— i.e. governance. Their studies have used complex policy debates about illicit drugs control as an explanatory device to bridge theory and management practice.

One conclusive discussion points that citizens and key stakeholders develop conflicting perceptions about the nature of particular social problems and will continue to have different views about appropriate responses or solutions (Head, 2017). Important implications from these debates stress the importance of inclusive processes of argumentation and conflict resolution among stakeholders. Furthermore, in order to develop 'transdisciplinary' usable knowledge to address a wicked problem, constructive

platforms are needed to bring several kinds of knowledge i.e. lay and expert, civic and professional, together to crystallize how to tackle the challenge (Head, 2017).

The Network Governance model of public administration has often been regarded as a good response to wicked problems. However, Ferlie et al. (2011) argued that the transition from traditional bureaucratic mode to network governance require changes to structure, organizational capacity and process. They proposed three domains that are needed for successful transition to network governance; namely (Ferlie et al., 2011, p.307):

1) cross-organizational Information and Communication Technologies (ICTs)/databases

2) Strong Inter Organizational Learning (IOL)

3) Shift from vertical management to lateral leadership

2.4 More nuance in the approaches to wicked problems

In this particular study we have produced a conclusive and wide-ranging literature review, (*see appendix 1*), which covers the various areas of wicked problems. The sheer scope of wicked problems outlined below attests to the significant nature of this particular area of research, as well as its continuing prominence. Examples discovered from our literature review are as follows: the problem of drugs in general, Alfrord and Head (2017) immigration and homelessness (Christensen, Laegreid, & Laegreid, 2019), Sustainable palm oil plantation and harvesting (Dentoni, Bitzer, & Schouten, 2018), general environmental issues (Dewulf, & Biesbroek, 2018) and the more general climate change debate (Levin, Cashore, Bernstein, & Auld, 2012). Moreover, other more specific types of wicked problems, were identified, such as the fifth runway at Heathrow Airport (Griggs & Howarth, 2018), Young People's Services in Wales Kaehne (2013), the localisation of indigenous services (Marsh, Crowley, Grube, & Eccleston, 2017), Emergency Planning in Sweden, Nohrstedt, D., and helping medical patients with varying wicked problems (Southby & Gamsu, 2018). Finally, and more generally, a number of politically-orientated wicked problems were examined, such as

effective e-governance in India (Mohan & Parthasarathy, 2016), the sustainability of the EU's Common Agricultural Policy (Termeer, Dewulf, Breeman, & Stiller, 2015), the wicked problems associated with the UN's Sustainable Energy for All Programme (Waddell, 2016), and lastly, national responses to climate change (Walls, 2018).

From our literature review it as clear that there is a dearth of research on the wicked problem of *opium abuse*, and given recent news events and overtures from institutions, this seems to represent a significant research gap; one that warrants further research and attention. Furthermore, all of the research presupposed similar ideas to the change in management methodology as outlined by Ferlie above. In point of fact, *Cross-organizational ICTs, databases, improved knowledge management, interorganizational learning* and *a shift from vertical management to lateral leadership* all point to the idea of a system where *data governance* is a central factor in dealing with any *wicked problem*—something that we contend successfully deals with the nuances of the problems under discussion and will explore throughout the remainder of this paper.

In further terms of the nuances of wicked problems, besides the famous objection of a one-size-fits-all approach (Alford & Head, 2017; Head & Alford, 2015) to wicked problems research, there have been other studies that have promulgated a more nuanced approach to wicked problems. Daviter (2017) similarly designates a more nuanced approach citing the three mechanisms of *cooping, taming* and *solving*. In addition, Banink and Trommel (2019) recommended a more piecemeal approach to wicked problems, based upon Karl Popper's theory of social engineering. Thus, their theory in part utilises in previous work *from classical sociological theory* and *the philosophy of science*; demonstrating the interdisciplinary nature of the problem and the use of sociologically imaginative solutions to the problem.

Dentoni et al. (2018) also discuss the issue of dealing with multi- stakeholder-partnerships (MSPs) using an innovative analytical framework all connected to a linear process of knowledge harnessing and including deliberation, decision-making and enforcement. Kaehne (2013) in the context of transition support for young people has also noted the need for (MSPs) to fit the needs of the various types of wicked problems.

Moreover, Kennedy (2017) and Kirschke, Franke, Newig, and Borchardt (2019) advocate a more challenging process of assessment moving beyond the simple binary simple success or failure of wicked problem strategies. Likewise, Peters (2017) and Termeer, Dewulf, and Biesbroek (2019) have expounded upon a more stringent criteria through which to measure wicked problems and analyse the conceptual category of "wicked problems" itself and its semantic meaning. As wicked problems have been defined in terms of their uncertainty above, Dewulf and Biesbroek (2018) also conducted a wide ranging literature review and found that the three main types of uncertainty are: *epistemic*, *ontological* and *ambiguity*—but were part of an overall analytical model that incorporated *nine overall types of uncertainty*. Recognition of these uncertainties will, according to the authors, aid in any future research. Research by Levin et al. (2012) argue for "applied forward reasoning" and expand the category of wicked problems to that of "Super wicked problems" such as climate change—we have categories of wicked problems that here include the ideas of *responsibility*, *time is running out*, *the central response is weak* and *policy responses should discount future irrationality*. All of these approaches and theories expand the concept of wicked problems way beyond their former parameters when they were originally postulated in the early 1970s.

Of course, the other end of the scale if the one expounded by Marsh et al. (2017) who press the need to *localise* wicked problems and also revolve them around locally administered 'learning and administrative changes.' And finally, Weber and Khademian (2008) examine the knowledge distribution of wicked problems and outline how and through what agencies and media this complex epistemic task can best be carried out. *The extremely broad scope* and scale of these approaches and assessments aptly demonstrates the need for a *pluralisti*c *and nuanced* approach to the various wicked problems and the ways in which we deal with them; an idea equally applicable, in the context of the current study, to the wicked problem of opium addiction and production.

3. Data governance and wicked problems

In the current digital era, most people agree that data is vital for the operation and decision making of organizations—both governmental and private— (Alhassan, Sammon, & Daly, 2016). A study by Pierce, Dismute, and Yonke (2008) reported that out of 200 organizations studied, almost 60% see data as a strategic asset of their organization. It is also generally believed that the most successful organizations are those who can handle, take advantage of and strategize their data most effectively—in other words, utilize a successful *governance of data*. As a result, the study of data governance has mushroomed and gained popularity in the field of Information System (IS) and among practitioners (Alhassan et al., 2016; Cheong & Chang, 2007; Hagmann, 2013; Khatri & Brown, 2010; Weber, Otto, & Österle, 2009).

Data governance is believed to help organizations use data to achieve optimal performance. Organizations need quality data that covers all aspects of their organization's needs (Otto, 2011); from clients to management, from suppliers to materials and production and so forth. Successful data governance indicates who makes decisions, while focusing on the relevant features of the data and on tasks and duties resulting from the decisions that were initially made. In other words, data governance encompasses all aspects of data control needed by an organization. It is "a universal approach to data accountability" (Alhassan et al., 2016, p.64).

Regardless of its popularity, data governance as a field of study in IS which is still in its infancy. In 2016, Alhassan, Sammon and Daly reviewed scholarly works on data governance and found only *31 papers that explicitly discuss data governance activities*, most of them focusing on the process of "defining" action in the data government framework, while currently not conducting analyses of other aspects of data governance, such as implemention and monitoring (Alhassan et al., 2016). Moreover, most studies focus on the data governance of large organizations, predominantly business entities (Begg & Caira, 2012), as opposed to governmental agencies.

Data governance frameworks (Khatri & Brown, 2010) are supposed to be applicable to any kind of organization. However, Begg and Caira (2012) argue that this is not the

case for small-and-medium sized enterprises (SMEs), due to their organizational nature, lack of resources, and a concurrent lack of understanding of data governance among those who have authority and responsibility regarding their organization's data. Along the same lines, Thompson, Ravindran, and Nicosia (2015) have found that many public organizations also face the dangerous problem of not being able to meet the relevant data quality standards, such as protecting data privacy.

This present study takes a step beyond the extant work and will apply data governance to an organization in *two dimensions*. Firstly, this project aims to unearth whether a data governance framework can be applied to a plural *network of organizations*. Secondly, (and more importantly) it aims to tackle a specific problem—a "wicked problem." In other words, the goal of this study is to apply a data governance framework to the work of a network of organizations that are working on one of the most "wicked" problems in Thailand—the problem of opium addiction.

3.1 Notions of data governance

Data is crucial. This statement is true for business entities and government agencies alike. Data provides information needed to make a right choice and to achieve organizational objectives. Therefore, organizations need data of good quality to make correct and effective decisions. This is when data governance comes into the picture (Wende, 2007).

The Data Governance Institute (Thomas, n.d., p.3) defines data governance as "the exercise of decision-making and authority for data related matters." Thus, data governance is an organization-wide framework for decision rights and accountabilities which leads to organizations' desirable behaviors in the use of data. Data governance creates guidelines for steering the appropriate use of data. It ensures the quality of data, as well as data accountability and data improvement (Alhassan et al., 2016; Kamioka, Luo, & Tapanainen, 2016).

Data governance is not just a piece of information or the management of that piece of information. According to Otto (2011, p.47) data governance can be defined as "a company-wide framework for assigning decision-related rights and duties in order to

be able to adequately handle data as a company asset." While data management is about making decisions and implementing those decisions, data governance is about what decisions need to be made and by whom. The scope of data governance is far beyond data management. It covers not only the decision domain, but also accountability for decision making (Fu, Wojak, Neagu, Ridley, & Travis, 2011). Moreover, data governance strives to make certain that management is effective and data use is optimal (Fu et al., 2011; Khatri & Brown, 2010). It provides a structure for achieving these tasks outlining who can make decisions with various kind of information and when they may make them. It gives guidelines of what to do, using each measure under each circumstance (Young & McConkey, 2012).

The idea about data governance starts from an organization's attitude towards data, i.e. seeing data as an "asset" and how to use a "data asset" to its maximum benefit. Data governance is about what decision about data needs to be made and who makes each decision regarding data. In other words, who is accountable for making decisions about data assets. Khatri and Brown (2010) proposed 5 decision domains about data decision making i.e. *data principles, data quality, metadata, data access and data lifecycle*. All of these 5 domains are interrelated but each of them deals with different core issues in data governance framework (Alhassan et al., 2016; Khatri & Brown, 2010).

Data governance allows organizations to perform better. Unfortunately, a study by Holt, Ramage, Kear, and Heap (2015) found most organizations do not have data governance policy. Kamioka et al. (2016) studied relationships between data governance and company's marketing performance among Japanese companies. The authors found a positive relationship between the two factors. Organizations that have good data governance are more likely to be successful because data governance helps organizations to have a clear mission with guidelines for using organizational data. Fu et al. (2011) argue that data governance creates accountability and a quantifiable success. Clearly, data governance can contribute to an improvement of organizations. The question is why many organizations do not apply data governance in their practice. The answer lies in the difficulties in the establishment of data governance. Data differs among organizations (Wende, 2007). What may be considered as data for one organization might not be applicable to others. Hence, there are no standards for, or

format for a data governance framework. Data governance varies greatly from one organization to another. Moreover, departments within an organization might well have different takes on data as an asset. Any data governance framework, thus, must be able to reconcile differences in the organizational perspective on data governance.

Although there are quite a number of studies on data governance, there are few studies of data governance employed in the environment of a multiple agency network. In terms of issue, there are also few studies of data governance used by organizations working on wicked problems. *This current study will use data governance as an analytical framework in order to examine the work of multi-agencies in dealing with a particular wicked problem—opium eradication*. This study focuses specifically on the data of opium addicted patients' treatments.

3.2 Data governance in general and dealing with wicked problems

Alford and Head (2017) argue that for data to exhibit wicked problems, a number of issues need to be met; for example, a lack of overall knowledge about the problem seen as a whole. Moreover, not only is there little knowledge about the issue, but the nature of the problem or its solution is such that it is unknowable—that is— the relevant information is hidden, disguised or intangible; furthermore, it comprises multiple complex variables and its workings require taking action to discern causal links and probable outcomes. According to Bannink and Trommel (2019), when the complexity of the problem is high, there is a strong need to inform the policy system with case knowledge and treatment expertise (policy characteristics).This means that the *regulated* actor and the *regulating* actor have different information—also known as 'actor constellation'. Consequently, Wicked problems are problems in which there is both a strong difference in the information which both the regulating and the regulated actors have and possibly a strong difference in the values they have.

This is also due to the possibility that any information available may be both confusing and incomplete to the various actors/agencies involved in the governance. Therefore, if the information relevant to solving wicked problems can be *defined in more than one way*, and the framing of the problem essentially determines what counts as facts in the

process of inquiry, then the challenge of analysing wicked problems lies not so much in adjudicating evidence, but in adjudicating frames—and 'frames are not easily adjudicated' (Dryzek, 1993, p.222). Thus, a whole new formulation of knowledge is involved at a deeper structural level when we consider not only the nature of the relevant problems, but the level of expertise itself required when dealing with so-called wicked problems. This can further be considered a mode of social learning, which deals with *problem framing and re-framing* based on joint information cooperation and epistemic development Dentoni, Bitzer, and Pascucci (2016) and Weber and Khademian (2008) advocate an epistemologically pluralistic approach to data governance, while Termeer et al. (2015) also crucially argue that *four governance capabilities* are essential for addressing wicked problems: 1) The capability to deal with multiple frames; 2) The capability to adjust to changes; 3) The capability to respond to changing agendas and expectations and; 4) The capability to unlock stagnations. Therefore, in all of the extant research it appears that a *more dynamic and pluralistic approach* is required for successful data governance of wicked problems and even beyond to other intergovernmental areas of work.

From a political point of view this pluralistic approach can be beneficial for addressing fundamental challenges that public policy making faces in its attempts to solve the wicked problems of modern societies. In particular, it enables the reaching of wider and more heterogeneous audiences in a shorter timeframe and at lower fiscal expense (Ferro, Loukis, Charalabidis, & Osella, 2013). Gil-Garcia and Sayogo (2016) also found that a compatibility of technical infrastructures and *formally assigned* project-managers were the two most important predictors explaining the success of inter-organizational information-sharing initiatives, crucial for successful data governance. This view is largely echoed by the findings of Head and Alford (2015) and Marsh et al. (2017) discuss localized, *place-based solutions* in the context of data governance, centered around learning and administrative changes. Different place-based solutions are posited based upon localized variables and include *joined-up funding*, federal-state *collaboration* and *continuous improvement*.

Other methodological variables need to be taken into account when assessing data governance and its possibilities for future utility, especially when undertaken in a

multiple- agency environment. For example, Christensen et al. (2019) found that institutional patterns in *different policy areas* are often the causes of a lack of communication and coordination between various agencies when analyzing data governance. They also found that civil servants working in ministries report better coordination capacity than those working within central agencies. Furthermore, Christie, Rowe, and Pickernell (2009) also found that variables such as *authority-based relationships* had an effect upon overall data governance, rather than interdependence based upon social relationships. Finally, Gabriele's unusual (2015) historical analysis also found that historically, flatter organizational structural models, which offer greater degrees of flexibility to modify, while remaining true to citizen's needs, can help promote more *horizontal* modes of communication—possibly alleviating problems found in authority-based relationships.

4. Case selection

This study targets a complex case of opium addiction problems in Omkoi District, Thailand. As discussed earlier, this case is very challenging because it can be characterized as a wicked problem. Moreover, the agency that is responsible for this case is not any single organization. Rather, it is a network of organizations mandated to work together to solve this problem (Jongruck, 2015). However, the scope of the opium problem is multi-faceted. It is a series of combined and intertwined problems that need to be attended to. To study every angle of the opium problem is not possible within the limits of this study. Hence, only one case is selected, i.e. opium addicted patients' treatments.

This study selects only one working group, i.e. the Working Group on Rehabilitation, Treatment, Monitoring, and Comprehensive Reintegration of Opium Addiction Patients as a case study. As mentioned earlier, the Omkoi area accounted for the majority of Thailand's opium production and the level of opium use in the area was high. To resolve these problems the Centre for Resolution of Security Problems in Omkoi District (CRSPO) was established in 2012. Its mandates were to plan, direct and integrate all activities relating to opium reduction in Omkoi, and to create operational plans to eradicate opium in Omkoi (Jongruck, 2015).

In 2016, the government established a 5-year master plan (2017 – 2021) for combating opium poppy cultivation in Omkoi. The master plan comprised 6 major-strategies and working committees which involved more than 20 organizations to work together in a network. The master plan's 6 major-strategies are 1) Intelligence database, 2) Effective control of opium cultivation, trade and use, 3) Holistic and easy access treatment, 4) Comprehensive prevention from cultivation to addiction, 5) Developing increased involvement within the community, and 6) Modern management (ONCB, n.d.).

After an implementation of the master plan, many organizations have strived to reduce opium production. Consequently, results from the report of NCSMI showed that the opium poppy cultivated areas dramatically reduced from 246.37 hectares in 2014 to 9.05 hectares at the end of 2018 (Centre for Resolution of Security Problems in Omkoi District [CRSPO], 2018). Regrettably, however, the number of opium users—the numbers of opium addicted patients—has not declined.

This present study places specific interest on the 3rd strategy, the holistic process of treatment and rehabilitation. For this strategy, the duties of responsible agents are to find out, identify, treat, and follow-up with opium addicted patients in the area. In order to facilitate education and treatment of patients in the rural areas, the working committees launched around 19 mobile units and dubbed them "Mobile Clinics" to provide outreach service around the Omkoi area.

Omkoi Hospital is the main responsible agency for these mobile units, assisted by staff members from the military, local administrative organizations, Omkoi District Office, local Headmen, and so on (composition varies by location). Omkoi Hospital is the only hospital in the area. It acts as a hub for all information regarding opium addicted patients. The hospital, through its mobile units, has been trying to update patients' information once a month to provide information in order to support other related organizations. In addition, they are working hard to identify new patients to help them quit opium.

According to CRSPO, opium addicted patients are categorized into 4 groups namely 1) unregistered new patients, 2) opium-addicted patients who attended both the hospital

treatment program and spiritual treatment program, 3) opium-addicted people who attended only the spiritual treatment program, and 4) people who completed the hospital treatment program (CRSPO, 2018). It is interesting to point out that while the reported area of poppy cultivation has declined, the number of addicted patients is on the upward trend—i.e. 1,405 in 2017 and 1,501 in 2018 (CRSPO, 2018). Superficially, the number reported can be deceptive. The increase in number of addicted patients came partially from the efforts of the network to identify addicted patients. These newly identified patients are higher or about the same number as the ones who completed the treatment program. This implies that there are many opium addicts in the Omkoi area that have not been identified or come out for treatment, which makes evaluating the success of the program difficult. This is one of the difficulties encountered by the CRSPO.

Holistic treatment and rehabilitation begins with the identification of a newly addicted patient, either by self-identify (voluntary) or identification by local the authority (e.g. village headmen). The patients can choose to participate in the treatment program provided by the hospital or a spiritual program performed by a local spiritual leader. Those who participate in the hospital treatment program will be given a hospital number and will be put into a hospital database. During treatment at the hospital they will be given Methadone as a substitute for opium. Each month, patients will have to go to the hospital or one of the mobile clinics in their areas for a checkup and receive a Methadone refill. Patients stay on Methadone until they feel that they do not need it anymore, then they graduate from this program. Patients who complete this program are eligible for occupational support from the government. The government sector, e.g. Narcotics control office region 5, the Omkoi District Office, will review their eligibility and consider their request for occupational support.

5. Analytical framework

This research study utilizes the data governance framework proposed by Khatri and Brown (2010) as a tool to explain and analyze how a network of organizations handle information (data) in dealing with the opium problem, which is a wicked problem, in the context of a developing country like Thailand.

As observed by Wende (2007), when dealing with data quality management (DQM), most organizations target IT departments and disregard other departments altogether. On the contrary, implementing a data governance framework requires organization-wide information from all departments who are responsible for collecting, managing, storing as well as reporting data (Young & McConkey, 2012). This framework is far more extensive and inclusive than earlier efforts. Data governance concerns not only the quality of the data but also specifies various areas of responsibility for collecting, using, and stewardship of the data. Who is the decision maker in instances when something goes wrong and what kind of decisions can be made (Young & McConkey, 2012).

