TARTU UNIVERSITY

Faculty of Social Sciences

Johan Skytte Institute of Political Studies

Kavisara Thitasut

GENDER BLIND SPOTS? NETWORK STRUCTURES AND GENDER IN SMART MOBILITY: BANGKOK AND KHON KAEN, THAILAND

MA Thesis

Supervisors: Kristina Muhhina, PhD; Heiko Pääbo, PhD

Tartu 2024

Authorship Declaration

I have prepared this thesis independently. All the views of other authors, as well as data from literary sources and elsewhere, have been cited.

Word count of the thesis: 20,624

Kavisara Thitasut, 20 May 2024

Table of Contents

List of tables

Abstract

Adding to the critiques of smart city planning being gender-blind, the issue of gender and mobility persists. Network governance, a collaborative approach involving diverse actors, presents a potential solution. Theoretically, this non-hierarchical structure fosters inclusive policy design. This research addresses a critical gap in literature by examining how network structures influence the integration of gender considerations in smart mobility programs. Feminist urbanism and network theory inform this study.

Employing a qualitative approach with coding techniques, the research investigated smart mobility programs in Bangkok and Khon Kaen, Thailand. Data included interviews with nine informants across four stakeholder groups and 17 relevant documents. While network structures differed across the cases, the analysis revealed no significant variation in the strategies for integrating gender considerations. These findings highlight the need to focus on understanding gender in their respective policy arena, within networks, regardless of structure. The research concludes with policy recommendations for designing more gender-responsive smart mobility programs.

Introduction

"Call me when you get home" is a common phrase I heard growing up as a woman, especially when I commute alone, whether it is in broad daylight or at night. My family and friends always say this to each other before we depart. Growing up, I have always learned the fear of dwelling around the city where I was born and raised as a woman, and it seems to be the shared experience of women in many places across generations.

What gives me a substantial grasp that this abnormally normalized phenomenon is common is a short web-based game called "Get Home Safe" project. It was launched last year in 2023 as an art thesis of a decorative art student from Silpakorn University, Thailand, simulating a story of a woman traveling alone at night, trying to get home safely (Keupram et al., 2023). Going through each step in the game provoked all the fear I know when it comes to commuting at night; all the choices the player has to make are no stranger to me. From choosing between a bus or the last train, taking a taxi or walking in a dim alley to home, strategies to handle possible sexual harassment or assault, and so on. I do not know the game developer besides that she is a young woman living in Bangkok like me. But somehow, her story in the game is just relatable.

This sense of insecurity while using public transportation extends far beyond Thailand's borders. In Berlin, similar concerns are voiced by women who "feel more unsafe than men" (MINT.einander Konferenz, 2019). Some women even resort to carrying self-defense tools, holding "the keychain as a weapon in her fist and letting the keys stick out between her fingers, or even carry a pepper spray can" (MINT.einander Konferenz, 2019). The UK paints a similar picture, with 92 percent of women reporting their biggest fear as "being sexually harassed or assaulted travelling on public transport" (Huseyin, 2023) In Indonesia, statistics reveal a stark disparity, with women being "13 times more vulnerable to sexual harassment on public transportation than men" (The ASEAN Post, 2020). These examples across diverse geographical contexts underscore the significant role gender plays in shaping urban mobility experiences.

The experience of mobility is not homogenous. Besides safety, women and men often exhibit distinct travel patterns and transportation needs. Women tend to make more frequent, shorter trips, often for childcare, errands, and caregiving responsibilities (Economic and Social Council, 2008; ITF, 2018). Conversely, men often have more linear commutes, reflecting a traditional division of labor in the workplace (Havet et al., 2021). As citizens increasingly

demand improvements in public services, understanding these gendered discrepancies becomes critical.

Mobility is the lifeblood of urban life. It is a daily act, a means to access education, healthcare, and employment. It shapes our social interactions and defines our sense of belonging within the city. Yet, traditional urban planning approaches have often overlooked this crucial gender dimension (Oudshoorn et al., 2004; Sangiuliano, 2017). This oversight manifests in poorly lit streets, a lack of safe public restrooms, and inadequate public transportation options during evening hours - all factors that disproportionately impact women's security and well-being.

In recent years, the concept of "smart cities" has emerged, promising to leverage technology to provide efficient and user-friendly urban solutions covering several aspects include health, safety, mobility, activity, and governance (IMD World Competitiveness Center & WeGO, 2023; Quélin & Smadja, 2021). Smart mobility programs integrate digital technologies, like real-time information systems and integrated ticketing, to improve public transportation accessibility and efficiency (Brčić et al., 2018; S. Y. Yoon et al., 2021). However, a growing critique suggests that these initiatives are often designed with a "gender-blind" perspective, failing to account for the specific needs and challenges faced by women travelers (Listerborn, 2015; Parnell et al., 2022).