Khatri and Brown propose a data governance framework, an adapted version of an IT governance framework, to encompass 5 governance domains, specifically: data principles, data quality, metadata, data access, and data lifecycle. The authors place data principles on top of the other 4 domains. Data principle guides the direction of the balance of the decision-making domains. In general, it sets the scope and requirements of intended uses of data and also sets expected conditions or standards for data quality. Data principles are also used as a basis for data interpretation (metadata) and a guideline for making decisions about data access by users. Lastly, data principle is also integrated into the process of making decisions about production of data, retention of data and its expiration (data lifecycle) (Khatri & Brown, 2010).

Picture 1. Decision domains for data governance

<table>
<tr><td colspan="3">Data principles</td></tr>
<tr><td rowspan="2">Data quality</td><td>Metadata</td><td rowspan="2">Data lifecycle</td></tr>
<tr><td>Data Access</td></tr>
</table>

Source: Khatri and Brown (2010)

This framework of data governance will be used to explain and evaluate how well a network of organizations utilize data in order to better handle the treatment of opium addicted patients in Omkoi District, Chiang Mai Province, Thailand. The result of this study will be the basis for creating a sustainable solution for overcoming opium problems using data as a key factor for success according to the data governance framework above.

6. Methodology

Research methods are the tools or instruments which are adopted in conducting research in order to collect empirical data (Bryman, 1989; Guba & Lincoln, 2005; Sarantakos, 2005). Under the scheme of qualitative frameworks, we had managed to combine different methods of data collection, covering various dimensions of the study that are needed and suitable for the real situations in the field. The methods are document research, participatory research and in-depth interview.

6.1 Documentary research

As mentioned before, Omkoi has been announced as a primary targeted area for opium eradication operations. In addition, the author and colleagues have been invited to consult in establishing the 5-years master plan for opium eradication operations. The plan is the road map for operations involving more than 20 institutions; beginning in 2017 and continuing through 2021.

Initially, document research was an early requirement of the project. Doing document research allows us to develop an understanding of the phenomenon in order to picture the whole structure of the wicked opium problem. In the social sciences, this documentary research method is not universally favored. However, there are some social sciences researchers who argue that the documentary research method is an acceptable method when used in conjunction with more traditional research methods (Ahmed, 2010; Mogalakwe, 2009). Payne and Payne (2004, p.60) state that

> *"Documentary methods are the techniques used to categorize, investigate, interpret and identify the limitations of physical sources, most commonly written documents, whether in the private or public domain (personal papers, commercial records, or state archives, communications or legislation)*

Using this type of material in a research study means that the documents are recorded as secondary data sources (Ahmed, 2010). The major groups of documents that have been researched, consist of; 1) Government official documents such as acts, plans, meeting reports and project reports. 2) Books, research and articles relating to data governance, opium eradication and wicked problems.

6.2 Participant observation

Later, in the period of the master plan implementation, the research team has been working with the operation groups in various kinds of projects, such as information management, and community development. According to this mandate, we are allowed to have opportunities to do participatory observation through all the processes of the master plan's operation.

Participant observation is perhaps the most well-known method of data collection within qualitative research. Participant observation refers to the way that researchers embed themselves into the communities they are studying (Bryman, 1988). According to Waddington (2004), participant observation involves the interaction between the researchers and participants within the context of their field of research. The researcher is allowed to observe the everyday life of the participants in their real-life situations. The observers or the researchers observe from inside of the communities, by immersing themselves as community members. As members of these communities, they can investigate many dimensions of the attitudes of the community members (Sarantakos, 1998).

The researcher team has been immersed as the committee members within the cooperation of multiple organizations. Therefore, the researchers have opportunities to observe the actions of the community as insiders. Consistent with the outline of the research, these researchers have observed from within the community from 2015 until

now. The most relevant areas of observation are the activities relating to the data collection of information from the ‘opium addiction patients.’ The researchers have observed the procedures of collecting patients’ information by the responding officers; and through their process of interaction with the patients; the practices of data finding; the criteria of data; the organization of data; the form of data management and the computerization of the data. In addition, the researchers have also investigated the patterns of use of the collected data by the several communities; how the data is accessed; how it is used as a problem-solving tool; and how the data are presented and finally the forms of data presentation.

Investigating from the inside, the researchers can gain access to the ‘real’ actions of involved actors in the ‘real’ circumstances that take place in the ‘real’ lives of the officers and the patients. Over time, we began to understand the advantages and the limitations of the data governance procedures and the characteristics of the collected data.

The following are examples of situations in which the researchers have participated. Firstly, most of the time the researchers attended the annual meeting of the committee and other relevant meetings and seminars. Secondly, the researchers investigated the data processing of the collected data of the working group and other units with responsibility. Moreover, the researchers have also visited the Omkoi hospital several times to observe the ways the hospital officers work with the hospital software. This is important because the hospital is the only unit that has a database of the opium addicted patients. In order to provide knowledge and advice and understand the details in greater depth, an academic scholar focusing on software architecture was invited to the field. This specialist could then criticize the structure of the data collecting software, data processing systems and the accessing or presentation of useful information. Thirdly, the researchers participated with the involved release units when they travelled out to the targeted villages, located in a deep forest, visiting between 2-4 times each year; sometimes going with the mobile units to monitor and provide methadone support for the patients. This allowed the researchers to see the real working process (e.g. capturing data, recording data and interpreting the data.)

6.3 In-depth interview

Because the selected phenomenon is very complex, documentary research and participatory observation may not provide all of the required information. Therefore, an in-depth interview technique was adopted. In-depth interviews or unstructured interviews encourage the researchers to intensively interact with the interviewees. Researchers often use in-depth interview as a companion to participant observation. Participant observers cannot simply conduct only observation. They mostly conduct unstructured interviews or in-depth interviews along with observations (Bryman, 1988).

Boyce and Neale (2006, p.3) give the definition that "in-depth interviewing is a qualitative research technique that involves conducting intensive individual interviews with a small number of respondents to explore their perspectives on a particular idea, program, or situation."

In-depth interviews are an effective and appropriate method when the research approach needs detailed information from some key players, for example, their thinking, attitudes, actions and in-depth experiences. In-depth interview allows participants to provide their personal stories and experiences, which can be different from person to person even though they are living or have been through the same circumstances.

In order to get the deepest information we strategically used the in-depth interview method with some of the key informants, who provided their experiences and perspectives. We talked to many people in the field. However, for the record, the researchers have conducted 19 in-depth interviews among selected persons, who have been working closely with the project in different dimensions. The topics discussed covered various subjects from the list of research objectives.

Since the researchers have spent many days in Omkoi District, we have developed close relationships to a number of local officers, local leaders and others. This relationship allows the interviewees to open their minds and give insightful information from various unique points of view. However, among some key informants, we have

conducted the interviews in an official way. We made a phone call to introduce the objectives of our research project and then made an appointment. The interview took place in their office and occasionally it happened during a mobile unit visit to the village. Before starting the interview, we asked for permission to record the conversation, which was conducted in Thai. To fully cover areas of interest, we did not rigidly follow the discussion guide (Blaikie, 2000).

However, each key informant had different responsibilities and experiences. Therefore, they were asked questions based on the strength of their responsibilities, experiences and knowledge. The interview process took about 1 hour to 2 hours and 30 minutes.

Table 1 The list of the interviewees' information and the topics of the interviews.

No.	Positions	Interview topics	Date
1	• High ranking officer of a Sub-district Administrative Organization • A committee member of the 5-years master plan for opium eradication operations.	• Perspectives on roles of opium in the communities • The lifestyles of the opium users and their interactions with the treatment program • Data governance of opium addicted patients' treatments	September 11, 2018
2	• A high ranking officer of a Sub-district Administrative Organization	• Perspectives on roles of opium in the communities • The lifestyles of the opium users and their interactions with the treatment program • Data governance of opium addicted patients' treatments	September 11, 2018
3	• The operating officer of the local public health unit	• Data collection, processing and distribution • Data governance of opium addicted patients' treatments	September 12, 2018
4	• High ranking officer of Omkoi District • A committee member of the 5-years master plan for opium eradication operations.	• The plan for developing a new data base • Data governance of opium addicted patients' treatments	September 12, 2018

5	• The operating officer of a local public health unit • The person responsible for collecting and processing data	• Data collection, processing and distribution • Data governance of opium addicted patients' treatments	September 12, 2018
6	• A high ranking officer of a Sub-district Administration Organization	• The perspectives and responses of the opium addicts • Data governance of opium addicted patients' treatments	September 12, 2018
7	• A high ranking officer of Omkoi District	• Data governance of opium addicted patients' treatments	September 12, 2018
8	• Policy and plan analysis officers of the Sub-district Administrative Organization	• Budget and plans to support the patients after rehabilitation • Socio-economic status of the communities • Opium and the opium consumption situation • Data governance of opium addicted patients' treatments	September 13, 2018
9	• A high ranking officer of the local army unit responsible to deal with the opium problem. • A committee member of the 5-years master plan for opium eradication operations.	• Opium and drugs suppression operation • Development projects to develop household income in order to substitute opium production • Data governance of opium addicted patients' treatments	September 13, 2018
10	• A high ranking officer of a Sub-district Administrative Organization • A committee member of the 5-years master plan for opium eradication operations.	• Impact of the operation of the master plan on local communities • Data governance of opium addicted patients' treatments	September 13, 2018
11	• The operating officer of Omkoi Hospital	• The HOSxP database of Omkoi Hospital • Operation of the software system	October 22, 2018

		• Data governance of opium addicted patients' treatments	
12	• A high ranking officer of Omkoi District • A committee member of the 5-years master plan for opium eradication operations.	• The roles of Omkoi District • Career preparation/support for patients who have overcome opium addiction • Data governance of opium addicted patients' treatments	October 22, 2018
13	• High ranking officer of Omkoi District.	• The roles of Omkoi District • Career preparation/support for patients who have overcome opium addiction • Operation of the master plan • Data governance of opium addicted patients treatments	October 22, 2018
14	• A software engineer scholar	• The burden of data governance of opium addicted patients' treatment • The development of a new software architecture	October 22, 2018
15	• The operating officer of a Sub-district Administration Organization	• Opium producing, trading and consuming • Data governance of opium addicted patients' treatments	November 3, 2018
16	• A high ranking officer of a Sub-district Administration Organization • A committee member of the 5-years master plan for opium eradication operations.	• Data governance of opium addicted patients' treatments	November 11, 2018
17	• A high ranking officer of a Sub-district Administration Organization •A committee member of the 5-years master plan for opium eradication operations.	• History of opium in the local communities •Data governance of opium addicted patients' treatments	November 11, 2018

18	• A high ranking officer of the Office of the Narcotics Control Board • A committee member of the Master plan	• Rehabilitation programs • Career preparation/support for patients who have overcome opium addiction • Data governance of opium addicted patients' treatments	November 11, 2018
19	• A high ranking officer of the Office of the Narcotics Control Board • A committee member of the Master plan	• Career preparation/support for patients who have overcome opium addiction • Applying data in decision making in the implementation of the plan • Data governance of opium addicted patients' treatments	January 24, 2019

6.4 Data analysis

The data analysis is the reduction of large amounts of information into usable numbers and categories to begin to understand the results of the research project. Distinctively, in social research, the researchers can employ the analyzing processes while they are conducting the field research, in order to assess and evaluate the research findings and develop hypotheses that succinctly summarize the story behind the data and then to construct meaningful conclusions (Sarantakos, 1998). Even though the majority of qualitative researchers apply analysis during data collection, the analytical process of the completed data set is the most important analysis of the study. As Sarantakos (1998, p.342) wrote, "data analysis follows a systematic pattern which enables the researcher to organize data in a constructive way and to facilitate further and more meaningful operations".

Ritchie and Spencer (2002, p.176) opine that "qualitative data analysis is essentially about detection, and the tasks of defining, categorizing, theorizing, explaining, exploring and mapping are fundamental to the analyst's role". The analytical approach is a systematic process dealing with the steps of sifting, charting and sorting information, according to key issues and themes of the research plan (Ritchie & Spencer, 2002).

In this research, we followed the framework of Khatri and Brown (2010) which we believe is most suitable for the aims of this research. Even though we initially analyzed the case in the context of the wicked-problem of opium addicted patients' treatments, we framed the analysis according to a set of five data property domains; *data principles, data quality, meta data, data access and data life cycle*.

7. Research findings

This present study targets mainly the treatment and rehabilitation of opium addicted patients in Omkoi District, Chiang Mai Province, Thailand. Moreover, it is important to note that treatment of the patient is only one side of a multi-faceted opium problem that has been embedded in Thailand for centuries, especially in this area of the country.

This study applies the Khatri and Brown (2010) data governance framework to analyze the performance of this "mandated network" in handling this "wicked problem" and focuses especially on the treatment and rehabilitation of opium addicted patients in one area of Chiang Mai Province. The goal is to examine whether this "mandated network": specifically a Working Group involved in Treatment and Rehabilitation (from now on we will refer to this party as the "Working Group"), is able to develop an effective data governance framework. More specifically, the study aims to evaluate whether the Working Group are able to design and develop a strategic plan for the governance of data (both data treatment and data use) allowing for proper analysis of the information.

The Khatri and Brown (2010) data governance framework requires information relating to who holds data the decision-making rights in five different decision domains: namely *data principles, data quality, metadata, data access, and data life cycle*. According to these authors, data is a crucial asset of any organization (Khatri & Brown, 2010). Unfortunately, the findings of this present study suggest that the outcome of this Working Group did not demonstrate a full utilization of the available data as an asset. In other words, the Working Group are unlikely to be capable of developing, strategizing and designing a data governance framework; problems with the current approach are presented below.

7.1 Data principles

Data principles are decisions that concern ground rules about data as an asset, such as how to use data for business; how to communicate about the use of data within an organization; what are the most desirable ways to employ data as an asset; what are the best practices for sharing and reusing data; and how to regulate the use of the collected data (Khatri & Brown, 2010). In this case of treatment and rehabilitation of opium addicted patients in Chiang Mai Province, the central organization—*data owner/data custodian/data steward/data producer*—is Omkoi Hospital. The operation is based on data from the Hospital, using patients' Hospital Numbers as key informational resources. Omkoi Hospital collects patients' information as needed using the hospital computer database called HOSxP. "This database is composed of patients' general information—such as name, gender, age, and weight—as well as information regarding health issues; including opium addiction. Each person in the data base is assigned a disease number. We treat opium addiction like a disease, so, it is assigned a disease number just like other diseases. When a patient comes to the Hospital, we will know from their Hospital Card that he or she is an opium-addicted patient," said a member of Omkoi Hospital Staff.

However, the needs of information from in-house data consumers is different. For example, the District office, which is responsible for the well-being of the people in the district has different informational needs regarding opium-addicted patients. "The District Office needs to know the true number of opium addicts in the area, not just the number of those who are already in the treatment program." The interviewee from the District Office further stressed that "our office is responsible for the well-being of the people in Omkoi District, not just the patients. We need to see the bigger picture." The interviewee from District Office also stated that "this District office is responsible for post-treatment occupational promotion; thus, we need more than just patients' information in order to know what type of occupation development we should promote in a specific area."

These two examples illustrate the problem that the Working Group has been confronted with. Most importantly, the Working Group rarely discussed data principles nor

recognized data as an asset. There are more than 20 actors that are formally involved in the state-led mandated network for combating opium problems in the Omkoi area. Each of them may recognize information that is important for their own organizational use; however, there are less agreed upon definitions for required data, nor any guidelines on what data is and how it should be treated as an asset. Most importantly, since the issue of data principles has never been formally discussed, there is no integrated plan for guidelines or standards of operation. From the example above, the District Office's focus is on the issue of community development while the Omkoi Hospital's scope is the patient's health data. The differing needs of different members of the working group have not been shared or discussed enough.

Also, there is no clear guideline or standard of operation describing how data should be requested or circulated. "Some data must be requested by formal letter. Some can be inquired via Line Application", said a Local Administrative Officer. "In some cases, data that we collected was unclear and/or incomplete, we need to do it again or we need to collect more data to satisfy requests from other organizations. We do not have the database or software that allows all to access or share", said an Omkoi Hospital member of staff.

In sum, this study finds that the issue of data principles has never formally been on the agenda of either the CRSPO or the Working Group, since it has not been deemed urgent or significant enough to be taken under review by the full committee. Data principles have not been set and agreed among the Working Group, which make other data governance decision domains quite problematic.

7.2 Data quality

The next data governance decision domain is data quality. Data quality is quite straight forward as it sets the standard requirement of data. Bad data can be costly, while good (correct and timely data) can have a greater impact. However, good quality data may differ depending on the need of the end user. The data needs to be accurate, timely, complete, credible, etc. (Khatri & Brown, 2010). In the context of this study, good quality data helps both to treat and eradicate the use of opium in Omkoi District. Hence,

these various uses demand that the information about opium addicts (both those who are already in the problem and who are not) be accurate in areas such as: information about their name (spelling in Thai language), well-being, living standard, health information, education, occupation, treatment, family, social context, and religious belief. Having this information, accurately recorded, can increase the rate of success in treatment tremendously.

However, the major obstacle for good quality data in the Working Group is dealing with a "wicked problem". Experience has demonstrated that accuracy, timeliness, completeness, and credibility of the data regarding opium addiction in Omkoi District, Chiang Mai Province is difficult to achieve.

The fact that Omkoi District is located in a remote mountainous area in the Northern region of Thailand, difficult to reach by car or any means of transportation, makes gathering good quality data rather difficult.

The treatment program for opium addiction in Omkoi District is executed through the administration of methadone. Hospital staff and health volunteers will go to villages on the mountains every month to give out Methadone to opium addicted patients around Omkoi District area. In December 2018, this mobile medical unit went to 19 spots around the Omkoi area. In each area, they will meet with between 30-100 patients. A member of hospital staff said that "We (hospital staff and/or a Methadone distribution mobile unit) collect information about patients who receive Methadone on paper patient cards as well as a "booklet", which patients carry with them as a proof of treatment to show to legal authorities if asked. Our primary concerns for data are a patient's information, such as a patient's name, identification number, age, weight, height, duration of drug (opium use), cigarette use, other drug use and their record of receiving methadone. Information on these paper cards will be put entered into our HOSxP database every month. Patients will then be called by Hospital Number (HN) instead of name."

The aforementioned process of patient information recording is problematic in various ways, including accuracy, timeliness, completeness or even credibility. These problems

are especially acute for Omkoi Hospital, the main data owner and data quality manager. For example, one major problem that was found is the language barrier. Most opium addiction patients in the Omkoi area are indigenous people, mostly Karen ethnic people, who are illiterate and live in extreme poverty. They do not speak—or barely speak—Thai. Thus, information given from patients might be misunderstood or wrongly recorded by staff. For example, writing their Karen name using Thai characters can yield different names (in Thai) for the same person. As a result, one person might be counted multiple times.

Some of the opium-addicted patients are mobile. They go to the cities for work and sometimes do not come back to their village to receive Methadone because of travel difficulties. A Narcotics Control Officer commented that "some patients receive methadone treatment one or two times, then disappear because they have to go find work elsewhere, frequently in other provinces. This group has a high recidivism rate. But we do not have their information. They just disappear. In this case, if they want to continue treatment, we have to refer them to a new hospital. But most of the time, when they come back, they have to start all over again."

7.3 Metadata

The third decision domain is metadata. Metadata or data architecture is about the mechanisms for management of the collected data (Khatri & Brown, 2010). Designers of the data system must know the needs of all parties involved, such as the Office of Narcotics Control, Omkoi Hospital, the Army, the District Office and the Local Administrative Office, before they can develop a system that works for the entire network.

The findings of this study show that the "content" of data the Working Group focuses most heavily on is the patients' hospital information using the HOSxP database. It does not cover other areas of information needed to combat opium addiction problems, such as career development and social security. The software package, HOSxP, does not and cannot respond to the needs of other actors in the network. Hence in order to respond to the specific requirement or need of other agencies rather than the hospital, the

hospital officer, who is a primary responsible agent, will have to manually create a set of data specifically to fit the needs of those who request a set of data relevant to their needs.

From the interviews, this study finds that both the hospital staff and other agencies involved agree that it is better to have a system which has information related to the work of each agency and procedures that allow each of them to have access to the data they need. If this were in place, they would not have to go through the hospital database every time they require information. The current process not only takes time, but also adds an extra burden on the hospital staff, who already face a manpower-shortage problem.

This study, therefore, sought comments from a software engineer expert for thoughts on the best solution to this problem. In order to create an adequate software package, this person claimed "first of all, we should talk to all stakeholders. Find out what they want. What kinds of data they all need? What data the hospital needs? What data the District Office needs? Then start to eliminate duplicated data sets until left with what the Working Group really needs."

"Even though a different software database is created in response to stated needs, this newly created software must be linked to the existing one in order to avoid redundancy". Furthermore, "this new system should be able to allow the mobile units and other units rather than the hospital to input data by themselves", said Omkoi Hospital staff. This process will significantly decrease menial works of the hospital staff and allow opportunity to cross-check with data owners on site, which should result in fewer mistakes. "Instead of exporting data and using an existing program package like Excel to calculate future trends of opium addiction rates, or patient dropouts from the program, this new software should be able to fulfil such a function," commented a District Office employee. Lastly, but not the least important feature of the software, is the level of security access. "The newly designed software should have several levels of security access in order to protect important and sensitive information", commented an officer from The Office of Narcotics Control and the District Office.

In sum, the current data architecture is incomplete as it is based solely on the Hospital database. It is unable to fulfil the work of other organizations in the Working Group, especially the District Office, which is responsible for the well-being of the people in the Omkoi District. “There is no mechanism for long-distance, on-the-spot data entry available for the HOSxP database. The paper-based system is prone to error”, said a member of Omkoi Hospital staff.

7.4 Data access

Data access is the fourth decision domain. As discussed earlier, data regarding opium addiction patients is primarily based on the hospital database called HOSxP. This database only supports the work of Omkoi Hospital and does not support other agencies in the Working Group. In other words, only hospital personnel can access the information recorded in the HOSxP database by using Hospital Numbers (HNs) of the patients or using the disease code for opium addiction. Therefore, the only way to access data regarding opium addiction is through the hospital staff. This present study also finds no protocol in terms of security. Any agency or members of the Working Group and/or CRSPO can request information from the hospital staff and receive it as a matter of courtesy.

One hospital staff member explains that “when we were asked for information, we normally gave them what they requested. Most of the time, the requests came in the form of interpersonal request such as verbal or Line Application, rather than official requests.” “We have to provide patients’ data to the other organizations because we have to work together, but there are no written rules or standards of operational data access to protect patients’ privacy or for the transfer of data.”

With respect to data access, the Working Group does not perform any risk assessment. However, it is understood by all members that the anonymity of the patients is necessary and important for the Working Group’s success. An officer from the Sub-district Administrative Organization explains that “people do not want to participate in the treatment program because they do not want others to know they are an addict.” “Although it is common for people in the village to use opium, it is still illegal. Some

villagers do not trust the authorities. They do not want other people to know," said another officer. "If patients do not trust us, it is difficult for us to do our job," said an officer from The Office of Narcotics Control Office.

A recommendation from this field research is to have a programmer or an IT specialist assigned specifically for this program—the opium addiction patient treatment program. Then, the IT specialist can have control of all information and be able to manage and distribute information according to written and established protocols for such distribution.

7.5 Data life cycle

The last decision in Khatri and Brown's data governance's framework is the data life cycle. Supposedly, the data life cycle is under the control of the data architect or information chain manager, who decides what kind of information should be kept and what is the program for managing filtering, storing, and retiring data (Khatri & Brown, 2010). It is vital that data as an asset must be kept up-to-date. Regrettably, the efforts of the Working Group fall short in this area.

As mentioned several times, Omkoi Hospital is the main data owner/data steward/data custodian and they tend to keep all the information they produce rather than retire unnecessary or unrelated information. The Working Group receives monthly information about patients from the methadone treatment program when patients come to Omkoi Hospital or visit the 19 mobile units to receive Methadone. Every month hospital staff and health volunteers will fill out patient cards and bring them back to the Hospital in order for input into the HOSxP database. With this system, there are new data inputs needed for about 900 patients every month.

The mobile units help Omkoi Hospital, and, by extension, the Working Group, in terms of retaining information about opium-addicted patients in remote areas. However, like other areas in the decision domain, the Working Group does not have a mechanism or regulations regarding length of data retention or when it should be retired and/or moved to other Working Groups.

8. Conclusion and discussion

This study aimed to evaluate data governance as a framework for analyzing the work of a network of organizations that work together to solve an opium addiction problem in a developing country like Thailand. The goal was to understand whether a data governance framework is applicable to 1) the work of this network and 2) in dealing with a complicated social problem known as a "wicked problem." This effort focused mainly on the efforts of The Working Group on Treatment and Rehabilitation of Opium Addicted Patients in Omkoi District, Chiang Mai Province, Thailand.

This Working Group was established as one of many working groups that have been established as integral parts of an effort by the Thai government to combat the use of opium in the Northern Region of the country. The opium problem is complicated and it has been embedded in this region of the country for more than a century; moreover, it cannot be easily solved. This is the reason why this study has categorized opium growth and use as a "wicked problem."

This study applies Khatri and Brown's data governance framework (Khatri & Brown, 2010) to analyze how the Working Group, tasked with reducing the impact of this problem, perform when measured by changes in growth and use over time. From the research findings, this study comes to the very promising conclusion that member organizations of the Working Group realize that data (or in other words, information), is crucial for their individual responsibilities. However, less promising, is the lack of recognition of the importance of integrating data, which is useful to each individual agency. Furthermore, the issue of data as an asset is rarely mentioned within the Working Group—nor among the full Committee. Thus, the very foundation of the data governance framework (i.e. data principles) is very weak, which leads to uncertainty in the other four pillars of decision domains.

In terms of data quality, the existing problems such as language barrier (Thai and Karen), hardships, mobility problems, etc. can be overcome if the Working Group can design metadata or data architecture that integrates the needs of all agencies; moreover,

with some level of security control that allows access limited to only those with a verifiable “need to know”.

The major discovery of this study in terms of data governance is that among these related agencies, governance lacks a strong foundation and common understanding. Moreover, communication among related agencies is hampered by the level of data governance. This low level of understanding of the importance of data corrupts other dimensions of data governance as well. Finally, it is our observation that the Working Group still exists in a semi-analog world; the process of digitization has to be done by hand, which can seriously harm the governance of data. This study demonstrates the need for data governance to be an effective framework for, as Otto (2011) argued below: “a company-wide framework for assigning decision-related rights and duties in order to be able to adequately handle data as an asset.” The decision-making networks at the civic level of Omkoi further require a similar set of structures in place in order to function successfully as social networks that coordinate correctly to deal with this particular wicked problem. Successful achievement of the tasks envisioned by agents involved with this wicked problem will only be accomplished with optimal and effective data usage and governance. These findings correlate with those postulated by Fu et al. (2011) and Kamioka et al. (2016) who argue that quantifiable successes and accountabilities in data governance both lead to organizational improvements. We conclude also that data governance can be applied to a *plural network of organizations*. We further argue that this use of data governance framework is ideally suited to an improvement in dealing with the wicked problem of opium addiction in Omkoi district.

9. Recommendations for practitioners

Implications gathered from this study strongly suggest that the Working Group as well as the CRSPO should focus on setting a higher, more regulated standard for data use and recognize that data is an asset. It is very important that the Working Group set strong and comprehensive data principles, which can be the foundation for determining *data quality, metadata, data access, and data life cycle*. Each organization must define what data is an asset to them and essential for their particular decision-making domain.

The data governance could be specifically designed with the various stakeholders in mind, as well as the various relevant MSP's in mind (Dentoni et al., 2016; Dentoni et al., 2018). Indeed, the production of this data governance and the regulations for data usage should be set by the various MSP's (multi-stakeholder partnerships) involved in this wicked problem. This helps in organizing governance processes in a more rational manner. Furthermore, data governance should be set according to a *localized framework*, which would once again take into account the relationships between various groups in the overall process, whether they be governmental, NGOs, or of another civic relationship to the other relevant agents in the overall process. Accordingly, the use of locally administered 'learning and administrative changes' which would be of benefit to all stakeholders and which would provide open, easy access to data would be incredibly beneficial to the future agencies who are dealing with this wicked problem.

Moreover, a new comprehensive database, including new software, is needed in response to the specified tasks of the Working Group. As discussed, this Working Group is responsible beyond the treatment of patients, but also for rehabilitation, the well-being of the community and the ultimate goal—the eradication of growth and use of opium in the Northern Region of Thailand. The new software, thus, should go beyond the scope of the hospital and must respond well to the needs of all involved partners, with a sophisticated security system. A new software program should be able to be updated and provide real-time tracking information. It should have a user-friendly interface. And most importantly, this new software should be able to link with the already working HOSxP program.

With the accomplishment of these goals, all the working groups could work in a synchronized pattern based on a single integrated database, which will open up more opportunities for further success in handling the treatment of opium-addicted patients in a sustainable way.

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11. References

Ahmed, J. U. (2010). Documentary research method: New dimensions. *Indus Journal of Management & Social Sciences*, *4*(1), 1-14.

Alford, J., & Head, B. W. (2017). Wicked and less wicked problems: a typology and a contingency framework. *Policy and Society*, *36*(3), 397-413.

Alhassan, I., Sammon, D., & Daly, M. (2016). Data governance activities: an analysis of the literature. *Journal of Decision Systems*, *25*(sup1), 64-75.

Bannink, D., & Trommel, W. (2019). Intelligent modes of imperfect governance. *Policy and Society, 38*(2), 198-217. doi:10.1080/14494035.2019.1572576

Begg, C., & Caira, T. (2012). Exploring the SME quandary: Data governance in practise in the small to medium-sized enterprise sector. *The electronic journal information systems evaluation*, *15*(1), 1-11.

Berkes, F. (2004). Rethinking community-based conservation. Conservation biology, 18(3), 621-630.

Blaikie, N. (2000). *Designing Social Research*. Cambridge: Polity.

Boyce, C., & Neale, P. (2006). *Conducting in-depth interviews: A guide for designing and conducting in-depth interviews for evaluation input. Pathfinder International Tool Series*, Watertown, MA: Pathfinder International.

Bryman, A. (1988). *Quantity and Quality in Social research*. London: Routledge.

Bryman, A. (1989). *Research Methods and Organization Studies*. London; New York: Routledge.

Burge J.E., McCall R. (2015). Diagnosing Wicked Problems. In: Gero J., Hanna S. (Eds) *Design Computing and Cognition '14*. New York: Springer, Cham.

Centre for Resolution of Security Problems in Omkoi District [CRSPO]. (2018). *Annual meeting report for the directing board of CRSPO,* Chiang Mai; Centre for Resolution of Security Problems in Omkoi District. (In Thai)

Cheong, L. K., & Chang, V. (2007). The need for data governance: a case study. *Proceedings of ACIS 2007*, 100.

Christensen, T., Lægreid, O. M., & Lægreid, P. (2019). Administrative coordination capacity; does the wickedness of policy areas matter?. *Policy and Society, 38*(2), 237-254. doi:10.1080/14494035.2019.1584147

Christie, M. J., Rowe, P. A., & Pickernell, D. (2009). Unpacking a wicked problem: Enablers/impediments to regional engagement. *Australian Journal of Public Administration, 68*(1), 83-96.

Daviter, F. (2017). Coping, taming or solving: alternative approaches to the governance of wicked problems. *Policy Studies*, *38*(6), 571-588. doi:10.1080/01442872.2017.1384543

Dentoni, D., Bitzer, V., & Pascucci, S. (2016). Cross-Sector Partnerships and the Co-creation of Dynamic Capabilities for Stakeholder Orientation. *Journal of Business Ethics, 135*(1), 35-53. doi:10.1007/s10551-015-2728-8

Dentoni, D., Bitzer, V., & Schouten, G. (2018). Harnessing Wicked Problems in Multi-stakeholder Partnerships. *Journal of Business Ethics, 150*(2), 333-356. doi:10.1007/s10551-018-3858-6

Dewulf, A., & Biesbroek, R. (2018). Nine lives of uncertainty in decision-making: strategies for dealing with uncertainty in environmental governance. *Policy and Society*, *37*(4), 441-458. doi:10.1080/14494035.2018.1504484

Dryzek, J. S. (1993). Policy Analysis and Planning from Science to Argument. In Fischer, F. & Forester, J. (Eds). *The Argumentative turn in policy analysis and planning*, Durham and London; Duke University Press.

Ferlie, E., Fitzgerald, L., McGivern, G., Dopson, S., & Bennett, C. (2011). Public policy networks and 'wicked problems': a nascent solution?. *Public Administration*, *89*(2), 307-324.

Ferro, E., Loukis, E. N., Charalabidis, Y., & Osella, M. (2013). Policy making 2.0: From theory to practice. *Government Information Quarterly, 30*(4), 359-368. doi:https://doi.org/10.1016/j.giq.2013.05.018

Fu, X., Wojak, A., Neagu, D., Ridley, M., & Travis, K. (2011). Data governance in predictive toxicology: A review. *Journal of cheminformatics*, *3*(1), 1-16.

Gabriele, K. R. (2015). Lessons From a Buried Past:Settlement Women and Democratically Anchored Governance Networks. *Administration & Society, 47*(4), 393-415. doi:10.1177/0095399713481600

Gil-Garcia, J. R., & Sayogo, D. S. (2016). Government inter-organizational information sharing initiatives: Understanding the main determinants of success. *Government Information Quarterly*, *33*(3), 572-582. doi:https://doi.org/10.1016/j.giq.2016.01.006

Griggs, S., & Howarth, D. (2018). So Close, but so Far? The Davies Commission and the Contested Politics of UK Airport Expansion. *The Political Quarterly, 89*(3), 427-433. doi:10.1111/1467-923x.12519

Guba, E. G., & Lincoln, Y. S. (2005). *Paradigmatic Controversies, Contradictions, and Emerging Confluences*. In N. K. Denzin & Y. S. Lincoln (Eds.), The Sage handbook of qualitative research (pp. 191-215). Thousand Oaks, CA: Sage Publications.

Gunawong, P., & Gao, P. (2017). Understanding e-government failure in the developing country context: a process-oriented study. *Information Technology for Development*, *23*(1), 153-178.

Hagmann, J. (2013). Information governance–beyond the buzz. *Records Management Journal*, *23*(3), 228-240.

Head, B. W., & Alford, J. (2015). Wicked problems: Implications for public policy and management. Administration & society, *47*(6), 711-739.

Head, L. (2017). Cultural landscapes and environmental change. Routledge.

Holt, V., Ramage, M., Kear, K., & Heap, N. (2015). The usage of best practices and procedures in the database community. *Information Systems*, *49*, 163-181.

Jongruck, P. (2015). From Bureaucracy to (Mandated) Network: A Changing Approach to Opium Eradication in Northern Thailand. In *proceedings of 15th International Research Society for Public Management Conference (IRSPM)*. March 30 – April 1, University of Birmingham, UK.

Jongruck, P. (2019). Network governance and the contemporary opium problem in northern Thailand. *Asian Education and Development Studies* (In press).

Kaehne, A. (2013). Partnerships in Local Government: The case of transition support services for young people with learning disabilities. *Public Management Review, 15*(5), 611-632. doi:10.1080/14719037.2012.698855

Kamioka, T., Luo, X., & Tapanainen, T. (2016). An Empirical Investigation of Data Governance: the Role of Accountabilities. In *proceedings of PACIS*, June 26.

Kennedy, A.-M. (2017). Uncovering wicked problem's system structure: seeing the forest for the trees. *Journal of Social Marketing, 7*(1), 51-73. doi:10.1108/JSOCM-05-2016-0029

Khatri, V., & Brown, C. V. (2010). Designing data governance. *Communications of the ACM*, *53*(1), 148-152.

Kirschke, S., Franke, C., Newig, J., & Borchardt, D. (2019). Clusters of water governance problems and their effects on policy delivery. *Policy and Society, 38*(2), 255-277. doi:10.1080/14494035.2019.1586081

Kreuter, M. W., De Rosa, C., Howze, E. H., & Baldwin, G. T. (2004). Understanding Wicked Problems: *A Key to Advancing Environmental Health Promotion. Health Education & Behavior, 31*(4), 441-454.

Levin, K., Cashore, B., Bernstein, S., & Auld, G. (2012). Overcoming the tragedy of super wicked problems: constraining our future selves to ameliorate global climate change. *Policy Sciences, 45*(2), 123-152. doi:10.1007/s11077-012-9151-0

Marsh, I., Crowley, K., Grube, D., & Eccleston, R. (2017). Delivering Public Services: Locality, Learning and Reciprocity in Place Based Practice.

Australian Journal of Public Administration, *76*(4), 443-456. doi:10.1111/1467-8500.12230

Mogalakwe, M. (2009). The documentary research method–using documentary sources in social research. *Eastern Africa Social Science Research Review*, *25*(1), 43-58.

Mohan, A. K., & Parthasarathy, B. (2016). From hierarchy to heterarchy: The state and the Municipal Reforms Programme, Karnataka, India. *Government Information Quarterly*, *33*(3), 427-434. doi:https://doi.org/10.1016/j.giq.2016.05.007

Office of the Narcotics Control Board [ONCB]. (n.d.). *Master plan: The solving of opium, illicit drugs, and security problem in Omkoi District, chiang Mai Province, Thailand, Five-Year Plan. (2017-2021)*. Chiang Mai: ONCB. (In Thai)

Otto, B. (2011). Organizing Data Governance: Findings from the Telecommunications Industry and Consequences for Large Service Providers. *CAIS*, *29*(3), 1-24.

Payne, G., & Payne, J. (2004). *Key concepts in social research*. Sage. Thousand Oaks; London and New Delhi: Sage.

Peters, B. G. (2017). What is so wicked about wicked problems? A conceptual analysis and a research program. *Policy and Society*, *36*(3), 385-396. doi:10.1080/14494035.2017.1361633

Pierce, E., Dismute, W. S., & Yonke, C. L. (2008). Industry report: the state of information and data governance: understanding how organisations govern their information and data assets. *International Association for Information and Data Quality, Baltimore, MD*

Ritchie, J., & Spencer, L. (2002). *Qualitative Data Analysis for Applied Policy Research. In Analyzing Qualitative Data*, In A. Bryman & B. Burgess (Eds.), *The Qualitative Researcher's Companion* (pp. 173-194). London and New York: Routledge.

Rittel, H. W., & Webber, M. M. (1973). Dilemmas in a general theory of planning. *Policy sciences*, *4*(2), 155-169.

Roberts, N. (2000). Wicked problems and network approaches to resolution. *International public management review*, 1(1), 1-19.

Sarantakos, S. (1998). *Social Research* (2ed). Melbourne: McMillan.

Sarantakos, S. (2005). *Social Research* (3ed). Hampshire: Palgrave Macmillan.

Southby, K., & Gamsu, M. (2018). Factors affecting general practice collaboration with voluntary and community sector organisations. *Health & Social Care in the Community, 26*(3), e360-e369. doi:10.1111/hsc.12538

Sullivan H. & Skelcher C. (2002). *Working Across Boundaries*. Palgrave, Basingstoke.

Termeer, C. J. A. M., Dewulf, A., & Biesbroek, R. (2019). A critical assessment of the wicked problem concept: relevance and usefulness for policy science and practice. *Policy and Society*, *38*(2), 167-179. doi:10.1080/14494035.2019.1617971

Termeer, C. J. A. M., Dewulf, A., Breeman, G., & Stiller, S. J. (2015). Governance Capabilities for Dealing Wisely With Wicked Problems. *Administration & Society*, *47*(6), 680-710. doi:10.1177/0095399712469195

Thomas, G. (n.d.). The DGI data governance framework. Retrieved from http://www.datagovernance.com/wp-content/uploads/2014/11/dgi_framework.pdf

Thompson, N., Ravindran, R., & Nicosia, S. (2015). Government data does not mean data governance: Lessons learned from a public sector application audit. *Government Information Quarterly, 32*(3), 316-322.