The gender-blind perspective could be the result of *who* plan smart mobility policies. Traditional urban planning is led by the government, and sometimes, the tradition can no longer handle the complex problems in many policy arenas, such as education, poverty, climate change, and transportation. In response to this, a new form of governance that fosters collaborative practice, being less hierarchical, and can be led by non-state agencies emerged as an alternative to handle "wicked problems" (E. H. Klijn & Koppenjan, 2016).

Networks governance fosters collaboration among a variety of actors, including government agencies, private companies, civil society organizations, and citizen groups (H. Wang & Ran, 2023). This collaborative approach holds the promise of fostering inclusive processes by engaging diverse perspectives and experiences. Smart mobility programs, when designed within a network framework, could potentially leverage this diversity to address the gender gap in urban transportation.

This research delves into a critical puzzle of how networks handle wicked problems of gender blindness in smart cities. While smart cities are often touted as innovative solutions for

urban challenges, their implementation raises concerns about gender bias. This bias could be attributed to the underlying governance structure.

The relevance of my research stems from a critical gap in existing literature. While there is a growing body of research on both gender and smart cities, and networks and inclusive processes, the question of how network governance structures influence the integration of gender considerations remains largely unexplored. This research aims to contribute to this gap by investigating the relations between network structures and inclusive policy design in the context of smart mobility programs.

The central research question guiding this study is: **how do different network structures influence the integration of gender considerations in smart mobility programs?** This question explores into the potential of network governance to foster a more inclusive approach to urban mobility planning. Illustrated through a comparative case study of Bangkok and Khon Kaen, two Thai smart cities exhibiting different governance network structures, this research seeks to analyze the relation between each dimension of network structure (key player, centrality, size, and trust) and how each element engage with the integration of smart city through feminist urbanism lens.

The findings of this research not only contribute to a deeper understanding of smart city initiatives in the Thai context but also hold policy implications.

Ultimately, this research aims to contribute to the creation of smart cities that truly benefit everyone. Women, along with all citizens, deserve to navigate their cities with ease and security. By bridging the gap between network structures, gender considerations, and smart mobility programs, we can move towards a future where transportation is not just efficient and innovative but also inclusive and equitable.

This research will utilize a qualitative analysis method through a guided coding technique. Case studies of Bangkok and Khon Kaen, Thailand, with contrasting network governance structures, will be explored to understand how these structures influence the integration of gender considerations in the design of smart mobility programs. Additionally, interviews with key stakeholders and document analysis will be conducted to gain deeper insights into the process of policy designing from both state and non-state actors.

Through this investigation, I hope to move beyond the critique of gender-blind smart cities and pave the way for the development of truly inclusive urban mobility solutions. Women, as

active participants in city life, deserve transportation options that reflect their needs and empower their daily journeys.

This thesis unfolds across three chapters, building a comprehensive understanding of the topic. Chapter One, Conceptual Frameworks, lays the groundwork by establishing the theoretical foundation and reviewing relevant literature on networks, feminist urbanism, and gender considerations. Following this scene-setting chapter, Chapter Two, Methodology, explains the research design, chosen case studies, and the meticulous process of data collection and analysis that guides me toward the conclusions. Finally, Chapter Three, Analysis and Discussion, presents the analysis of the case study data, examining it through the lens of each network structure dimension. This analysis is then discussed in the context of broader literature, enriching the findings. To conclude, the final chapter will briefly summarize the key points, offer policy recommendations based on the research, and propose areas for future study.

Chapter 1: Conceptual frameworks

This section serves as the cornerstone of the thesis, establishing the key concepts and their interrelationships. My research examines the link between the structure of networks, particularly the network types, and how smart mobility programs integrate gender considerations. Here, I will explore the three central concepts at the heart of my study: governance networks, smart mobility, and gender considerations in policymaking. Each concept will be examined not only in isolation but also in relation to the others, building connections and laying the groundwork for my research expectations. The chapter also includes literature reviews to bridge them together, offering readers to see how each concept connect.

1.1 Governance networks

This section delves into the concept of networks, exploring their rise as a new mode of governance. I will then examine the relationship between networks and inclusivity in policymaking and service delivery. This discussion will pave the way for the next section, which focuses on the role of gender considerations within policymaking.

1.1.1 What is networks?

The New Public Management (NPM) reform ushered in a new era for the public sector, emphasizing market mechanisms to improve service delivery effectiveness, efficiency, and responsiveness. This reform involved decentralization processes, such as privatization, agencification, and contracted services, which brought non-state actors into the fold of public service delivery. However, the complex nature of public issues, resource constraints within the public sector, and the involvement of diverse actors necessitated a shift from the traditional hierarchical approach to governance (E. H. Klijn & Koppenjan, 2016; Torfing, 2005a). Networks emerged as a novel approach to managing this intricate web of actors and resource dependencies to tackle complex public problems.