Waddell, S. (2016). Societal Change Systems: A Framework to Address Wicked Problems. *The Journal of Applied Behavioral Science, 52*(4), 422-449. doi:10.1177/0021886316666374

Waddington, D. (2004). Participant Observation. In Essential Guide to Qualitative Methods in Organizational Research, In C. Cassell & G. Symon, (Eds.), *Essential Guide to Qualitative Methods in Organizational Research* (pp. 154-164). Thousand Oaks; London and New Delhi: Sage.

Walls, H. L. (2018). Wicked problems and a 'wicked' solution. *Globalization and Health, 14*(1), 34. doi:10.1186/s12992-018-0353-x

Weber, E. P., & Khademian, A. M. (2008). Wicked Problems, Knowledge Challenges, and Collaborative Capacity Builders in Network Settings. *Public Administration Review, 68*(2), 334-349. doi:10.1111/j.1540-6210.2007.00866.x

Weber, K., Otto, B., & Österle, H. (2009). One size does not fit all---a contingency approach to data governance. *Journal of Data and Information Quality (JDIQ), 1*(1), 1-27.

Wende, K. (2007). A model for data governance-Organising accountabilities for data quality management. *In proceedings of 18th Australasian Conference on Information Systems (ACIS 2007),* December 5-7, Toowoomba.

Young, A., & McConkey, K. (2012). Data Governance and Data Quality: Is It on Your Agenda?. *Journal of Institutional Research, 17*(1), 69-77.

Appendix 1: Summary of review articles on wicked problems

No.	Articles: authors, titles, and outlets	Research objective	Context of study	Finding
1	Alford, J., & Head, B. W. (2017). Wicked and less wicked problems: a typology and a contingency framework. Policy and Society, 36(3), 397-413. doi:10.1080/14494035.2017.1361634	Instead of a one-size-fits-all approach to wicked problems, the objective is to create a more nuanced analysis of wicked problems arguing that complex problems vary in the extent of their wickedness, due to their degree of cognitive complexity, diversity and the irreconcilability of the actors or institutions involved.	The particular problem of "the war on drugs."	Having commenced with the simple device of focusing on the two irreducible elements of wicked situations: the problem itself and the actors involved in a two-dimensional matrix, it was found that a more contingent approach is necessary, and we have put forward *this typology* to enable distinctions to be drawn between different forms of problems.
2	Bannink, D., & Trommel, W. (2019). Intelligent modes of imperfect governance. Policy and Society, 38(2), 198-217. doi:10.1080/14494035.2019.1572576	The authors aim to show that the treatment of wicked problems in the literature on public administration approaches is inadequate. A wicked problem does not allow perfect solutions, but instead requires *imperfect*, but *intelligent* responses.	A general review article not bound within a single geographic area.	A wicked problem in itself does not allow perfect, but instead only imperfect responses. *Four or which are:* *social problems are a fact of life; we should use piecemeal social engineering to deal with them; we need to use sociological imagination and to find ways to make the problems less intractable.*

3	Christensen, T., Lægreid, O. M., & Lægreid, P. (2019). Administrative coordination capacity; does the wickedness of policy areas matter? Policy and Society, 38(2), 237-254. doi:10.1080/14494035.2019.1584147	To discover to what degree the variations in perceived coordinating capacity can be explained by structural and cultural features, particularly in "Wicked problem" areas. How do civil servants perceive the overall coordination capacity? Are perceived coordination capacities different in the wicked policy areas of climate change, immigration and policy compared to other policy areas? To what degree can structural and cultural features explain the variation in perceptions of overall coordinating capacity?	2322 Civil servants in the Norwegian central government: paying particular attention to coordination problems between ministries and central agencies.	Civil servants working in the three various wicked problem policy areas of immigration, policing and homelessness score lower overall, on *perceived coordination* capacity than civil servants in other policy areas perhaps because these policy areas are characterized by more complex institutional patterns and therefore they struggle more to coordinate. Moreover, civil servants working in ministries report better coordination capacity than those working in the central agencies.
4	Christie, M. J., Rowe, P. A., & Pickernell, D. (2009). Unpacking a Wicked Problem: Enablers/Impediments to Regional Engagement. Australian Journal of Public Administration, 68(1), 83-96. doi:10.1111/j.1467-8500.2009.00613.x	The question of what are the key LGA (Local Government Authorities') enablers/impediments to regional engagement? is addressed.	The study occurred in Australia but the specific region was kept confidential.	A key finding is the low trust between the triple helix selection environments –government, industry and institutions. Moreover, low trust prevents the emergence of patterns of complex behaviour that are critical to the emergence of an effective triple helix network system. For example, dependency was premised upon authority relationships rather than interdependence based on social relationships.

5	Daviter, F. (2017). Coping, taming or solving: alternative approaches to the governance of wicked problems. Policy Studies, 38(6), 571-588. doi:10.1080/01442872.2017.1384543	Rather than advocate for some universally applicable approach to the governance of wicked problems, the article asks under what conditions different ways of governing wicked problems are analytically reasonable and normatively justified.	N/A	Holistic approaches to wicked problems risk reviving the ideals of synoptic problem-solving despite decades of research showing why this route is counter-productive, especially in the case of complex and cross-cutting policy problems. *Wicked problems encompass both analytical and administrative challenges*, and any strategy must bear these in mind. There should also be a move toward the *more focused analysis of the different dimensions of wicked problems*.
6	Daviter, F. (2019). Policy analysis in the face of complexity: What kind of knowledge to tackle wicked problems? Public Policy and Administration, 34(1), 62-83. doi:10.1177/0952076717733325	To investigate the substantive challenges of policy analysis in the face of growing complexities and the substantive problems of policy analysis from a procedural perspective	N/A	The authors concluded that a more systematic assessment of alternative approaches of problem governance requires a reorientation of the debate away from the conception of wicked problems as a singular type toward the more focused analysis of different dimensions of problem wickedness.
7	Dentoni, D., Bitzer, V., & Pascucci, S. (2016). Cross-Sector Partnerships and the Co-creation of Dynamic Capabilities for Stakeholder Orientation. Journal of Business Ethics, 135(1), 35-53. doi:10.1007/s10551-015-2728-8	This paper explores the relationship between business experience in cross-sector partnerships (CSPs) and the co-creation of what we refer to as 'dynamic capabilities for stakeholder orientation. This co-creation of dynamic capabilities for stakeholder orientation is crucial for CSPs to create societal impact, as stakeholder-oriented organizations are more suited to deal with ''wicked problems.''	Multi-national companies and their stakeholders. *Unilever, Friesland Campina, Sara Lee* and *Heinz*	A pattern of increasing and then decreasing sensing capabilities was observed (Sensing is the ability of identifying both existing and potential stakeholders and understanding their needs and demands) across the four companies. In the context of wicked problems faced by CSPs (Cross Sector Partnerships) and the problem of coordination, participants in both CSPs and society would benefit from organizations that are able to re-deploy their resources and capabilities based on a continuous process of stakeholder identification and engagement (Ferrell et al. 2010; Freeman 2010; Hult 2011).

8	Dentoni, D., Bitzer, V., & Schouten, G. (2018). Harnessing Wicked Problems in Multi-stakeholder Partnerships. Journal of Business Ethics, 150(2), 333-356. doi:10.1007/s10551-018-3858-6	To examine the harnessing of problems in multi-stakeholder partnerships (MSPs) through the approach of taking into account the nature of the problem, and then of organizing governance processes accordingly.	The sample was a *Roundtable on Sustainable Palm Oil*	Taken together, the three interrelated processes of deliberation, decision-making and enforcement reflect an interconnected, nonlinear process over time in which the key dimensions of wicked problems can potentially be harnessed: 1. Harnessing knowledge uncertainty: collectively gathering, interpreting and using data on the causes, symptoms and consequences of the problem that the partnership aims to tackle. 2. Harnessing value conflict: collectively gathering, interpreting and synthesizing the variety of values represented by the stakeholders influencing or affected by the problem at hand, in particular those that are not permanent MSP members. 3. Harnessing dynamic complexity: collectively gathering knowledge from stakeholders and making sense of how the problem is evolving over time.
9	Dewulf, A., & Biesbroek, R. (2018). Nine lives of uncertainty in decision-making: strategies for dealing with uncertainty in environmental governance. Policy and Society, 37(4), 441-458. doi:10.1080/14494035.2018.1504484	To bring together different strands of the *literature on uncertainty* in complex environmental issues either on the substance of an issue (e.g. in environmental sciences) or on the decision-making process (e.g. policy sciences) in order to present a novel analytical framework.	N/A	**The three types of uncertainty are**: Epistemic (involving lack of knowledge of a system) Ontological (irreducible unpredictably due to inherent complex system behavior) Ambiguity (conflicts between fundamentally different frames about the issue at hand). **The three possible objects of uncertainty are**: Substantive uncertainty (uncertainty about the content of policy decisions)

				Strategic uncertainty (uncertainty about the actions of other actors in the decision-making process) Institutional uncertainty (uncertainty about the rules of the game in decision-making). The authors believe an approach involving *this range of uncertainties* will aid future investigation of wicked environmental problems.
10	Ferro, E., Loukis, E. N., Charalabidis, Y., & Osella, M. (2013). Policy making 2.0: From theory to practice. Government Information Quarterly, 30(4), 359-368. doi:https://doi.org/10.1016/j.giq.2013.05.018	To assess the potential and the challenges of a centralized cross-platform approach to social media by government agencies in their policy making processes and to develop a multi-dimensional framework for an integrated evaluation of such advanced practices.	Piedmont Region of Italy	The findings in this study indicate that this ICT (Information and Communication Technology) intervention in the policy making processes of government *agencies can create considerable value,* which is shaped both by features of the technologies used (e.g. ease of use and extensive content generation capabilities of the social media platforms) and also by human agency and culture (e.g. government agencies' political tradition concerning interactions.
11	Gabriele, K. R. (2015). Lessons From a Buried Past:Settlement Women and Democratically Anchored Governance Networks. Administration & Society, 47(4), 393-415. doi:10.1177/0095399713481600	This article examines the work of *the settlement women* of The Progressive Era (The Progressive Era was most active in the early 20th century and led to the 19th Amendment allowing women to vote) and explores how contemporary network managers can adapt and apply valuable but frequently overlooked managerial lessons from the field's history.	Historical context of the United States.	The combination of collaborative decision-making with disparate actors, which encourages citizen engagement and the evaluation of both outcomes and processes, organically results in a flatter organizational structure. This in turn promotes horizontal modes of communication, strong democratic anchorage, and an improved ability to address wicked problems.

12	Gil-Garcia, J. R., & Sayogo, D. S. (2016). Government inter-organizational information sharing initiatives: Understanding the main determinants of success. Government Information Quarterly, 33(3), 572-582. doi:https://doi.org/10.1016/j.giq.2016.01.006	To systematically identify and test some important determinants of the success *of inter-organizational collaboration and information sharing* initiatives through quantitative empirical analysis.	Sampling Data were based on a national survey of government managers from two policy domains (criminal justice and public health) in the United States. Subsequent to the original random sample of 173 responses the analysis was based on 158–160 responses from the criminal justice and public health areas (at all levels of government).	The authors found that compatibility of technical infrastructure and formally assigned project managers were the two most important predictors explaining the success of inter-organizational information sharing initiatives.
13	Griggs, S., & Howarth, D. (2018). So Close, but so Far? The Davies Commission and the Contested Politics of UK Airport Expansion. The Political Quarterly, 89(3), 427-433. doi:10.1111/1467-923x.12519	To explore the challenges of reaching a settlement for a new Runway at Heathrow Airport this article characterises *the shifting and contested political and policy contexts of UK aviation.*	London, England (specifically Heathrow Airport)	The focus of discussion was narrowed (more or less) to the case for Heathrow expansion, and the conditions that should be satisfied if a third runway is given the green light.
14	Head, B. W. (2010). Public Management Research. Public Management Review, 12(5), 571-585. doi:10.1080/14719031003633987	Are public management researchers sufficiently addressing the contemporary challenges and changes in the real world of public management, including the challenges identified by public management practitioners themselves.	2322 Civil servants in the Norwegian central government	Some future lines of inquiry to follow in the future are: *Clearer problem-definition, identification of evidence-based issues, the successful tackling of programme implementation issues, coordination issues, evaluation issues* and finally *the issues of responsibility and flexibility.*

15	Head, B. W. (2019). Forty years of wicked problems literature: forging closer links to policy studies. Policy and Society, 38(2), 180-197. doi:10.1080/14494035.2018.1488797	To outline and assess improvements in how agencies have learnt to deal with wicked problems and how they have developed more effective policy responses	Mainly theoretical	In the future researchers should draw more deeply on cutting-edge developments in **contemporary policy sciences**. Governments also need to embrace **stakeholder pluralism**, acknowledge the limits of current knowledge, while developing procedural reforms to make policymaking more open and transparent. **Constructivism is encouraged** for its emphasizing of the role of dialogue and conflict resolution as methods to overcome new challenges
16	Head, B. W., & Alford, J. (2015). Wicked Problems: Implications for Public Policy and Management. Administration & Society, 47(6), 711-739. doi:10.1177/0095399713481601	To turn the challenging features of wicked problems for government organizations into *more nuanced categories*, while also seeking to understand those governmental factors that make them especially *difficult for policy makers, public managers, and policy scholars to address*.	N/A	Provisional solutions despite governmental obstacles include*: Going beyond current technical/rational thinking, collaborative working, new modes of leadership* and *reforming the managerial infrastructure of government.*
17	Hovik, S., & Hanssen, G. S. (2015). The Impact Of Network Management And Complexity On Multi-Level Coordination. Public Administration, 93(2), 506-523. Doi:10.1111/Padm.12135	To illuminate how the important role of *network management on multi-level coordination* is conditioned by complexity. How does the *institutional complexity* of the network affect the outcome, understood as perceived coordination? How do different network management strategies influence the relationship between complexity and coordination?	Norway: The data being analysed stems from two national surveys, funded by the Norway research council.	The *more complex networks score better on coordination*, not supporting the general assumption of a negative relation between network complexity and outcome. Moreover, *network management intensity*, implying that the coordinators are active, visible, and make use of many strategies, is important for achieved coordination. There are also clear indications that what is *the most promising network management strategy depends upon institutional complexity*.

18	Kaehne, A. (2013). Partnerships in Local Government: The case of transition support services for young people with learning disabilities. Public Management Review, 15(5), 611-632. doi:10.1080/14719037.2012.698855	To examine the type of partnership that needs to be formed to deliver the wicked problem of transition support services for young people with learning disabilities.	Semi structured interviews with 30 professionals from various agencies were conducted in Cardiff, UK.	Young people and parents as the stakeholders in current transition partnership arrangements mainly fail to benefit from current practices. For example, whilst the young people are not consistently offered alternative options, parents' first preferences for post-school placements are often disregarded in the process. There needs to be improvements in partnerships across the board.
19	Kennedy, A.-M. (2017). Uncovering wicked problem's system structure: seeing the forest for the trees. Journal of Social Marketing, 7(1), 51-73. doi:10.1108/JSOCM-05-2016-0029	To provide social marketers with a *theoretically based framework* for approaching strategy formation for wicked problems.	N/A	The prescription thus developed for approaching wicked problems' system structure revolves around identifying the individuals, groups or entities that make up the system involved in the wicked problem, and then determining which social mechanisms most clearly drive each entity and which outcomes motivate these social mechanisms.
20	Kirschke, S., Franke, C., Newig, J., & Borchardt, D. (2019). Clusters of water governance problems and their effects on policy delivery. Policy and Society, 38(2), 255-277. doi:10.1080/14494035.2019.1586081	The classifiers "wicked" and "tame" problems are often used in social policy but do distinct 'wicked' or 'tame' problems empirically exist?	Data were collected between November 2014 and January 2016 through 65 semistructured interviews with leading experts from both scientific and practical areas of expertise. Also, this empirical analysis refers to the operation of the European Water Framework Directive in Germany	Factor analysis shows that the five dimensions of wickedness can be reduced to three factors, namely factor 1 ('system complexity'), factor 2 ('goals') and factor 3 ('informational uncertainty') These results may point to more possibly complex effects of problem types on solutions, moving *beyond simple dichotomies of success and failure of wicked and tame problems.*

21	Levin, K., Cashore, B., Bernstein, S., & Auld, G. (2012). Overcoming the tragedy of super wicked problems: constraining our future selves to ameliorate global climate change. Policy Sciences, 45(2), 123-152. doi:10.1007/s11077-012-9151-0	The research focuses on interventions and institutional arrangements to overcome a governance tragedy—in this case, the one inherent to **super wicked problems.** In this case *climate change*. What can be done to create stickiness making reversibility immediately difficult? What can be done to entrench support over time? What can be done to expand the population that supports the policy?	Climate Change Debate.	The authors argue that an "**applied forward reasoning**" approach is better suited for social scientists seeking to address climate change, which they characterize as a "super wicked" problem comprising four key features: time is running out; those who cause the problem also seek to provide a solution; the central authority needed to address it is weak or non-existent; and, partly as a result, policy responses *discount the future irrationally*. These four features combine to create a policy-making "tragedy" where traditional analytical techniques are ill equipped to identify solutions,
22	Marsh, I., Crowley, K., Grube, D., & Eccleston, R. (2017). Delivering Public Services: Locality, Learning and Reciprocity in Place Based Practice. Australian Journal of Public Administration, 76(4), 443-456. doi:10.1111/1467-8500.12230	What are the necessary conditions for establishing a governance regime that can support contextualised place-based solutions while maintaining accountability? How have place-based approaches been conceptualised in other jurisdictions, and how effective are they? Can regimes based on centrally determined targets and top-down performance management migrate to more cost-effective, place-based practice?	The study describes practices *the United Kingdom, the EU, and the United States*. And it explores efforts over the past decade to 'localise' indigenous services not only in in these regions but also in *Australia.*	The study suggests that the answers to the research questions – such as place-based approaches themselves – are highly contextual and *therefore localised context, embedded learning, and reciprocal accountability are all necessary components for place-based governance* and the infrastructure for centralised to place-based practice already exist; *but that these need to be re-oriented around 'learning' and administrative changes.*

23	Martin, S., & Guarneros-Meza, V. (2013). Governing local partnerships: does external steering help local agencies address wicked problems? Policy & Politics, 41(4), 585-603. doi:10.1332/030557312X655819	This paper examines what kinds of self-steering *local public service partnerships* require in order to address intractable public policy problems, and whether external steering by government helps or hinders them. How have the partners in these networks collaborated in order to address 'wicked problems'? What forms of self-steering do these partnerships exhibit? Has external steering by government helped or hindered them?	All in Wales, UK. A sampling of local partnerships (LSBs) involved with health authorities, the police and other local organisations to solve wicked problems. Next, three organisations were identified for further study. 17 semi-structured interviews with manager's responsible for day to day operations within these organizations were conducted.	The authors conclude that, contrary to some theories of network effectiveness, external steering has been beneficial. However, it is important to differentiate between 'hard steering', by which we mean attempts by government to dictate how partnerships operate through the imposition of top down targets and performance regimes, and 'soft steering', which they define as the provision by governments of funding, information and expertise. The authors also find that soft steering played an important role in helping to establish and mobilise the local partnerships.
24	McConnell, A. (2018). Rethinking wicked problems as political problems and policy problems. Policy & Politics, 46(1), 165-180. doi:10.1332/030557317X15072085902640	To ascertain how, in the context of liberal democracies, how do we identify and explain the role of 'politics' in shaping government responses to wicked policy problems?	N/A	A *pessimistic view* is that there is little we can do about wicked problems in the absence of deeper structural changes in society. An *optimistic view* is that strong, visionary leaders who are 'constraint challengers' (Keller, 2005) can make a difference (witness the phenomenon of Donald Trump and his supporters). 'Agents' can triumph over 'structure'. *A pragmatic view* offers some hope without being overly optimistic. Progress can made through piecemeal reforms over the years (Lindblom, 1977; Rose, 2005), even if at times the reforms don't quite live up to expectations.

25	Mohan, A. K., & Parthasarathy, B. (2016). From hierarchy to heterarchy: The state and the Municipal Reforms Programme, Karnataka, India. Government Information Quarterly, 33(3), 427-434. doi:https://doi.org/10.1016/j.giq.2016.05.007	Drawing on the *Municipal Reforms Programme* in Karnataka, India, this paper aims to highlight the varied manifestations of the state's centrality to argue that not all manifestations facilitate meta-governance	*The Municipal Reforms Programme in India*. The qualitative research framework used semi-structured interviews and participant observation of both the user groups and the service providers at the *provincial and the municipal level* in Karnataka, India. In addition, interviews with policy makers and senior level state representatives at *the national level* were also conducted.	The objective of achieving an effective state through e-governance was diluted with the emphasis on development and deployment of technology, rather than on addressing critical governance challenges. It was for this reason that most respondents claimed *dissatisfaction with the reforms programme.*
26	Monstadt, J., & Schmidt, M. (2019). Urban resilience in the making? The governance of critical infrastructures in German cities. Urban Studies, 56(11), 2353-2371. doi:10.1177/0042098018808483	This paper investigates the current preparedness levels of various cities in Germany to mitigate the impacts of different external infrastructural threats.	This is a qualitative study in terms of data collected (mainly open-ended questioning) quantitative type sampling procedures were followed to ensure good representation across the geographic areas of interest.	Cities' resilience to infrastructure failures can best be described as currently being in a state of '*local experimentation'* and *experience of crises* do more to implement preparedness. Finally, the complex task of urban infrastructure governance exceeds the problem-solving capacities of individual stakeholders.
27	Nohrstedt, D. (2016). Explaining Mobilization and Performance of Collaborations in Routine Emergency Management. Administration & Society, 48(2), 135-162. doi:10.1177/0095399712473983	This study investigates plausible explanations for collaborative activity and outcomes in response to extreme winter conditions in Sweden.	A web-based survey conducted by the *Swedish Agency for Civil Emergency Planning in 2010*. Targeting mangers in 66 organizations at national, regional, and local levels in Sweden.	The predictability and relatively limited scope of routine emergencies (compared with disasters) offers a straightforward explanation as to why *organizations affected by disruption do not engage in collaboration.* Prior experience of natural disasters also does not affect preparatory work; in general, collaborative variables do not correlate with emergency situations.

28	Noordegraaf, M., Douglas, S., Geuijen, K., & Van Der Steen, M. (2019). Weaknesses of wickedness: a critical perspective on wickedness theory. Policy and Society, 38(2), 278-297. doi:10.1080/14494035.2019.1617970	Would wickedness literature be strengthened by further emphasizing *situated relations, routines and rituals, adopting the perspective of situated wickedness*? The question is asked with reference to two specific cases, (counter) terrorism and forced migration/refugees.	2016 case study of Dutch counterterrorism strategy, fed by a policy document review, interviews with 60 of the national and local actors involved, and mapping of the key processes and routines the various organizations used to deal with terrorism. The forced migration case was examined in three phases: in 1997/8, 2001/2 and 2017/18. Policy documents were analyzed, observations of daily practices were done, and 164 interviews were conducted with local and national actors, including professionals, managers and asylum seekers.	Wickedness theory and literature would be strengthened by further emphasizing situated relations, routines and rituals, adopting the perspective of situated wickedness because: *(1) the daily experiences of people and their practices are missing from the grand narratives about wickedness,* *(2) the potential of collaborations and learning to address these problems is romanticized,* *(3) the implications for managerial and professional perspectives are unclear.*
29	Peters, B. G. (2017). What is so wicked about wicked problems? A conceptual analysis and a research program. Policy and Society, 36(3), 385-396. doi:10.1080/14494035.2017.1361633	To try to find a stricter criteria by which to measure and assess wicked problems, using a rudimentary research programme.	N/A	Policy makers have been asked about environmental problems, social policy problems, and then policy-making in general. None of these problems were considered particularly *wicked* by the sample of experts. This extremely preliminary attempt to research how policy-makers may consider policy problems, and especially wicked problems, should be supplemented by attempts to analyse how researchers and academics conceptualise wicked, and super-wicked problems.

30	Southby, K., & Gamsu, M. (2018). Factors affecting general practice collaboration with voluntary and community sector organisations. Health & Social Care in the Community, 26(3), e360-e369. doi:10.1111/hsc.12538	This paper aims to add to the knowledge base around collaborative practice between GPs and VCS (voluntary community sector) organisations by examining the factors that aid or inhibit such collaboration in helping patient's wicked problems.	Four GP/VCS pairs were selected in Sheffield, England and agreed to participate. In addition, 18 one-on-one interviews and a single focus group was reported.	GPs and VCS organisations developed individual ways of working in accordance with *their local context*, with some being more collaborative than others. Generally, the role of the VCS was to receive the "prescribed" patient and provide the holistic and social support that GPs were unable to provide. Finally, GP- VCS collaborations had "no real structure" and relied on the good will of individuals.
31	Termeer, C. J. A. M., & Dewulf, A. (2019). A small wins framework to overcome the evaluation paradox of governing wicked problems. Policy and Society, 38(2), 298-314. doi:10.1080/14494035.2018.1497933	This paper analyzes how the concept of small wins can contribute to evaluating progress in wicked problem areas in a way that energizes a variety of stakeholders instead of paralyzing them and embraces complexity instead of reverting to taming and overestimation. It also presents a "small wins evaluation "framework.	N/A	The policy perspective of continuous change through accumulating small wins is promising for making progress in **complex wicked problem areas**, because it allows people to embrace *ambiguity*, *uncertainty*, and *interconnectedness* and to welcome new understandings rather than tame wickedness. It's not easy to identify small wins, as they typically emerge under the radar of public attention and are hard to find. The authors distinguish a number of crucial characteristics: Energising, Learning by doing, Logic of attraction, Bandwagon, Coupling, Robustness.
32	Termeer, C. J. A. M., Dewulf, A., & Biesbroek, R. (2019). A critical assessment of the wicked problem concept: relevance and usefulness for policy science and practice. Policy and Society, 38(2), 167-179.	A discussion of a number of *ontological*, *theoretical* and *methodological* issues around the concept of "wicked problems".	N/A	The concept of wicked problems can be considered generative, because it has inspired much research in many research fields, but it has also created confusion, because it lacks analytical precision and has been used in very different ways. Framing something as a wicked problem in policy practice can breed neglect *but can also be an antidote against oversimplification and*

	doi:10.1080/14494035.2019.1617971			*unrealistic assumptions about policy interventions*.
33	Termeer, C. J. A. M., Dewulf, A., Breeman, G., & Stiller, S. J. (2015). Governance Capabilities for Dealing Wisely With Wicked Problems. Administration & Society, 47(6), 680-710. doi:10.1177/0095399712469195	To analyse whether the following four governance capabilities are essential for addressing wicked problems? (1) reflexivity, or the capability to deal with multiple frames; (2) resilience, or the capability to adjust actions to uncertain changes; (3) responsiveness, or the capability to respond to changing agendas and expectations; (d) revitalization, or the capability to unblock stagnations. (1) How do actors observe and analyze the wickedness of societal problems in a meaningful way, and what modes of observation are available to them? (2) Which action strategies could they develop to handle the wickedness of problems? and (3) Which conditions relating to the governance system enable meaningful modes of observing and acting?	The research question is addressed to examples from the sustainable food production of the European Union's Common Agricultural Policy.	Wicked problems not only require alternative action strategies but also alternative ways of observing and enabling. Four governance capabilities are essential: (1) reflexivity, or the capability to deal with multiple frames; (2) resilience, or the capability to adjust actions to uncertain changes; (3) responsiveness, or the capability to respond to changing agendas and expectations; (4) revitalization, or the capability to unblock stagnations.

34	Trujillo, D. (2018). Multiparty Alliances and Systemic Change: The Role of Beneficiaries and Their Capacity for Collective Action. Journal of Business Ethics, 150(2), 425-449. doi:10.1007/s10551-018-3855-9	To investigate how cross-sector (private, public and social sector) collaborations lead to systemic change in relation to tackling society's most wicked problems	Sampling: embedded case study design: two cases of alliance-based interventions in Colombia Two regions with maximum variation in their history of social mobilization: *Middle and Central Magdalena Peace and Development Corporation*	Participants described five mechanisms CSC uses to build beneficiaries' capacity, to assist beneficiaries in their transition from emergent to enacted collective action capacity, and to create systemic change. These processes are: *brokering trust, creating spaces, building bridges, circulating capitals, and buffering relationships*.
35	Waddell, S. (2016). Societal Change Systems: A Framework to Address Wicked Problems. The Journal of Applied Behavioral Science, 52(4), 422-449. doi:10.1177/0021886316666374	To develop the concept of a "societal change system" (SCS) as a framework to support addressing the organizing challenge inherent in tackling wicked, messy, complex and metalevel problems. encountered by entities, such as the UN's *Sustainable Energy for All* programme.	Research focuses on *Sustainable Energy for All (SE4All),* a United Nations initiative to integrate sustainability concerns into the production of electricity.	Developing effective SCSs is critical to respond to wicked problems. Their development and the methodology described here reflect Loorbach's systemic innovation concept of creating conditions favorable for co-evolutionary development of new ways of thinking, organizing and practicing around a (technological or other) alternative. (Loorbach, 2014, p. 40). It's also crucial to understand that an SCS's success is related to the ability to realize seven functions: visioning, organizing, resource mobilization, learning, measuring, advocating, and prototyping.

36	Walls, H. L. (2018). Wicked problems and a 'wicked' solution. Globalization and Health, 14(1), 34. doi:10.1186/s12992-018-0353-x	To investigate what will it take to create the '*tipping point'* needed for effective action in dealing with current wicked problems.	Netherlands A recent (2015) court ruling in The Hague, using the principles of tort law to address civil wrong-doings, held that the Dutch government's stance on climate change was illegal, and ordered them to cut greenhouse gas emissions.	The Dutch court ruling may be the 'tipping point' needed to force governmental regulatory change – something often hampered by conflicting stakeholder views and strong industry lobbies – by raising the political priority of the issue, and cutting through gridlock caused by institutional power imbalances by handing government a strong and legally binding mandate on which to act.
37	Weber, E. P., & Khademian, A. M. (2008). Wicked Problems, Knowledge Challenges, and Collaborative Capacity Builders in Network Settings. Public Administration Review, 68(2), 334-349. doi:10.1111/j.1540-6210.2007.00866.x	To investigate the possibility of mediating the variance in value assigned by different participants to particular information in a network in order to find ways in which this knowledge can be distributed among participants, and integrated to form a base of knowledge that can be used by the network to address the wicked problem	N/A	Any effort to effectively manage a wicked problem will require efforts to draw on a broad range of knowledge, to develop a new base of knowledge to address the complexities of the wicked problem and to serve as a premise for cooperation, and an ongoing effort to transfer, receive, and integrate knowledge.
38	Wood, M. (2015). Beyond Accountability: Political Legitimacy and Delegated Water Governance in Australia. Public Administration, 93(4), 1012-1030. doi:10.1111/padm.12178	To apply *a new conceptual model* based on organizational sociology and identifying multiple dimensions along which legitimacy to govern is lost and won, and hence authority secured.	*Murray–Darling Basin Authority*; an Australian water agency	The article shows multiple overlapping dimensions along which legitimacy is won (cognitive and moral) and lost (pragmatic). The article hence demonstrates the value of a framework analysing three forms of political legitimacy and may be systematized for use in further comparative analyses.

39	Zyzak, B., & Jacobsen, D. I. (2019). External managerial networking in meta-organizations. Evidence from regional councils in Norway. Public Management Review, 1-21. doi:10.1080/14719037.2019.1632922	To map managers' networking capabilities, more specifically the intensity of their external networking abilities.	A political-administrative meta-organization: regional councils in Norway.	It is not the case that there is a trade-off in the sense that managers who emphasize interaction with one group of external actors do it on the expense of interaction with other groups. Rather, it seems as one type of networking reinforces other types of external networking. However, organizational size has a negative effect on all types of networking, although the effects are not statistically significant

Project No.3

Line application and opium eradication operations in Northern Thailand: A task-technology fit perspective

Line application and opium eradication operations in Northern Thailand: A task-technology fit perspective

Abstract

This study focuses on the use of the LINE application as one of the main communication tools for opium eradication operations in the remote hills of Omkoi, Chiang Mai province. The operation consists of 23 separate organizations partnering together and requires a number of differing demands in terms of work collaboration and data integration including information sharing. The goal of this study is to investigate how the LINE Application fits with the various tasks of the opium problem solving groups according to the Goodhue and Thompson (1995) notion of Task-Technology Fit (TTF). There are 8 Task-Technology Fit factors used as a framework: Quality, Locatability, Authorization, Compatibility, Ease of Use/Training, Production Timeliness, System Reliability and Relationships with Users. With the Task-Technology Fit (TTF) theory as a theoretical framework, this study aimed to understand how the theory could be applied in the real working groups. The approach used qualitative research methods, and included open-ended questionnaires as well as participant observation. The communication and information sharing of the opium problem solving groups through the LINE app had been monitored for over 5 years. The results found that LINE app has become an important communication and information sharing tool and is used across the task forces. The technology has aligned their operations and enhanced the responsiveness of all sectors involved in the opium eradication efforts, making the efforts more effective and efficient.

Keywords: line application, task-technology fit, information sharing, opium

1. Introduction

Nowadays, it cannot be denied that the internet is a crucial part to our daily lives. Increasingly, the number of internet users has risen to 4.3 billion which represents more than half of the world's population (7.7 billion in 2019) while 3.5 billion are social media users (Clement, 2020). This represents the social media as global phenomenon.

In Thailand, social media use continues to grow in concert with the rest of the world. 80% of internet users use social channels on a daily basis (Kantar, 2019).

Also, Instant messaging applications are becoming more frequent for online communication in the area of mobile network connectivity. The most popular messenger app in Thailand, by far, is LINE. It is more popular than WhatsApp, Facebook Messenger and WeChat. LINE wins the heart of Thai users based on its convenience and simplicity as a general messaging app that combines messaging with a fun customized experience such as stickers, themes and LINE camera.

As Instant messaging applications are becoming effective as online communication tools in the aera of mobile network connectivity, the most popular messenger app in Thailand is LINE. It is by far the most popular messenger app in Thailand, more popular than WhatsApp, Facebook Messenger and WeChat. LINE wins the heart of Thai users based on its convenience and simplicity as a general messaging app combining with the fun customized experienced such as stickers, themes and LINE camera.

Due to the popularity of LINE in Thailand, it has been used to assist with communication both in public and private sectors. Various organizations use LINE as one of their communication tools. The prominent characteristic of LINE is instant communication by which users can send information at any time of the day through several forms such as text message, photo, video, voice clips or even Microsoft Office and PDF files which make it the perfect tool for information sharing.

With advances in information and communication technology, the feasibility of sharing information across organizations has become much easier. Information sharing is considered one of the processes that may save organizational resources, enhance work efficiency and performance. The importance of information sharing in the public sector

is increasingly in the spotlight. Major issues such as anti-terrorism and public health are in need of a number of information sharing initiatives from various government agencies in order to tackle the issues efficiently (Yang and Maxwell 2011). However, increasing need for information sharing among several agencies or across an organization can be a complex task, especially when the norm for public organizations is based on paper and computer printouts. This approach requires an enormous amount of time for the information to reach others. Instant messaging apps come in to aid in solving this problem.

This study focused on the use of the LINE app for communication and information sharing within the Centre for Resolution of Security Problems (CRSPO) in Omkoi, Chiang Mai Province. Omkoi has been one of the top opium cultivation areas in Thailand for many years and has been declared as a special area by the office of the Prime Minister in 2012. The CRSPO has been created with the objective to deal with the area's important problems including narcotics and security. Within the CRSPO, the organization consists of representatives from various government agencies and public organizations such as Narcotics Control Region 5, Subdistrict Administrative Organization Mae Tuen, and Omkoi Hospital. Situated in the remote highland far away from the center of Chiang Mai province, Omkoi's geography is one of the main obstacles for the CRSPO to solve the opium problems efficiently. Successfully tackling the opium problems in Omkoi requires work collaboration, agency integration and information sharing between those agencies. There is a need for instant communication and real time information sharing within the CRSPO and these need to be done across organization boundaries, therefore; the LINE app can play a vital role in the communication and information sharing within these working groups.

This fascinate us to investigate how the representatives from 23 partner organizations are working together, participating in 28 LINE groups involved in communicating and exchanging information that can lead to effective opium problem solving in this special area.

2. Social media and public administration

Early in the internet era, various forms of social media were created. According to Bryer, Zavattaro et al. (2011) p.327

"Social media are technologies that facilitate social interaction, make possible collaboration, and enable deliberation across stakeholders. These technologies include blogs, wikis, media (audio, photo, video, text) sharing tools, networking platforms (including Facebook), and virtual worlds."

According to Pew Research, the rise of social media has affected various areas of users' lives including, work, health, family, political deliberation, and communication patterns around the world (Perrin 2015).

At present, government organizations are starting to use social technologies, including various forms of social media to support their mission (Mergel 2012). Comprising a set of new technologies that enable data exchange in virtual environments, social media technology is adopted and expected to help increase transparency, support collaboration, and enhance participation, learning, and knowledge production in government settings (Welch and Feeney 2014); (Mergel 2013). Social Media have provided new platforms for individuals to communicate. The use of social media applications is being driven by its functionality and limited only by the innovation of its users.

While citizens increasingly rely on social media to consume and disseminate news and information. At present, this information and knowledge sharing in the public sector is mostly limited and not easily broadcast due to rules, fixed reporting structures, standard operating procedures, and laws that tend to restrict the free flow of information across organizational boundaries. (Mergel and world 2011) This traditional information-sharing pattern was challenged by the new social media tools (Dawes, Cresswell et al. 2009). The use of social media technologies is increasing the degree of participation of all stakeholders in the process of creating, maintaining, sourcing, and sharing knowledge.

Information sharing is vital for the successful of a group task (Mishra, Allen et al. 2011) since it can facilitate decision-making capabilities, stimulate cultural change and foster innovation. In this study, we look into the communication and information sharing of the CRSPO, a special project with the main objective being to suppress opium cultivation.

This study also focuses on a single social media tool that was chosen to aid the working of CRSPO. As one of the most commonly used social media, instant messaging (IM), was acknowledged as an informal communication channel that supports quick questions and clarifications, coordination and scheduling, organizing social meetings, and keeping in touch with friends and family. Such tasks usually involve rapid data exchange (Nardi, Whittaker et al. 2000).

The LINE application is the most used IM in Thailand. However, there is limited empirical research examining the use of LINE. In this study, the LINE app was researched as an online communication tool to aid information sharing, data exchange and to facilitate communication in a special project in a remote area.

3. Task-technology fit model as an analytical framework

Task-Technology Fit (TTF) is a model developed by Goodhue and Thompson (1995) in order to link Technology and Performance by matching the compatibility between task characteristics and the technology characteristics through the users evaluations of 8 factors:

Quality, Locatabilty, Authorization, Compatibility, Ease of Use/Training, Timeliness, Reliability, and Relationship.