The concept of networks has a rich scholarly background, leading to a variety of conceptualizations within the context of public governance. These differences stem from diverse perspectives on how networks operate. However, three main strands of network literature stand out: policy networks, collaborative networks, and governance networks (Isett et al., 2011; E. H. Klijn, 2008; E. H. Klijn & Koppenjan, 2016; Torfing, 2005a).

1) *Policy networks* focus on the role of public agencies and their influence on shaping public policy (E. H. Klijn & Koppenjan, 2016). This literature also highlights concerns about potential network closure and public resource allocation within these networks (Isett et al., 2011).
2) *Collaborative networks*, also known as *inter-organizational networks*, emphasize the role of resource dependency within networks for service delivery and policy implementation (E. H. Klijn, 2008). This perspective recognizes networks as either structured and led by public officials or as grassroots efforts that emerge organically (Isett et al., 2011).
3) *Governance networks*, or governing networks, delve deeper, revealing the multifaceted nature of public decision-making in tackling complex or "wicked" problems (E. H. Klijn, 2008). They go beyond mere service delivery, integrating joint efforts in providing public goods and services with shared decision-making on policy (Isett et al., 2011).

This research delves specifically into governance networks, which will be fully defined and explored in the following section. By examining two types of networks within a case study, this research aims to contribute to a richer understanding of governance networks and their role in contemporary governance.

1.1.2 Governance networks

Governance networks, a concept with a rich scholarly background, have been defined in various ways. Several scholars have explored the concept of network governance. E. H. Klijn (2008) defines it as a collaborative process where public policy is made and implemented through a network of relationships between government agencies, businesses, and civil society actors (p. 511). Similarly, Torfing (2005a) views governance networks as webs of actors involved in public governance, including politicians, administrators, interest groups, private firms, social movements, and citizen groups (p. 306). Provan & Kenis (2008) emphasize the collaborative nature of these networks, focusing on groups of at least three legally independent organizations working together to achieve both their individual goals and a shared collective objective. These networks can be formed independently or mandated, particularly within the public sector (p. 231). These definitions all point to key network characteristics: the inclusion of diverse actors, both public and private, who collaborate towards a shared objective – tackling complex policy challenges often referred to as “wicked problems.” This collaborative effort often leads to the

creation of public policies, programs, or service delivery solutions, depending on the network's problem definition.

Furthermore, resource dependency plays a crucial role in network governance. Actors join networks because they rely on each other's resources, fostering a more horizontal interaction compared to traditional hierarchical governance structures. Nevertheless, power dynamics can still be asymmetric, with some actors wielding more influence than others, and horizontal collaboration does not imply complete freedom within a network. Networks operate within a framework of self-regulation, influenced by the network type and structure. Additionally, some level of institutionalization exists, meaning the network operates under a set of rules agreed upon by its participants (E. H. Klijn, 2008; E. H. Klijn & Koppenjan, 2016; Rhodes, 1997; Torfing, 2005a).

Drawing on the established characteristics and definitions of networks discussed earlier, this research adopts a more focused perspective aligning with Provan & Kenis's (2008) definition. In their view, a network consists of three or more legally independent organizations collaborating to achieve both individual and collective goals. These networks can emerge organically or be mandated by legislation, particularly within the public sector.

Provan & Kenis (2008) definition serves as a cornerstone for this research as it effectively captures the essence of networks in my case studies. Crucially, their definition highlights that network actors can be motivated by both individual and collective goals when joining a network. This resonates with my two cases, which involve collaboration between public and private actors. In the Khon Kaen case, for instance, I anticipate observing a private-led network. Considering both individual and collective goals within the network will be instrumental in interpreting the studied networks and their coordination dynamics.

Furthermore, this research will incorporate Provan & Kenis's (2008) typology of networks as another building block of the conceptual framework. This typology will then be further developed into the analytical framework used to examine my independent variable.

The concept of governance networks is also referred to by other terms in the literature, such as collaborative governance and innovative governance. Collaborative governance is particularly prominent in studies focusing on collaborative decision-making processes within the US context (see Cho et al., 2023; Emerson & Nabatchi, 2015; Gazley et al., 2010; Öberg et al., 2018; Torfing & Ansell, 2017). Innovative governance, on the other hand, also encompasses

network approaches, but it is situated within the broader field of social innovation literature (see Georgios & Barraí, 2023; Grimm et al., 2013; Maccallum et al., 2023; Moulaert et al., 2007; Swyngedouw, 2005). Given that “governance networks" and "networks" are consistent with the majority of literature reviewed in this study, this research will use these terms interchangeably.