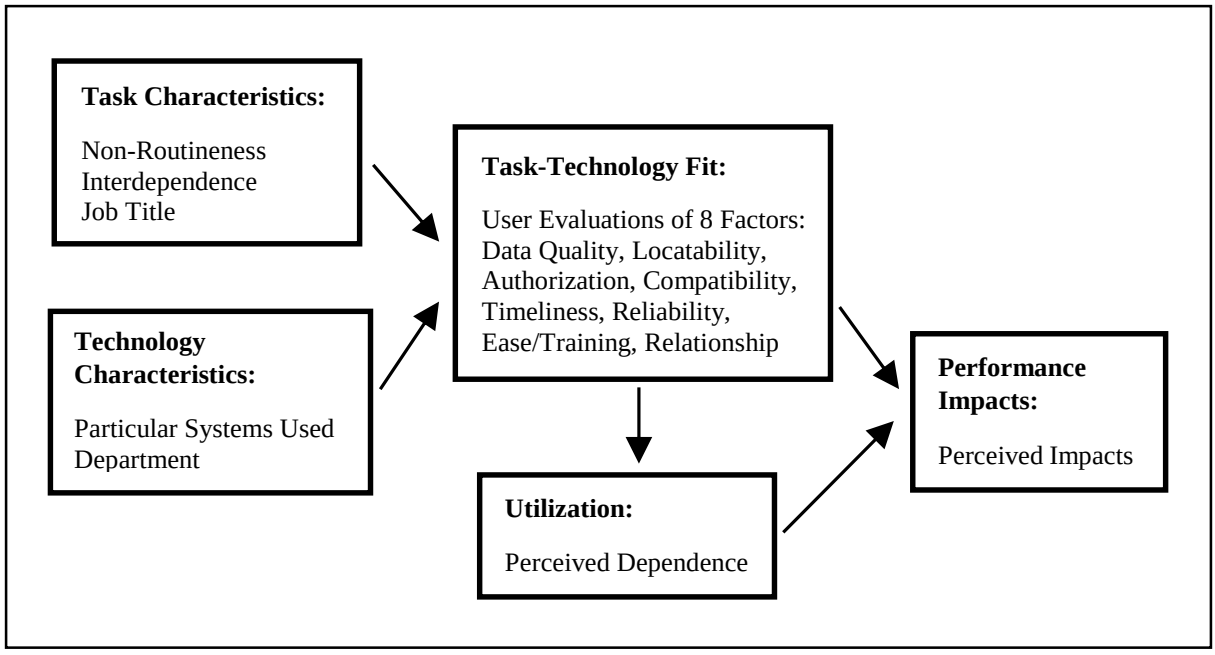


Figure1: Task-technology fit model, Goodhue and Thompson (1995, p.225)

The Task-Technology Fit model (Figure 1) illustrates how technology adoption is related to its ability to fit the task requirements (Pagani and Management 2006). Goodhue and Thompson (1995) suggest that the Task-Technology Fit (TTF) model can be used as a tool to evaluate whether Information systems (IS) in an organization are meeting user's needs. The model was first introduced in 1995 and has been widely used. Most often it is used in quantitative research involving opinion polls and laboratory experiments. The areas of research typically involve using a grading scale to understand how well an IS handles some required task (Goodhue (1998); (Staples, Seddon et al. 2004); (D'ambra, Wilson et al. 2004);(Strong, Dishaw et al. 2006).

TTF has been examined in various situations, including evaluating group performance situations (Shirani, Tafti et al. 1999); (Zigurs and Buckland 1998), studying managerial decision-making (Ferratt and Vlahos 1998) , and in situations where ease-of-use is important (Mathieson, Keil et al. 1998). The original model has been extended with the technology acceptance model (Dishaw, Strong et al. 1999), (Klopping, McKinney et al. 2004); (Pagani and Management 2006).

Later, TTF has seen use as a theoretical framework for a number of studies evaluating user performance with IS, including (Vlahos, Ferratt et al. 2004), (Junglas, Abraham et

al. 2008), and (Zigurs and Khazanchi 2008). However, there are no qualitative studies employing TTF in studying user evaluation, utilization and performance impacts of LINE App (instant messenger) in special governmental organizational setting.

The objective of this research is to use the TTF Model to evaluate LINE (instant messenger) app performance when used in a task force charged with opium eradication in a hard to reach area in the Chiang Mai highlands. Specifically, in this paper we study 1) task characteristics of opium eradication operations, 2) Technology characteristics of the LINE application, 3) task-technology fit factors, 4) LINE utilization, and 5) performance impacts in order to understand the user evaluations of the extent to which the functionality of LINE fits the needs of CRSPO members.

From a theoretical perspective, this paper explores the applicability of the TTF model in a new challenging domain using qualitative methodologies to gather rich data from open-ended questionnaires and participant observation. From a practical perspective, the research demonstrates the use of TTF as a theoretical framework for evaluating and explaining the performance impact of the Line instant messaging application, in resolving problems in a special and hard-to-reach area.

4. Methodology

The data collection methodology used in this research was a combination of two qualitative methods; (1) survey questions, and (2) participant observation. This approach was undertaken in order to cover the different dimensions of the study and to gain insight information by being a part of the working group.

4.1 Survey / open-ended questionnaires

The survey portion of this study focused on open-ended questions used to gain detailed spontaneous responses and to explore any new topics where close-ended questions would not be fruitful. In addition, these open-ended questions allow respondents to freely answer in their own words and give them an opportunity to provide long and rich responses (Emde and Fuchs 2012).

The two main reasons that drove this choice of open-ended as opposed to closed questions were the ability to gather spontaneous responses from individuals and bias minimization from suggesting possible responses to individuals. (Reja, Manfreda et al. 2003).

The survey was conducted at CRSPO meetings between September to November 2019 where 45 open-ended questions were made available in paper format and were distributed to members. The subjects of the study are CRSPO representatives from 23 partner organizations.

This research used open-ended questionnaires as a main tool for our survey. The purpose was to obtain information relatively quickly as we distributed the questionnaire during the general meetings of the CRSPO. As mentioned earlier, Omkoi is located in the remote highlands of Chiang Mai. Because of the terrain and the wide geographic dispersion of the members, it is difficult to have a clear chance to gather information regarding the issue of the use of the LINE app for exchanging information within the groups. Therefore, using questionnaires is the quickest way to gather information from various representatives at the general meeting.

However, this research used open-ended questions in the survey to allow respondents to include more information, including feelings, attitudes and understanding of the subject in order to collect qualitative pieces of information.

The survey questions are based on Figure 1 and task-technology fit aspects reported in prior research (Goodhue and Thompson 1995), and then adapted to the context of this study. The 8 aspects of task-technology fit include data quality, data locatability, correct level of authorization, data compatibility, ease-of-use and training, production timeliness, systems reliability, and relationship with the user. The survey also collected other information including a members' organization, their project responsibilities, information received and sent through the application, benefits, problems, obstacles and a user evaluation of any performance impact.

4.2 Participant observation

The second qualitative method used was participant observation. Participant observation is a key research method that social scientists can use when they study human behavior. Data collection essentially involves the systematic observation, recording, description, analysis and interpretation of people's behavior (Saunders, Lewis et al. 2003). (Schwartz and Schwartz 1955), p.344) states that "Participant observation is a process in which the observer's presence in a social situation is maintained for the purpose of scientific investigation." Whyte (1979) also defined participant observation as a research technique that requires a researcher to participate in research participants activities by observing and studying their respondents over an extended period of time. Therefore, participant observation could be deemed as a method by which researchers participate in a particular field project and closely observe social activities with the subject(s)of his/her study.

(Dewalt and DeWalt 2002), p.92) believe that "the goal for design of research using participant observation as a method is to develop a holistic understanding of the phenomena under study that is as objective and accurate as possible given the limitations of the method". They suggest that participant observation be used as a way to increase the validity of the study, as observations may help the researcher gain a better understanding of the context and phenomenon under study.

The research team has been participating in the working group of CRSPO for over 5 years since 2016 and has monitored the LINE groups of the CRSPO's related working groups for over a year—between 2017-2020. The team not only observed but actively engaged in the activities of the groups—to gain a better understanding of the context and phenomena under study.

Participating as committee members within several organizations has given the researcher opportunities to observe the activities within the LINE groups. However, one member can participate in more than one group, depending on the group purposes and members' responsibilities.

Being one of the insiders, the research can obtain various useful information and information access for the research. This includes the interaction between group members, shared data and personal insight. Combining both surveys and participant observation methods has strengthened the validity of this study.

The interpretations and research findings using multiple data sources reduces the risk of collecting biased data and arriving at invalid conclusions as might be possible using data obtained from a single source (Yin, 2003). By using different approaches to data collection and observation in particular, the outcome will lead to a richer understanding of the social context and the participants therein.

4.3 Data analysis

This study adopted the interpretivist's perspective and qualitative techniques to analyse the data. Thematic Analysis focuses on identifiable themes and patterns of living and/or behaviour (Aronson, 1994). After collecting the data, patterns of member experiences are listed and identify all data that relate to the already classified patterns in the study framework.

The data analysis followed the task-technology fit framework published by Goodhue and Thompson (1995). TTF focuses on the fit or match between user tasks requirements and Information System functionality. Moreover, the correspondence between user task needs and the available functionality of the IT leads to positive user evaluations, utilization, and positive performance impacts (Goodhue 1998). The research framed the analysis by dividing the analysis into 5 sections: Task Characteristics, Technology Characteristics, Task-technology Fit, Utilization and Performance Impacts.

5. Research findings

The purpose of the study on the utilization of 'LINE Application' in opium eradication is to understand the utilization of LINE app in the group communication between various agencies working in the remote hills of Omkoi, Chiang Mai province. This study employs qualitative research method with structured interview and collects information from a number of agencies working to address opium-related problems in the area of Omkoi district. The research team conducted Content Analysis of the user opinions on the use of LINE app in communication to solve the problems of opium.

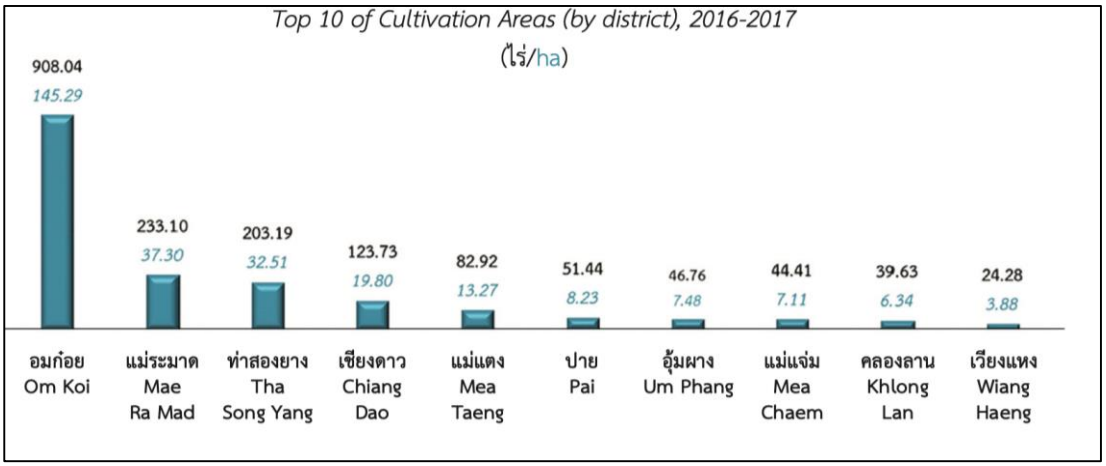
The study applies the framework of Task-Technology Fit (TTF) of Goodhue and Thompson (1995) which suggests that technology acceptance of user may happen only when it fits with the task requirements of users leading to increased efficiency. There are two important factors that inform the Task-Technology Fit: Task Characteristics and Technology Characteristics. This Task-Technology Fit leads to Utilization of technology resulting in the effectiveness and efficiency i.e. Performance impacts. The result of this study is presented in 5 sections as following;

5.1 Task characteristics of opium eradication operations

The most recent report on aerial and ground survey of illicit opium cultivation in Thailand between 2017-2018 reveals that there were 682 plots of illicit opium plantation found in 7 provinces throughout the country equivalent to 94.94 hectares. The top 3 provinces include Chiang Mai, Tak, and Mae Hong Son.

Omkoi District, Chiang Mai Province has been ranked at the top of opium cultivation areas in Thailand continuously for many years. The statistics from ONCB show that the opium cultivation area in Omkoi was accounting for 47.63 per cent of the countrywide cultivation in 2015. The comparison of Opium Cultivation Areas (by district) shows that Omkoi still has the highest cultivation areas at 908.04 rai in 2016-2017 though the figures continue to decline over the years. There were more than 4,500 poppy farmers, entrepreneurs, laborers, and opium addicts in the area (Office of the Narcotics Control Board, 2017) which are considered very dangerous to the economy, society and security of Omkoi District and nearby areas.

Table 1. Top 10 of cultivation areas (by district), 2016-2017 (ไร่/ha)



Source: (ONCB 2018) Opium cultivation and eradication report for Thailand 2017-2018

Ethnic minority groups make up a majority of population in Omkoi who lack almost every opportunity to maintain a good standard of living. There are many perpetuating factors that push people toward opium cultivation and related business ranging from lack of citizenship and land ownership, poor infrastructures, limited access to public provision such as healthcare and education, limited occupational choices. Opium cultivation is the only means for them to earn money and improve their quality of life. The opium problem in Omkoi is therefore a symptom caused by several underlying socio-economic problems and has become a concern for the Thai government, which recently began to take more actions in Omkoi.

Addressing opium problems in Omkoi requires work collaboration and integration among various agencies. Despite Narcotic Crops System being a tool to monitor and analyze the situation of narcotic crops survey especially opium poppy, there are continue reporting of illicit crop cultivation, opium addiction and the arrest of offenders. Obstacle to effective solutions is the geography of Omkoi which is located in the remote highland. Most households are poor, lacking proper supporting utilities and basic social and economic infrastructure.

To deal with the opium problem in Omkoi Thai government employed different approach from the traditional bureaucratic one that each government agency always works in a silo. In September of 2012 the Office of the Prime Minister declared Omkoi a 'special area'; it required a board to devise an area-based approach to deal with the area's "security" problems. The Government has since created the Centre for Resolution of Security Problems in Omkoi (CRSPO). The CRSPO's mandate is to suppress opium cultivation, human trafficking, and illegal logging, although opium suppression rapidly became the priority.

According to the CRSPO's mandate, the objectives of the Master Plan for Opium Reduction, Narcotics and Security Problems (2017-2021) consists of the following;

1) To reduce opium cultivation area and the spread of illegal drug

2) To control and take action against a group of people involved in opium cultivation, trading, and employment related to opium

3) to solve the problem of opium and narcotics with patient at the center together with the participation of family, communities and local government organizations

4) To improve the quality of life of those who complete opium and narcotics treatment, including their families

5) To build immunity for children and young people both inside and outside of the school, not to get involved with opium and drugs

6) To build consumption security and careers for the target population

7) To enhance efficiency and unity of management for the prevention and solution to opium and narcotic problems in the area

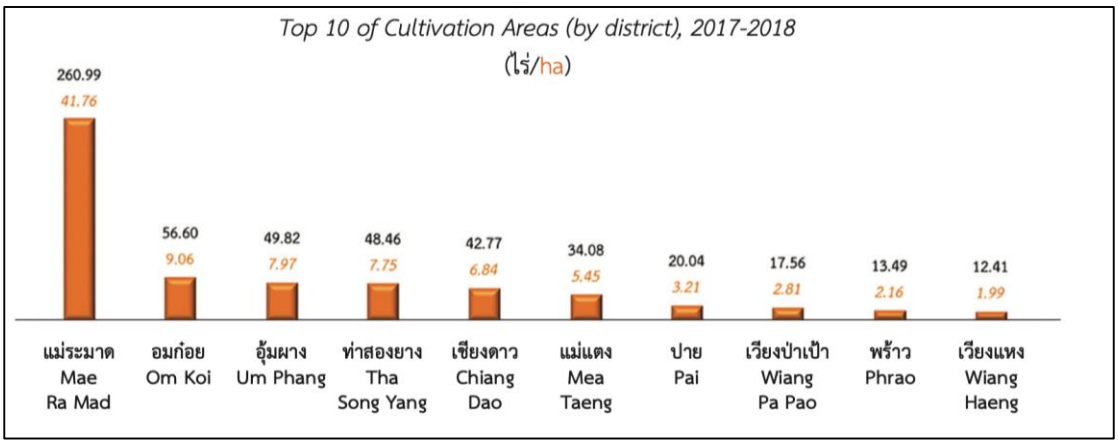
The Master Plan focuses on the following areas; 1) Data collection and clear Information management including sufficient database that can be utilized to directly address problems and situations, 2) Making use of the available information and contribute to reducing problematic incidents and enhancing development in the areas 3) Law enforcement and effective control of the spread of opium problems in the target

area 4) Treatment system that is suitable and meets the needs of opium addicts and drug users, accounting for the collaboration between local and regional governing organizations in managing and supporting the monitoring and rehabilitation of former addicts who complete the treatment program as well as their families 5) Improvement of quality of life through the Royal Project guidelines and the principles of the sufficiency economy philosophy and 6) Streamline procedures with flexibility and modern management according to specific issues in the target areas for opium eradication plan of actions.

In terms of task characteristics, the Centre for Resolution of Security Problems in Omkoi is the unit that plans, directs, coordinates, monitors and integrates relevant units in the work plans of reducing opium cultivation and prevention campaign targeting children and youth. While supervising treatment programs of opium addicts and drug addicts, suppression of drug dealers and influential people as well as other relevant issues in the target area. The framework that guides all 23 partner organizations in the opium reduction efforts highlight 'People center', 'Area-based approach', 'Participation oriented', 'Holistic approach', 'Balance approach', and 'Result-based management'.

The effectiveness of recent eradication efforts have led to significant reduction in opium cultivation. Factors include increase in control of opium cultivation and increase in the effectiveness of opium eradication thanks to the agencies with skilled and sufficient forces assigned to the eradication task forces.

Table 2. Top 10 of cultivation areas (by district), 2017-2018 (ไร่/ha)

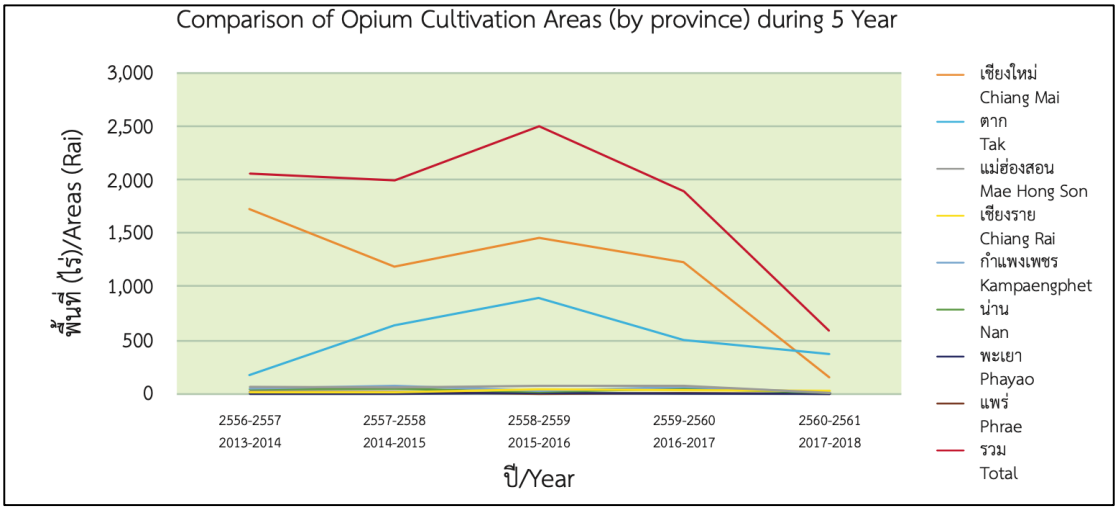


Source: (ONCB 2018) Opium cultivation and eradication report for Thailand 2017-2018

Moreover, increase in cooperation from related organizations has induced the success rate. Multi-stakeholders have been collaborating and implementing extension programs in at-risk areas to solve the problem sustainably by promoting the development of quality of life and alternative viable / licit livelihood for opium grower hill-tribes. One of the key factors is the access of communication and infrastructure system; both systems accessed and constructed into more remote areas leading to the reduction of opium cultivation.

Between 2017-2018 the illicit opium cultivation areas in Omkoi has declined to 56.60 rai. Omkoi has now been ranked below Mae Ra Mad District of Tak Province being in the top rank of cultivation areas by district. Successful eradication has left only a small amount of raw opium available for local markets. Despite such positive development, a number of opium users remained high, especially in the areas where opium cultivation was dense.

Table 3. Comparison of opium cultivation ares (by province) during 5 Year



Source: (ONCB 2018) Opium cultivation and eradication report for Thailand 2017-2018

5.2 Technology characteristics of LINE application

As increasing number of population in emerging markets are owning smart phones, messaging applications are becoming critical effective onLINE communication in the era of mobile network connectivity. LINE applications is one of many prominent Instant Messaging (IM) applications (app). LINE is developed by employees of NHN (Next Human Network) Japan, a subsidiary of South Korean internet company Naver, and released for public use in June 2011 (LINE Corporation Global News, 2013). By 2014 LINE is among the top three largest global messaging apps after WhatsApp and WeChat then. It has become the mobile communication channel and an alternative for users to communicate with each other through its Official Accounts and LINE@ features. While the former (OA) is the main marketing tool targeted at large corporations, the latter (LINE@) is meant for communication and marketing tool to individuals, groups and small and medium-sized enterprises (SMEs).

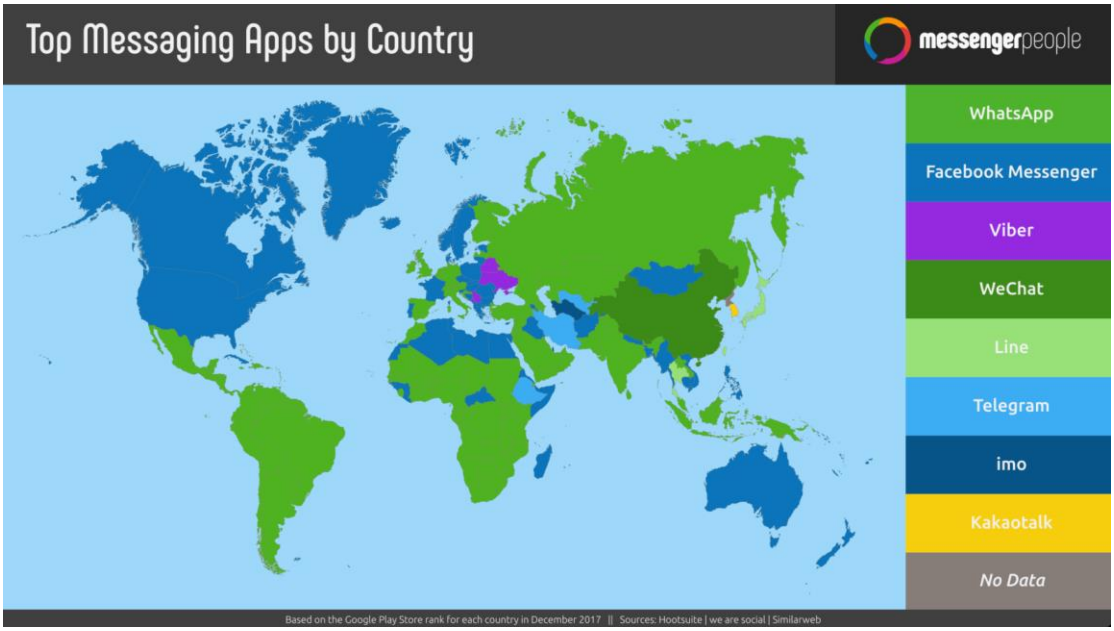
With the LINE messaging app as the cornerstone, LINE Corporation is the business entity that operates the technology. Its business encompasses development and operation of a wide range of mobile-first services including communication, content, entertainment and advertising, as well as new businesses in Fintech, AI, and other

domains. Under its corporate mission of "Closing the Distance," LINE Corporation strives to bring people around the world closer to each other, to information, and to services.

LINE app was originally developed for Android and iOS smartphones. The application also exists in versions for laptop and desktop computers using the Microsoft Windows and Mac OS platforms. LINE is free to download, install and provides many features for user including the ability to send messages from anywhere in the world that have systems supporting the use of this application. Users can communicate, exchange information both within the country and abroad as needed free of charge, 24 hours a day, via text message, picture/video sending, location sharing, animation or group call, voice call, telephone with video and audio (VDO Call).

LINE also allows data sharing for various types of documents such as Microsoft Office, PDF or multimedia files such as pictures, video (VDO), music (Voicemail), phone number or contact information of the person (Contact). In addition, users can send and receive messages at the same time as when talking to each other. User can also delete the chat history after the specified time period.

Global messaging app LINE is most popular in Japan, Thailand, Taiwan, Indonesia and Spain with development being expanded to India, South America, Turkey and Italy with almost 500 million users. By 2019 Thailand has more than 44 million LINE users among its 69 million population, making it the second largest market after Japan. Thais use their mobile phones an average of 216 minutes per day and use LINE for an average of 63 minutes per day. LINE app continues to be popular in Thailand as it has developed other sub-platforms which meet the needs of Thai users such as LINE Game, LINE TV, LINE Pay, LINE Ads Platform.



Source: https://www.messengerpeople.com/global-messenger-usage-statistics/

What separates LINE app from standard smartphone-based text and calling is how it has been able to enhance the user experience of simple chat and text by bringing a unique style of entertainment to the format. The key popular features of the service include the following;

1. Stamps/Stickers: These are unique emoticons/illustrations that users can send back and forth in chats, enhancing user experience with emotion beyond simple text message. A number of these features are free (including brand sponsored stickers), but there are limited versions that are also available for sale.

2. LINE Camera: Camera application that turns user's smartphone into a portable a machine that lets users design and customize digital stickers with photos of their face on them.

3. A complete local ecosystem of tools and services: Outside of calls and SMS, the camera and stamps are the main draw to the service as well as the group chats.

Another useful and popular feature within the application LINE is ability of single user to simply create a dedicated user group, called LINE group, which can invite up to 500 members from a contact list. Members of the group can share files in different formats by sending messages and attach the file in the chat room. There are bulletin boards that

can be used to post related stories and share any information. Member can create and pin 'Notes' to remind others. Each can make comment, click 'Like' which can be seen among group comments of up to 200 people. Adding a contact list is also as easy as scanning the QR Code. Search function can be done by looking up user name or LINE account ID, or the registered phone number, or simply by shaking the smartphone at the same time as those who want his/her contact to be added. (Lippold, 2013)

Research conducted in 2015 to examine LINE users' behavior, motivation, attitudes and factors influencing the use and adoption of LINE Official Accounts (LINE OAs) in Thailand reveals that most Thais use LINE because it is easy and prevalent. Users' main objective of using LINE is to keep in touch with their networks of friends and family. Entertainment is also the major motivation of LINE use especially the free stickers. Most of the users have good attitude towards LINE. 'Block' function, which users can customize to control interaction with other accounts, was investigated. Such function proves to be a factor that minimize the intrusiveness of user privacy and minimize users' negative attitude on LINE OAs (Simasatitkul and Hsieh, 2015).

5.3 The use of LINE app in opium problem solving in Omkoi : Task-technology fit

LINE application has become the network of communication between individuals, groups and organizations thanks to the variety of its functionality. This is especially present at the level of groups and organizations that prefer increased communication and management within as evident in the case of group communication to solve opium problems. The following section describes the 5 task characteristics of opium problem solving.

1. **Administrative group** has the main responsibility in the planning, administrating and collaborating with key partners in the preventing, suppressing, supervising and integrating units within the plan to eradicate opium.

2. **Prevention campaign group** has the main responsibility in implementing activities and projects related to preventing children and youth from becoming involved with opium. Their works cover activities that promote understanding of opium problems

and provide knowledge to strengthen communities and people while encouraging them not to interfere with opium.

3. **Opium cultivating and eradicating areas survey group** has important tasks in conducting surveillance of target areas of opium plantation, cutting and destroying the crop along with develop academic work related to the exploration and tracking opium cultivation trends.

4. **Treatment and rehabilitation group** has an important job function in the maintenance, treatment, rehabilitation of addicts and opium addicts.

5. **Local coordination and development group** has the responsibility in providing coordination at the district and village level, including the community leaders, sub-district headman, and village headman to participate in activities related to addressing opium problems. Projects range from structural development in target areas, career development, and livelihoods of people and communities in the areas.

With regard to the use of LINE App in communication to address the opium problems in Omkoi District; there are 26 LINE groups in the exploration and monitoring of opium cultivation that have been created as a means of communication and information exchange to support opium eradication efforts. (See appendix 1).

It can be concluded from the five LINE groups task forces working on the opium problems in Omkoi that there has been the exchange of information related to the implementation results and announcement/direction/work plan/activities and projects related to opium eradication efforts. It can be inferred that the tasks implemented by each units have been well-supported throughout by the information circulated from all of these LINE groups. As a result members of the group as well as relevant agencies were able to make appropriate use of information from LINE app. Such access to those information helps to align the operations of relevant task forces toward opium eradication efforts in Omkoi district.

In addition it is worth mentioning that the Administrative group is the main important group with various crucial information necessary for the opium eradication efforts.

There has been a sending and receiving of diverse information ranging from area-based information, outcome and implementation results, treatment and rehabilitation, operational results, announcement/direction/work plan/activities and projects related to eradication campaigns in Omkoi district along with information concerning narcotics suppression, the arrest of offenders, and reducing opium growing areas.

In the meantime, the Opium cultivating and eradicating areas survey group has been a core sender and receiver of important set of information in opium reduction efforts. These sets of information cover area-based data of target villages, opium cultivated area database, opium poppy field eradication operation and destroying fields data. Treatment and rehabilitation group has sent and received important information regarding the treatment and rehabilitation of opium addicts/opium treatment patient. Local coordination and development group has been receiving and sending information regarding the administration and jurisdiction of the local sub-district and villages including activities/projects related to areas development. While the prevention campaign group has exchange information on activities and projects implementation to preventing children and youth from becoming involved with opium. Including activities to strengthen communities and people to prevent opium problems. Details provided in the table 2

Table 4: Information exchange between LINE groups working on the opium problems

Receiving and Sending of information in LINE groups	Task characteristics of opium problem-solving				
	Administrative Group	**Opium cultivating eradicating areas survey group**	**Treatment rehabilitation group**	**Local coordination development group**	**Prevention Campaign group**
Area-based data of target villages/opium cultivating area/local situation	✓	✓	-	✓	-
Implementation results on opium eradication	✓	-	-	-	-
Treatment and rehabilitation of opium addicts/opium treatment information	✓	-	✓		✓
Operational results of staff, problems and obstacles	✓	✓	✓	✓	✓
Announcement/direction/work plan/related activities and projects	✓	✓	✓	✓	✓
Narcotics suppression information, the arrest of offenders, and opium poppy field eradication operation	✓	✓	-	-	-

The analysis on the appropriate use of LINE app in opium problem-solving take a look at 8 aspects; Quality, Locatability, Authorization, Compatibility, East of Use/Training, Production Timeliness, Systems Reliability and Relationship with User.

5.3.1 Quality means that the information sent out via LINE app is up-to-date and sufficient for the operations as well as accurate and fit with job activities of opium problem solving in Omkoi district. Information exchanged range from area-base data providing local context of Omkoi district, target villages, opium cultivation areas, opium addicts data, people in addiction treatment, to arrest information and staff performance report data. Such information is up-to-date, delivered in a timely manner, sufficient as well as accurate and suitable for the operations. These information is exchanged by experienced, well-understood and well-informed staff and members of the LINE groups responsible for specific tasks in the target area. It results in the quality information and data being exchanged and shared among the LINE app. It is evident in the response of the survey below;

> "*LINE groups of Omkoi opium eradication task forces are set up specifically for the tasks assigned. Information in these LINE groups were sent by responsible staff or units of the specific areas. Those people have clear understanding of their tasks and they are experienced. The shared data and information therefore is of good quality.*" (Narcotics Control Office Region 5)

> "*Information exchanged via LINE groups were done by the members of the groups who possess working knowledge of operations in the areas. User can be confident that the information is accurate and suitable for use."* (Interviewee from Omkoi Hospital).

5.3.2 Locatability means the ease of finding information and the relevance of the data sent from LINE app with the tasks of opium reduction in Omkoi. Finding the information in the LINE group can be done easily. It takes short time to read and understand. Information of the members in each LINE group is accurate, consistent and fit with the tasks. For example, there is information directly about people on opium addiction treatment in the Omkoi opium addiction treatment LINE group. Including the

information about activities and projects useful for the addiction treatment. When members of the group need information for their work, they can do so immediately. In addition, the information sent in the group is not blocked. All members are able to make decisions and use the information to support their work and responsibility in each unit.

> "*Searching for information in LINE is easy. Take a short time to read and understand. Because the work is already within the responsibility*" (Interviewee from Narcotics Control Office Region 5)

> "*Easy because the information in the group is accurate, unblocked and easy to search without having to read through various documents or books*." (Interviewee from Nakian Subdistrict Administration Organization)

At certain times, various documents are delivered via the LINE app in many groups, making it impossible to read in time. Sometimes information is unable to read or data is unable to be saved immediately resulting in the expiry of data access or data recording.

> "*Information in LINE groups that have been sent for a long time cannot be viewed or recorded because it has expired*" (Interviewee from Omkoi District Office)

5.3.3 Authorization means the right to access information in the LINE app that will be useful for the job of opium reduction in Omkoi district. Once being added as member of the LINE group everyone in the group is not prevented from accessing, reading, recording, forwarding, or keeping any the information. In addition, there is a sharing of information between various LINE groups which is useful for working to solve opium problems. Access to information is granted in LINE app giving freedom to access information making it greatly useful for user. Especially the case of knowledge sharing and awareness raising about opium reduction work in the areas or applying to the responsible tasks.

> "*Everyone in the group has the right to view and use the information. Because the information that is published in the group are all useful information and*

would like members to study it to help increase knowledge that can be used for work" (Interviewee from the 33rd Infantry County, Chiang Mai Province)

"*Everyone has the right to view information because each is in the same LINE group*" (Interviewee from Scout Troops 3608 Scout Unit 36)

5.3.4 Compatibility means the information in LINE app can be used to work together to solve opium problems in the Omkoi area. Including the similarities and differences of data in the LINE app and other data sources. The information in the LINE app can be used to work collaboratively to solve opium problems. The Working Groups of Centre for Resolution of Security Problems in Omkoi (CRS-Omkoi) consists of governmental and multi-sector units with various roles and responsibility. Each unit has specific roles and responsibility. For example the hospital that possess importation information about patients and patients on opium addiction treatments. Community Development Office possesses information about career development, quality of life. Local government organizations have area context information, project/activity for area development. While the District Office has administrative information about the sub-districts and villages. A LINE group was created in each department to facilitate the work and share information so other units can make good use of the information to solve opium problems.

"Working to solve the opium problem is an integrated work from both departments and the information from various sections. There are many created LINE groups, which is the fact that needs to be integrated for complete analysis." (Interviewee from Narcotics Control Office Region 5)

""Information in LINE app is up-to-date information, reporting daily from various sections which is necessary to rely on information from many Sources of work to solve opium problems." (Interviewee from Nakian Subdistrict Administration Organization)

Regarding the similarities and differences of information shared; the information sent in LINE app is not different from the information that the department already has, or not different from other sources. Information published via LINE app is a fact which

has already been published in various sections and has not been modified by any documents or information. Sending data to LINE groups is important because group members or other work units will use the information or broadcast it via other channels.

> "*Working at the district level requires information from various sectors. All information received via LINE is the same as the information that other departments have.*" (Interviewee from Omkoi District Public Health Office)

5.3.5 Ease of use/training means users learning how to use the app which allows them to use the application easily and conveniently. It includes access to training or knowledge about using the LINE app for the purpose of learning how to operate the application. It is not difficult to learn how to operate and use the application. The procedures are easy. User instruction and procedure is not complicated allowing users to learn to use it quickly. It also greatly facilitates operations in Omkoi district. Due to the geographical features of Omkoi District Some villages/areas Living in a remote area, making it difficult to access the area. Communication via LINE app has helped facilitate the operations of task forces. For example aiding the surveillance and patrol missions by military task forces that survey remote highland areas by sharing coordinates and area conditions via LINE group. This has supported staff operations to be more accurate and precise. The Public Health Department and Local government organization have co-created the Metadone LINE Clinic group that helps tracking and providing treatment to opium addicts in the area that has been notified of field registration. Including distributing medicines, visit the patients receiving addiction treatments or opium addicts in the area etc.

> "*Staff will coordinate via LINE app every time they make a visit to the home of opium addicts/patients on addiction treatment to disperse medicines. And each time the group will immediately report the results and make information available quickly [through LINE]*". (Interviewee from Mae Tu Subdistrict Administration Organization)

> "*In the surveillance/scouting to track the target area, the officials have informed team about the area information. They coordinate with each other to keep*

updated about the situation every time via LINE. In some cases when the officials arrived in the remote areas, they have to rely on information from the LINE group to help with they operations." (Interviewee from Scout Troops 3608, Scout Unit 36)

In addition, it is easy to learn to use the LINE app, and users do not require training or can be self-taught. This is because the application is easy to use and user can learn by themselves especially with the manual and instruction provided in Thai language.

"*User of LINE app can be self-taught because it is used in the daily life or in their work operations*." (Interviewee from Narcotics Control Office Region 5)

5.3.6 Production timeliness means the speed, timeliness, and up-to-date quality of application including the use of information received from the LINE app that help reduce the time required for data transmission and communication among operators and take forces in solving opium problems in Omkoi area.

"*The workplace is far. Traveling is difficult. It is difficult getting to the district in order to coordinate on various issues. The road is not good. So most of them tend to work through LINE app. The office has high-speed internet making communication [via LINE app] fast and up-to-date*". (Interviewee from Siber Health Promoting Hospital)

In addition, solving opium problems in Omkoi district can be achieved with efficiency thanks to receiving fast information that keep the task forces up-to-date. That is it helps reducing the time required for data transmission and communication of various departments. Such as the case of the LINE group of the Center of Security operations of Omkoi in which there are many members or organizations that participate. If there is a meeting or information to be share, members will use LINE as a tool for data distribution to various relevant departments. It reduces the time to deliver documents to various departments and can be considered as fast communication approach when comparing with the delivery of documents by post or a mail. LINE app can be considered more effective.

"*Greatly reduces working time because information about some urgent work can be sent via LINE immediately*" (Interviewee from Mae Tu Subdistrict Administration Organization)

"*Drastically reduce time because if it's a document sent via inter-agency mail system or within the department, it will take longer for all parties to acknowledge. But for the information once sent via LINE app, it will be received immediately and acknowledged immediately*" (Interviewee from Omkoi Hospital).

5.3.7 System reliability means the credibility and ability to use the application at all times and accessibility issue. LINE app is a stable and reliable operating system. It is a continuously developed application that is kept updated with social change. The application is popular throughout the world and can be used continuously for 24 hours. User can benefit from it for having full access to the data wherever and whenever needed.

"*LINE is a stable system. It can be used anywhere, anytime, in any area with an internet signal*" (Interviewee from Omkoi Subdistrict Administration Organization)

Using the LINE app; however, may encounter difficulty to access during certain periods of time for example in areas without internet or telephone signal. Various information sent previously for a long time will expire making it impossible for user to access information when needed.

"Some areas are unable to send or receive data because there's no phone signal" (Interviewee from Nakian Subdistrict Administration Organization)

5.3.8 Relationship with users means the satisfaction of users in utilizing the app and the ability to respond to the requirement of solutions to address opium problems in the Omkoi District. Users or members of the LINE group in opium eradication task forces are very satisfied with performing their tasks using the LINE app. This is because the application has helped to deliver information and news related to the work in a timely

fashion. Omkoi District is located in a remote area. Bad transportation has caused delays in the collaboration among stakeholders and task forces. When using LINE app, they are able to integrate data quickly and enhance collaboration among various departments leading to a more efficient response to the problems in the area.

> "*Satisfied with LINE communication and the information received can be used to support the operations*" (Interviewee from Narcotics Control Office Region 5)

> "*Today, without using LINE communication, work in Omkoi will be extremely delayed because some areas are difficult to access, i.e. remote areas. It can be said that data reporting on various situations came from village headman, head of sub-district, leader of the communities. These people sent information via LINE application*" (Interviewee from Omkoi District Office)

5.4 Utilization of LINE app in opium reduction efforts in Omkoi and the analysis of problems and obstacles

There are 6 benefits of using the LINE application to solve opium problems in Omkoi District.