1.1.3 Typology of networks

Provan & Kenis (2008) established a foundational framework for understanding governance networks by proposing three typologies: participant-governed networks, lead-organization-governed networks, and network administrative organizations, based on a two-dimensional classification system (p. 233–236). Their work treats the network itself, rather than individual actors within the network, as the unit of analysis. Park & Park (2009) further developed this concept by specifically focusing on local network governance. Building upon Provan & Kenis’s typology, they introduced a typology of community development network governance structures based on three key factors: centralization, density, and the local government’s position. This typology, informed by their fieldwork on community initiatives in South Korea, provides a more nuanced view of how these networks function in the real world (Park & Park, 2009). Given my research focus on local-level initiatives within the Asian region, Park & Park’s (2009) typology is particularly relevant as it likely reflects greater similarity to the networks I will be studying compared to typologies derived from European or Anglo-American contexts.

In this typology, the authors use four dimensions to categorize types of networks: density, centrality, size, and key player. Although they did not provide an elaborate explanation of the various degrees (low, moderate, high) in each dimension they measure, nor the suggested measurements to use, they provide some conceptualization of each dimension, which will be discussed below.

The first dimension is network density, particularly the density of trust between actors, is considered a crucial aspect due to the inherent uncertainty within networks (Klijn et al., 2010). Because network operations cannot rely solely on contracts or reward systems, trust becomes a key facilitator for success (Edelenbos & van Meerkerk, 2018). Trust is generally defined as "the willingness to accept vulnerability based on positive expectations about another’s intentions or behaviors” (McEvily et al., 2003, p. 92, as cited in Provan & Kenis, 2008). Networks with high

trust can become closed ecosystems. In such networks, easy access to information and smooth agreement processes foster strong trust among members. However, this very trust can lead to network closure (Korhonen et al., 2018). This closure can make the network exclusive, shutting out or marginalizing certain actors who are not part of the trusted inner circle. Importantly, trust density indicates a network where many actors trust each other, creating a robust web of trust-based relationships. Without this dense network of trust, shared governance suffers due to the lack of a foundation for collaboration among members.

The next dimension is centrality. Network centrality refers to the uneven distribution of power among actors within a network, particularly in complex decision-making situations (Klijn & Koppenjan, 2016; Torfing, 2005b). As Castro et al. (2023) explain, citing Sandström (2008), centrality "describes the extent to which activity levels, i.e., decision-making processes, are dominated by a small number of actors." In simpler terms, networks with high centrality concentrate decision-making power in the hands of a few key players, while those with low centrality distribute power more evenly among participants. However, network centrality also carries implications for efficiency. Park & Park (2009) highlight that wider power distribution, while fostering inclusivity, can lead to increased costs and complexity in the decision-making process. More stakeholders need to be involved, potentially slowing down progress. This observation challenges a common assumption in the literature, which often views "centralization of authority units, and even a centralized policy process, as necessary for effective action" (Park & Park, 2009, p. 94). The optimal level of centrality might depend on the specific context and the trade-off between inclusivity and efficiency.

Network size plays a crucial role in collaboration and decision-making. Park & Park (2009) suggest that smaller networks, where agreements can be reached efficiently, tend to perform better. However, as the network grows, the cost of reaching agreements increases due to the complexity of managing diverse needs, values, and information (Park & Park, 2009). While Provan & Kenis (2008) do not provide specific size recommendations for different network types, they suggest that participatory structures, known for offering high control of decision-making to members, likely function best with fewer than eight organizations. This suggests a potential reference where "few" actors represent networks under eight participants, with "moderate" and "many" encompassing larger groups. Despite the cost increase associated with

larger networks, the inclusion of diverse actors also brings a benefit. With a wider range of perspectives, these networks can access richer information and make more informed decisions.

Building upon Provan & Kenis's foundational network typology, Park & Park (2009) introduced the concept of "key player" to further refine the analysis. This concept focuses on leadership within a network, identifying the actor or actors who function as managers or leaders specific to each network type. In government-led and partnership networks, where a separate entity takes the reins, unlike the self-governed model, the key player refers to the network manager(s). Conversely, in participatory networks where self-governance is the norm, the key players become the organizations leading the project implementation. Understanding the key player is critical because they significantly shape network dynamics. Park & Park (2009) emphasize that key players facilitate collaboration among network members while simultaneously holding the power to both permit or restrict entry into the network. This power directly influences the overall size and diversity of the network itself.

The authors propose a typology of networks based on four key characteristics: trust density, power centrality, size, and key player. This typology identifies three distinct network types. Each type exhibits unique characteristics across these four dimensions. For a quick reference, Table 1 summarizes this expanded typology.

Type 1 Government-leading Network features a flat structure sustained by the local government, serving as the primary network manager. With sparse connections, this network occurs in horizontal settings, often when one organization possesses ample resources and legitimacy to take a leading role. In this type, residents passively engage in community development activities, depending on local bureaucrats for leadership. The local government conveys the appearance of resident-driven projects but is, in reality, superficially mobilizing participation to secure budget support from the central government, showing little interest in genuine collaboration with local residents.

Type 2 Participatory Governed Network is characterized by a dense, flat structure with interdependent relations, lacking central actors. It operates as a self-governing, small-sized network, fostering social capital through high redundancy. Governance is collective, with no separate structure, and participants manage internal and external relations. Local government and multi-stakeholders are members, with the network's responsibility lying with its participants. Private actors' coalitions may lead in some communities, influencing project conditions. The

network, a strong tie, may block the entry of other actors. The local government serves as a messenger for the national government. While central-positioned local actors prioritize community development, residents focus on economic interests.

Type 3 Partnership Networks is a hybrid collaboration involving both public and private entities. It combines participatory and government-led models, where collaboration includes all willing organizations, aiming for consensus decision-making. Some groups adopt a strong-tie form for efficiency, with one actor representing others. Local government serves as the primary network manager through a separate administrative entity dedicated to network governance. Unlike the government-led model, local government's role here is solely focused on network governance, communicating project benefits and national government support to residents to encourage participation. Local residents contribute ideas for overall project development, fostering understanding, while officials actively participate in meetings to oversee project plans tailored to the local community's circumstances.

Table 1: Types of Network Governance

	Trust Density	**Power Centrality**	**Size**	**Key Player**
Type I (Government-led)	Moderately Low	High	Moderate	Local Gov'y
Type II (Participatory)	Moderately High	Low	Few	NGO, Private Org.
Type III (Partnership)	High	Moderate	Many	Local Gov't, NGO, Private Org.

Source*:* Based on Park & Park, 2009 and Provan & Kenis, 2008

This section explored network typologies, with a particular focus on the work of Provan & Kenis (2007) and Park & Park (2009). Park & Park's typology, designed from local network governance in the Asian region, aligns well with my research focus on local initiatives within Asia. I will leverage this typology as the analytical framework for our independent variable. The methodology section will further elaborate on the specific indicators used for categorizing networks within this typology. The methodology section will detail the specific indicators used to operationalize these dimensions.

1.1.4 Networks and inclusivity

Network governance, characterized by the integration of diverse actors to tackle complex public issues, has sparked significant research interest. A review of the literature[1] using the terms "networks," "collaborative networks," "governance networks," and "inclusivity" reveals a primary focus on diversity and inclusivity within networks themselves, with less emphasis on how these factors influence actual policy outcomes.

A review of 22 studies on networks highlights four key themes: the benefits and challenges of inclusivity, the role of power dynamics, balancing inclusivity with efficiency, and alternative approaches to studying networks.

In the first theme of benefits and challenges of inclusivity, research suggests that networks with diverse actor participation, often referred to as "inclusive networks," achieve greater collaboration effectiveness. Cho et al. (2023) and Fasting et al. (2021) provide successful examples of fostering inclusivity, highlighting the benefits of information and shared resources within such networks. Beyond performance, inclusivity also enhances network legitimacy. A study by Hopkins (2010) proposes that inclusivity grants legitimacy through engagement with citizens or non-state local representatives. Carboni et al. (2017) and Z. Wang et al. (2018) further emphasize this concept, suggesting that ambiguity in being inclusive, i.e., local participants might be affiliated with the national-level party (Wang et al., 2018) or under-representation of NGOs in decisive meetings (Carboni et al., 2017), can lead to questioned legitimacy. In essence, this theme underscores that network engaging with a wider range of stakeholders, both state and non-state actors, gain more insights, possess more resources for informed decisions, and are perceived as more legitimate. This understanding of how diverse and inclusive networks benefit network functioning will inform my own research observations.

The second theme, then, discussed power dynamics and network composition as crucial factors influencing network effectiveness. Blanco (2015) highlights that actors' motives can impact network diversity, while Korhonen et al. (2018) demonstrate how government and traditional industry dominance can hinder knowledge transfer within a network. Montefrio & Sin (2019) delve deeper, exploring how political elites strategically use exclusion and inclusion to control network access, often influenced by the state's overall approach. Pattberg (2010) further

[1] The total number of reviewed articles is 22

emphasizes this point, revealing a lack of inclusivity in climate change networks dominated by state agencies and businesses. Studies on this theme consistently highlight the role of power asymmetry, particularly the dominance of state actors. Notably, Park & Park (2009) define "centrality" as a network characteristic reflecting power distribution. This existing literature suggests that decision-making power often concentrates within state actors, potentially hindering inclusive decision-making processes, limiting power distribution and participation, and ultimately affecting network legitimacy. Understanding network centrality, therefore, becomes a key aspect of analyzing different network types for this thesis.