1) **Convenience and speed**: it was found that the use of LINE app to solve opium problems in Omkoi District has made the information delivery more convenient and can be used for work in a timely manner. Interviewee from the Omkoi Hospital quoted "[*LINE app] helps speeding up the work allowing for comprehensive sharing of information and reports*". While other interviewee from Centre for Resolution of Security Problems in Omkoi (CRS-Omkoi) quoted "It is fast and convenient in communicating".

2) **Save resources**: the utilization of LINE app help agencies save resources such as reducing the use of paper-based documentation, cost saving on traveling expenses and telephone expenses. Interviewee from Omkoi District Community Development Office commented that "*Using LINE app helps reduce paper-based document and travel expenses*". While interviewee from Nakian Subdistrict Administration

Organization suggested that *"[Teams] Do not need to pay for telephone fees to talk and coordinate*".

3) **Enhance work effectiveness**: The purpose of creating LINE groups for opium reduction efforts is to integrate resources, collaborate, and share news and information. The increased effectiveness and collaboration in the operations results in quick response to the problems in the area while staying up-to-date. This is supported by the survey response; that said "*LINE group for opium task forces was formally established with the aim to integrate both information and collaboration among various departments in the working groups to enhance work efficiency.*" (Interviewee from Narcotics Control Office Region 5)

4) **Public Relations and communication of news and information**: It is a shared preference of the working groups in opium eradication taskforces to use LINE app for the PR activities and sharing of information related to the works. They use LINE app to report the result and outcome of their operations as well as to share information and news update to relevant agencies and units. The latter can therefore continue to utilize the information in other areas as they deem appropriate. Omkoi District Community Development Office quoted that the LINE app is used for "*public relations such as inviting relevant agencies to participate in the shared causes, or collaborate on activities such as vocational training for patients on opium addiction treatment*".

5) **Data Accuracy**: Because the set-up of LINE groups were done officially among those with authority in addressing opium problems in the target areas, the exchange and sharing of data and information via LINE is accurate, precise, credible and useful to the members or units in the groups. Parties can make use of the information received as deemed appropriate. The view is shared by the survey response from Omkoi Hospital that "*the [LINE] members in the groups consist of those responsible in the works of opium reduction in Omkoi. One can be confident that the information is accurate, precise and useful*".

6) **Relationship building**: With multi-stakeholders involved in the opium eradication in Omkoi, operations need teamwork and collaboration. Setting up LINE groups allow for members to get to know each other via the platform acting like virtual community despite knowing each other or having worked together before. This is supported by the survey response by the Scout Troops 3608, Scout Unit 36, that *"[LINE] Helps in getting to know members of the taskforce, making friends with those in other units of operation in addition of one own department*".

There are four main aspects of problems and obstacles in using LINE app in opium reduction operations in Omkoi.

1) Limitation due to the geography of Omkoi district: Omkoi is located in the remote area with limited connectivity in some of the village areas. Users may not be able to access the application or the mobile signal is not stable. This has caused delayed in data/information transmission. Interviewee from Omkoi Hospital provided comment in the survey that "Some communities are situated in a remote area without internet connection. Field operations cannot benefit from the LINE app." Coordination unit for the villagers of Thung Ton Ngio Village which is one of the Royal Project Initiatives in the area said "There is no internet connection in the area".

2) Access to various data sets sent via LINE App has expired: Users cannot access the data set transmitted via LINE when user attempt to access previously sent data/information beyond the expiry date noted on the application. This is recognized by users as one interviewee shared in the survey that "LINE data has an expiration date. If accessed beyond this date, data/information cannot be accessed or read."

3) There are many LINE groups working on opium eradication in Omkoi: Sometimes data and information has been sent/shared/exchanged in various LINE groups causing duplication of data as well as data sharing efforts. Users do not want to read or access information in the LINE groups. The view is echoed with that of the interviewee from Narcotics Control Office Region 5 that "There are many LINE groups with various tasks. One has to spend time to make clear understanding of it".

4) Data security and privacy is low: Users increasingly rely on the use of mobile phone like in the case of LINE app for their everyday activities and needs. Sending sensitive information related to opium reduction operations through such tool may pose significant risks not only to users' security and privacy but also the security and the outcome of the whole operations. This issue may be one of the challenging limitations of the utilization of LINE app in the opium eradication.

5.5 Performance impacts from the use of LINE app: The effectiveness and efficiency of opium reduction in Omkoi District

Communication via LINE app has helped to increase the effectiveness and efficiency of opium eradication efforts in Omkoi District. LINE app is considered a supportive communication technology helping staffs and units related to the opium eradication work in acquiring information and related up-to-date news about the target areas more conveniently and in a timely manner. In addition, the app has facilitated in the collaboration, the given of direction and guideLINEs for various agencies, hence allowing for greater outreach.

In regards to the effectiveness and efficiency in resources utilization of the organizations; LINE app is a mode of communication without subscription fee. This results in cost saving for the taskforces in various units – ranging from reducing workflow/steps, to reduce paper-based documentation, to reducing cost.

Moreover, with the nature of multi-stakeholder of various LINE groups, the taskforces has seen greater work integration taking into account the collaboration from various parties with cross-functional teams and responsibilities. Communication via LINE app has resulted in the alignment of operations with greater collaboration and integration of information and related news and updates about the opium eradication efforts.

It is evident in the opinions shared by one of the interviewee from Omkoi Hospital. LINE app has many benefits - both being convenient and quick. It allows various units to work in the same direction and truly integrated. As noted by the interviewee from Omkoi District Community Development Office; that *"[LINE] has helped [staff] to work more efficiently and coordinate easily and faster. While helping to reduce*

resource utilization, ensure outreach of information sharing among all departments allowing them to receive and acknowledge information immediately. Hence, align all work plans among the task forces."

In conclusion, the study of using LINE app for communication to solve opium problems in Omkoi District found that the Centre for Resolution of Security Problems in Omkoi (CRS-Omkoi) functions as the field agency focusing on integrating various relevant sectors to reduce opium cultivation problems and other related issues in the area. The LINE app is an important information communication technology tool that is utilized among the taskforces – both internal units of operations and external parties. There are 5 LINE groups involved in the opium eradication; Administrative group, Prevention campaign group, Opium cultivating and eradicating areas survey group, Treatment and rehabilitation group, and Local coordination and development group.

All of them are well aware of the operational data of each segment – covering comprehensive information from announcement/direction/work plan/activity or related project. The LINE groups' members of related taskforces are able to appropriately use the information from the LINE app in their tasks. The working groups have received consistent information about the guidelines to help address the opium problems in Omkoi. The technology has aligned their operations and enhanced the responsiveness of all sectors involved in the opium eradication efforts, making the efforts more effective and efficient.

When considering the task-technology fit of LINE app in opium eradication effort; the finding highlights the 'Quality' aspect which regards to the information of being current, up-to-date, sufficient and suitable to be used in the work. LINE app provides 'Locatability'; that is, users are capable of searching for information needed in the LINE groups with convenience – allowing for appropriate decision-making. 'Authorization' is another characteristics that allows any member of the LINE groups a total access to information available in the platform. While granting them the access right to utilize the information.

LINE app shows ‘Compatibility’ which facilitates the exchange of information in various formats among multi-sector partners in the LINE groups that were officially set-up for the opium eradication efforts. The taskforces of cross-functional teams and responsibilities are able to work collaboratively. Moreover, information shared/exchanged via LINE app is considered facts obtained by all sectors involved or have already been reported via the PR websites of the agencies. It appears to be that the data transmission via LINE is more popular than other media because it is fast and gains greater outreach.

In regards to the ‘Ease of Use/Training’ aspect; learning how to use the app is not difficult as the procedures are easy to follow. User instruction and procedure is not complicated allowing users to learn to use it quickly. It also greatly facilitates the opium eradication operations. For example, reducing the use of paper-based documentation and saving resources of the organizations. On ‘Production Timeliness’, using the LINE app to send information proves to be faster. This results in timely information to support a fast pace opium reduction operations. Efficiency is therefore achieved.

In regards to ‘Systems Reliability’; LINE app is a reliable and stable operating system that has continuously developed in LINE with social change. On ‘Relationship with Users’; organizations and relevant units or individuals can make use of the app according to the need. Users or members of the LINE group in opium eradication task forces are very satisfied with performing their tasks using the LINE app. This is because the app has helped to deliver information and news related to the work in a timely fashion. This helps in the communication among various groups for integrated work leading to a more efficient response to the problems in the area.

In addition, the use of LINE app technology for communication in opium reduction has many benefits. Data transfer can be done fast and conveniently - helping to save agency resources and enhance work efficiency. The technology also helps build relationships among members, increasing familiarity with one another while inducing teamwork spirit and integrated working environment and atmosphere. It can be concluded that LINE app technology fits with the tasks of opium eradication in Omkoi District. If users

can learn, apply and realize these benefits for the efficiency and effectiveness of the work, they can utilize the tool in other areas of work with relevant agencies.

It can be said that the use of LINE technology responds to the communication needs at the groups and departmental levels in solving opium problems in Omkoi area. In addition, the study discovers important finding that LINE can meet various needs of many members of the LINE groups involved in solving opium problems. LINE helps create relationships between personnel of both inside and outside relevant departments, allowing them to get to know each other more closely in the form of virtual groups (Group Reality). Communication about work is not tense and stressful while users can interact instantly with each other on various issues involved in the job (Real time). The app allows user to realize visual and atmosphere like in the real events. It also helps develop bodies of knowledge at work that users can apply in their operations. This is because the LINE groups has information from various news and sources aiding research and development. While helping with expression responses for individuals (Self-Expression).

Group integration or identity in the LINE app makes the members of the group aware of each other's identity. While users can participate in sharing opinions and dare to express creativity. When comparing to the face-to-face work environment, it was found that a person may become self-conscious; they are not confident to make comment on the job/tasks out of fear of confrontation with peers in the working environment with many people, which could result in possible self-censorship. Confrontational work creates conflict or problems in communication about the work discouraging people from expressing themselves in such context of operations. When using LINE app and under virtual groups, users have independent and freedom of expression. Self identification can be customized into pictures or symbols according to the user. When using the LINE app, there is only the user and the technology tool at hands. Users are confident in expressing their thoughts and showing their identify. This leads to successful execution and work implementation according to the roles and responsibilities along with work operations in various aspects of the organizations. The result is effectiveness and efficiency.

This research study shows that technology and task can be integrated as one under the new form of work culture and customs, which is worth watching. Not only that LINE

app technology fits with the tasks, it also fit with the characteristics of individual user who tends to be familiar with the app from the daily use. Especially when technology can bring about the true identity of user both positive and negative aspects. In the age of borderless communication technology, people have to think and be very aware of how technology should be used in the working environment in order to achieve the highest efficiency and effectiveness. While being aware of any potential negative effect and find preventive measures to counteract it.

6. Conclusion and discussion

The purpose of this study is to understand the link between the LINE application's functionality and the communication needs of the working group. The working group consisted of various organizations working on an opium eradication operation in Omkoi, Chiang Mai. In Omkoi, the use of opium and opium cultivation is a complicated problem and requires intense collaboration and a high level of information-sharing between several Thai governmental institutions including local governments, police, narcotics control, hospitals & clinics.

The LINE Application was chosen as a tool to fulfil the communication gap between these organizations. LINE provides communication channels for group members in real-time, allowing for the exchange of information anytime, free of charge. which reduces the time and resources spent on group communication and information exchange.

The study applies the Task-Technology Fit Model from Goodhue and Thompson (1995) to analyze tasks and technology characteristics and try to see the 'fit' or the match between these two on 8 aspects. According to the research findings, the LINE application was used frequently to help the group members with their efforts to resolve the opium problem. It can therefore be concluded that the LINE app technology fits with the tasks of opium eradication in Omkoi District.

Moreover, the fit between tasks and technology in the framework also leads to utilization and performance impacts. This communication technology aided the operations and enhanced the responsiveness of all sectors involved in the opium eradication efforts, making the efforts more effective and efficient.

7. Limitations and recommendations for future research

According to the findings of the study, the adoption of the LINE app as the communication tool for multi-organization collaboration was well utilized in the context of CRSPO in Omkoi. From Users/CRSPO members' evaluations, they seemed to be satisfied with LINE and will continue to use LINE for communication and information sharing within the group.

However, there are still problems and obstacles in using the LINE app in the working group, including delays in data/information transmission associated with the Omkoi geography (isolated and mountainous with spotty signal availability), expired data , too many LINE groups (both for work and social), and low data security and privacy.

From our observations, we can see that there are no clear rules and regulations developed in the communication and information sharing within the groups. Therefore, individual communication patterns differed between the members of each group. Some just posted greetings and some shared important files. This finding may be an interesting area for future research.

In addition, the context of the research was conducted in a special context that is in Omkoi with its broad geographical dispersion of members in remote areas. This is another limitation for generalizability because the usage and performance impact are influenced by the nature of tasks, work position, the varying status of members, and group culture. The multi-organizational feature of the group also needs to be considered. As the group consists of 23 organizations, loosely connected by this common cause (opium eradication) and all having different organization structures. Future research should address these differences with other types of groups and their members.

Moreover, with the expanding choices for collaborative technologies, most of which emphasize communication and connectivity (Zigurs and Khazanchi 2008), research is needed on other types of social media, which also act as communication and collaboration tools.

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9. References

Alpeyev, P., Nakamura, Y., & Leung, A. (2016). “Has Japan’s Most Popular Messaging App Peaked?. Retrieved from https://www.bloomberg.com/graphics/2016-LINEipo/Thailandzocialawards. (March 10, 2020)

Bryer, T. A., et al. (2011). "Social media and public administration: Theoretical dimensions and introduction to the symposium." 33(3): 325-340.

Clement, J. (2020). Worldwide digital population as of April 2020. Accessed April 24, 2020. Retrieved from https://www.statista.com/statistics/617136/digital-population-worldwide/

D'ambra, J., et al. (2004). "Use of the World Wide Web for international travel: Integrating the construct of uncertainty in information seeking and the task-technology fit (TTF) model." 55(8): 731-742.

Dawes, S. S., et al. (2009). "From “need to know” to “need to share”: Tangled problems, information boundaries, and the building of public sector knowledge networks." 69(3): 392-402.

Dewalt, K. M. and B. R. J. C. A. DeWalt (2002). "Participant observation. Walnut Creek."

Dishaw, M. T., et al. (1999). "Extending the technology acceptance model with task–technology fit constructs." 36(1): 9-21.

Emde, M. and M. Fuchs (2012). Using adaptive questionnaire design in open-ended questions: A field experiment. American Association for Public Opinion Research (AAPOR) 67th Annual Conference, San Diego, USA.

Ferratt, T. W. and G. E. J. E. J. o. I. S. Vlahos (1998). "An investigation of task-technology fit for managers in Greece and the US." 7(2): 123-136.

Goodhue, D. L. and R. L. J. M. q. Thompson (1995). "Task-technology fit and individual performance." 213-236.

Goodhue, D. L. J. D. s. (1998). "Development and measurement validity of a task-technology fit instrument for user evaluations of information system." 29(1): 105-138.

Junglas, I., et al. (2008). "Task-technology fit for mobile locatable information systems." 45(4): 1046-1057.

Kantar. (2019). 80% of connected consumers in Thailand use social channels on a daily basis, with LINE dominating the online experience. Accessed November 19,2019. Retrieved from https://www.tnsglobal.com/asia-pacific/intelligence-applied/80-connected-consumers-thailand-use-social-channels-daily-basis-line-dominating

Klopping, I. M., et al. (2004). "Extending the technology acceptance model and the task-technology fit model to consumer e-commerce." 22(1).

LINE Corporation. (2020). “About LINE Application”. Retrieved from https://LINEcorp.com/. (March 15, 2020)

LINE Corporation. (2019). “LINE Q3 2019 Earnings Results”. Retrieved from https://scdn.LINE-apps.com/stf/LINEcorp/en/ir/all/FY19Q3_earnings_release_EN.pdf (March 18, 2020)

Lippold, J. (2013). “Let's Talk About LINE”. Retrieved from https://www.clickz.com/lets-talk-about-LINE/37831. (March 18, 2020)

Mathieson, K., et al. (1998). "Beyond the interface: Ease of use and task/technology fit." 34(4): 221-230.

Mergel, I. (2012). Social media in the public sector: A guide to participation, collaboration and transparency in the networked world, John Wiley & Sons.

Mergel, I. J. G. I. Q. (2013). "Social media adoption and resulting tactics in the US federal government." 30(2): 123-130.

Mergel, I. J. T. f. o. p. a., public management, and p. s. a. t. world (2011). "The use of social media to dissolve knowledge silos in government." 1: 177-187.

Mishra, J. L., et al. (2011). "Information sharing during multi-agency major incidents." 48(1): 1-10.

Nardi, B. A., et al. (2000). Interaction and outeraction: instant messaging in action. Proceedings of the 2000 ACM conference on Computer supported cooperative work.

ONCB. (2018). 'Opium Cultivation and Eradication Report For Thailand 2017-2018'. Office of the Narcotics Control Board, Ministry of Justice. Retrieve from https://www.oncb.go.th/Lists/OpiumTile/Tiles.aspx (April 22, 2020)

Pagani, M. J. I. and Management (2006). "Determinants of adoption of high speed data services in the business market: evidence for a combined technology acceptance model with task technology fit model." 43(7): 847-860.

Perrin, A. J. P. r. c. (2015). "Social media usage." 52-68.

Reja, U., et al. (2003). "Open-ended vs. close-ended questions in web questionnaires." 19(1): 159-177.

Saunders, M., et al. (2003). "Research methods forbusiness students."

Schwartz, M. S. and C. G. J. A. j. o. s. Schwartz (1955). "Problems in participant observation." 60(4): 343-353.

Shirani, A. I., et al. (1999). "Task and technology fit: a comparison of two technologies for synchronous and asynchronous group communication." 36(3): 139-150.

Simasatitkul, Palida and Hsieh, Ying-Jiun. (2015). 'Examining LINE Users' Behavior, Motivation, Attitudes and Factors Influencing Use and Adoption of LINE Official Accounts in Thailand'. Asian Conference on Psychology & the Behavioral Sciences 2015 Official Conference Proceedings. The International Academic Forum, www.iafor.org.

Staples, D. S., et al. (2004). "Testing the technology-to-performance chain model." 16(4): 17-36.

Strong, D. M., et al. (2006). "Extending task technology fit with computer self-efficacy." 37(2-3): 96-107.

The Center for the Resolution of Security Problems in Omkoi (CRSPO). 2017. The Omkoi Mater Plan, duration 2017-2021. edited by The Center for the Resolution of Security Problems in Omkoi (CRSPO). Chiang Mai: The Center for the Resolution of Security Problems in Omkoi (CRSPO).

The Center for the Resolution of Security Problems in Omkoi (CRSPO). 2019. Annual report. edited by The Center for the Resolution of Security Problems in Omkoi (CRSPO). Chiang Mai: The Center for the Resolution of Security Problems in Omkoi (CRSPO).

Vlahos, G. E., et al. (2004). "The use of computer-based information systems by German managers to support decision making." 41(6): 763-779.

Welch, E. W. and M. K. J. G. I. Q. Feeney (2014). "Technology in government: How organizational culture mediates information and communication technology outcomes." 31(4): 506-512.

Whyte, W. F. J. T. A. S. (1979). "On making the most of participant observation." 56-66.

Yang, T.-M. and T. A. J. G. I. Q. Maxwell (2011). "Information-sharing in public organizations: A literature review of interpersonal, intra-organizational and inter-organizational success factors." 28(2): 164-175.

Zigurs, I. and B. K. J. M. q. Buckland (1998). "A theory of task/technology fit and group support systems effectiveness." 313-334.

Zigurs, I. and D. J. I. s. m. Khazanchi (2008). "From profiles to patterns: A new view of task-technology fit." 25(1): 8-13.