Another key theme explored in the literature revolves around the delicate balance between network inclusivity and optimal performance. Berardo (2009) highlights the need to manage inclusivity alongside resource management for network efficiency. However, overly inclusive processes can backfire. Hovik & Stokke (2007) found that very open networks suffered from weak outcomes due to coordination issues. Additionally, Swyngedouw (2005) raises concerns about the democratic legitimacy of "government-beyond-state" networks, where inclusivity can clash with existing power structures. Vermeiren et al. (2021) offer a potential solution for public-non-profit networks facing this balancing act, suggesting the use of multi-level governance structures to manage both inclusivity and efficiency. In essence, the literature highlights the challenges associated with open network structures and their management. Horizontal coordination with many actors creates complex management issues, and overly inclusive structures can hinder decision-making effectiveness. Therefore, exploring strategies for balancing inclusivity with network effectiveness in my case studies would be valuable, focusing on potential challenges and how these networks cope with them.

The final theme delves into alternative approaches for studying network inclusivity. Baud et al. (2021) offer a novel framework for analyzing urban governance, emphasizing knowledge production and context over network actors and power dynamics, a shift from the network-centric approach used in my research. Cutts et al. (2015) highlight culturally appropriate public access networks as valuable educational resources for marginalized groups. Ingram et al. (2014) propose a methodology for investigating "narrative-networks." While not directly network-related, Qian (2023) explores citizen participation in urban planning, and Reggi et al. (2022) examine the potential of Open Government Data (OGD) for fostering inclusivity in governance. Similarly, Torfing & Ansell (2017) advocate for collaborative governance as a solution to policy innovation

challenges. Ayres (2022) investigates how informal governance can influence network legitimacy, even when formal structures are weak. Although these studies offer valuable new perspectives on studying inclusivity, none propose a framework directly applicable to my research. However, some aspects can enrich my observations beyond the Park & Park (2009) typology. For instance, I can examine policy innovations emerging from my cases or explore the potential application of Open Government Data. By incorporating these elements alongside the typology, I can gain a richer understanding of inclusivity within the networks I study.

Although several themes on network and inclusivity have been exhaustively studied in the literature of both governance networks and collaborative governance, it is evident that literature mostly discuss inclusivity and diversity within networks, or as a premise outcome. However, little empirical works have explored the relationship between networks and inclusive policy outcomes. In this dataset, only two studies directly link these two concepts together.

Lee et al. (2023) provide insights into how network approaches can influence inclusivity in smart city development. Their comparative study of Seoul's centrally controlled model and Portland's community-centered approach reveals contrasting strategies. While Seoul fosters collaboration with private actors and citizens for service delivery, Portland prioritizes collaboration with local organizations to address digital equity and inclusivity concerns. These contrasting cases showcase the diverse strategies cities can employ through network governance to tackle specific challenges. Notably, the authors suggest that community-based approaches like Portland's might be particularly effective in promoting inclusivity.

Beyond smart cities, Eriksson et al. (2015) examined network structures in sea cucumber fisheries governance across the Indian Ocean. While emphasizing the context-dependent nature of network effectiveness, they offer intriguing observations. Their study suggests a correlation between a larger and more diverse network of user groups (fishers, businesses, etc.) and decreased government influence, potentially leading to greater inclusivity. This could indicate that in situations with weaker government control, other stakeholders become more involved. Additionally, the study hints at a potential link between healthy fish stocks and more inclusive governance structures, suggesting that involving diverse stakeholders might contribute to better resource management outcomes.

These two studies suggest a potential positive relationship between networks with greater non-state actor influence and inclusive policy outcomes. The apparent gap in literature exploring

the connection between network structures and inclusive policy outcomes inspires this research. My study aims to contribute to network governance literature by filling this gap.

Unlike the aforementioned studies, my research will analyze network structure based on the typologies proposed by Provan and Kenis in the previous section to explore *how different network structure influence the integration of gender considerations in smart mobility programs*. This research will investigate how network structures affect the inclusivity of policy design, particularly in the context of gender-focused smart mobility programs.

1.2 Gender considerations

Drawing on relevant scholarship, this section delves into the intersection of gender with smart cities and public policy. Recognizing cities as products of interdisciplinary efforts, it builds upon the governance scholarship introduced earlier by incorporating urban studies, particularly feminist urbanism, to establish a foundation for a feminist perspective on cities. The relationship of gender, smart cities, and smart mobility. Finally, the section concludes by examining public policy approaches that prioritize gender considerations. These approaches serve as the bedrock for analyzing gender consideration efforts within this thesis, which constitutes the dependent variable.

1.2.1 Feminist urbanism

Emerging within critical urban theory, feminist urbanism is a recent addition to urban planning and geography literature. Critical urban theory challenges dominant ideologies to expose power imbalances, inequality, injustice, and exploitation within and between cities (Brenner, 2009). Feminist urbanism builds on this foundation, encompassing two key aspects. Firstly, it represents a body of research focused on "understanding women's place in the city" through feminist theories like gendered social relations, embodied experiences, and gender performativity (Peake, 2016; Peake et al., 2021). Secondly, it is a practical approach to city design and development. This approach prioritizes equal access to urban benefits for all, emerging as a response to traditional planning methods that reflected patriarchal norms (Dutton et al., 2022).

These theoretical and practical dimensions of feminist urbanism are inherently intertwined. Studies exploring the multifaceted experiences of women in cities, including zoning, housing, economic development, urban design, and transportation (Snyder, 1995), provide a strong foundation for feminist approaches to urban design.

This concept of feminist urbanism is an important building block for my research on gender consideration efforts in my case study. It is the starting point for recognizing the importance of applying a critical feminist lens to urban policies, particularly in the mobility arena.

1.2.2 Gender, smart city, and smart mobility

The rapid rise of smart city development presents a promising solution to urban challenges (Ahvenniemi & Huovila, 2021; Hall et al., 2000; Lee et al., 2023). However, achieving true sustainability requires a multi-faceted approach that considers environmental, social, and economic aspects (Anthopoulos, 2015; Dameri, 2017; Neirotti et al., 2014; UK Government & DEPA, 2020; S. Y. Yoon et al., 2021). This is reflected in the nine pillars of the smart city framework, with many cities aligning their development with the United Nations' Sustainable Development Goals (SDGs) (Sasanapitak & Amornsiriphong, 2020).

One crucial SDG is Goal 11: building inclusive, safe, resilient, and sustainable cities (United Nations, 2012). This goal emphasizes accessible and sustainable transportation systems, particularly for vulnerable populations like women, children, and the elderly (Target 11.2). Consequently, smart cities adopting the SDGs are inherently tied to the gender aspect, especially within the domain of mobility.

Mobility, defined as the ability of people to move freely (Levy, 2013), encompasses transportation infrastructure and its various modes (UNESCAP, 2022). Smart mobility builds upon this concept by integrating advanced communication technologies (ICT) to enhance convenience for users. However, a critical flaw exists in smart city planning: a tendency to treat citizens as a homogenous group with a focus on technological innovation over inclusivity (Aurigi, 2016; Batty et al., 2012; Listerborn & Neergaard, 2021).

Research on mobility planning reveals concerning gender biases. Existing practices often overlook the specific needs and experiences of women, resulting in a lack of social inclusion. Feminist urbanism offers a promising approach to address this gap. By advocating for equitable cities, it highlights the gender-blindness embedded in planning processes. Examples like "feminist cities" in Liverpool and Glasgow demonstrate the effectiveness of this approach (Arup et al., 2022).

Challenges for transportation planning are particularly evident in rapidly urbanizing regions of the Global South (Uteng & Turner, 2019). While public transport use remains high, personal vehicle ownership is surging, leading to environmental concerns and a prioritization of road expansion that may not consider the specific needs of developing cities. Additionally, conventional planning frameworks often prioritize cost-benefit analyses and travel demand forecasting, neglecting how these strategies disproportionately impact women, such as limited street lighting compromising their safety (Uteng, 2021).

Alternative options like ride-hailing services also fall short. Bauriedl & Strüver (2020) point out their lack of integration with domestic work, primarily undertaken by women, and their tendency to cater to privileged groups. In other words, complementary transport options did not expand to suburban areas or were offered at high prices, which, in fact, did not provide more options for women with care works and low income. Furthermore, Iqbal & Woodcock (2023) research on Karachi, Pakistan, highlights how transportation can limit women's employment opportunities due to restrictions on travel imposed for safety reasons. Sietchiping et al. (2012) emphasize the need for transportation planning that prioritizes the well-being of the urban poor, particularly women.

The reviewed literature, despite its diverse geographic focus, consistently highlights the negative impact of gender-blind planning on women's lives, including those with lower socioeconomic status. From household chores to work opportunities, inadequate access to inclusive mobility services hinders women's mobility and potential. To fulfill the promise of equitable smart cities, policymakers must prioritize gender-specific needs to achieve a more inclusive urban mobility system.

Building upon this critique, scholars call for a more gender-inclusive approach in smart city planning (Asteria et al., 2020; J. in Chang et al., 2022; Prabhakar & Nimesh, 2022). For this study, I define "gender considerations" as efforts to incorporate gender-based differences into program and policy development (European Institute for Gender Equality, n.d.; OECD, 2023; Women's Democracy Network, 2020). This framework provides a foundation for analyzing and advocating for gender-inclusive smart mobility solutions.

1.2.3 Gender approaches in public policy

Gender mainstreaming, gender-responsive, and gender-transformative are established frameworks within public policy, all aiming to tackle gender equality throughout the policy lifecycle (planning, design, implementation, evaluation). While often used interchangeably, these terms have nuanced differences depending on the framework provider, such as the OECD, European Commission, or Women's Democracy Network. Originating in the EU, this global effort to promote gender equality has seen wide adoption across multilevel governing organizations worldwide, including the Global South (Moser & Moser, 2005; True & Mintrom, 2001; Walby, 2005). Examples include its use in Taiwan (D. T. Chang, 2018), ASEAN institutions (Alami, 2017), South Asian education policy (Gunawardena & Jayaweera, 2008), and even forest policy (Tyagi & Das, 2017). Three frameworks from European Commission, Women's Democracy Network, and Asia Development Bank (ADB) will be discussed in the next section to demonstrate their strengths and weaknesses, then leading to how my research conceptualizes gender considerations based on them.

The European Commission: EQUAL guide on gender mainstreaming

The European Commission (2005) conceptualizes gender mainstreaming as both a tool and a strategy for quality improvement within Development Partnerships. This approach offers a roadmap for reaching target audiences and understanding their specific needs and expectations. It emphasizes integrating gender considerations from the very beginning of the development process. This analysis ensures that policies and programs avoid perpetuating gender-based discrimination and actively contribute to the broader goal of achieving gender equality.

The framework provided four themes as evaluation criteria of whether or not the program or project consider gender as a part of their project. These themes are: analysis of the context, the specific objectives and target groups, presentation, implementation of the program (resources and methods), and implementation and evaluation. In each theme, the framework provides examples of questions and evidence as a checklist which is relatively helpful to understand an overall picture of what the European Commission would count as gender mainstreaming elements (European Commission, 2005).

However, while the guidelines offer indicators suitable for evaluating the plans and strategies of policy actors across policy design, implementation, and evaluation, a potential downside exists. The concepts and questions within the guidelines can sometimes sound abstract, potentially hindering clear data collection from actors due to difficulty in understanding.

Women's Democracy Network: Gender-responsive policymaking handbook

The International Republican Institute's (IRI) Women's Democracy Network (WDN) has developed a unique framework for creating gender-responsive policies. Their "Gender in Policymaking Toolkit" serves as the foundation for this framework. A gender-responsive policy, as defined by the toolkit, goes beyond simply considering the needs of men and women. It embraces inclusivity by acknowledging the diverse needs of subgroups within the broader categories of gender (e.g., youth, elderly, LGBTQI+ community, ethnic minorities). This can be achieved through two main approaches: gender-specific policies, which directly target gender equality (e.g., increasing female representation in parliament), and gender-integrated policies, which mainstream gender considerations into broader policy areas (e.g., ensuring natural resource management plans address the specific needs of both women and men) (Women's Democracy Network, 2020).

Unlike the European Commission's framework, this toolkit offers a process-oriented approach. Structured around the entire policy cycle, from design to implementation, it provides detailed checklists that guide users in integrating gender considerations at each stage.

Asia Development Bank (ADB)

The Asian Development Bank (ADB) recognizes the importance of gender equality in designing and monitoring mobility projects. Their framework emphasizes incorporating a Gender Action Plan (GAP) into the Design and Monitoring Framework (DMF). This ensures clear expectations for gender-focused deliverables and outcomes throughout the project lifecycle.

The ADB framework goes beyond simply including a GAP. It advocates for integrating gender performance targets and indicators at various DMF levels, with a particular focus on project outputs. This approach allows for targeted interventions and a clearer understanding of how the project impacts women's mobility. To accurately measure progress, the ADB framework stresses the importance of collecting sex-disaggregated baseline data. This establishes a reference point and enables tracking changes in women's access, use, and benefits from transportation infrastructure and services. While quantitative indicators offer a clear metric for measuring achievements, the framework acknowledges the value of qualitative indicators as well. These qualitative measures provide a more nuanced understanding of the project's impact on women's experiences.

Unlike the previously discussed frameworks aimed at policy-making, the ADB framework adopts a project management approach. It provides specific guidelines for integrating gender considerations at both output and outcome levels. This includes monitoring performance indicators, reporting mechanisms, and underlying assumptions to ensure progress towards achieving gender-equitable outcomes. The ADB framework's emphasis lies in quantitative indicators. They encourage establishing baseline data through research to set numerical targets and track progress toward achieving those targets. Examples of such indicators include the proportion of women involved in project planning and design, the percentage of women using public transport, and the reduction in travel time (measured in hours per day) for both men and women as a result of the implemented project (Asian Development Bank, 2013).

In essence, the ADB framework offers a practical and results-oriented approach to integrating gender equality into mobility projects. By setting clear targets, monitoring progress, and utilizing both quantitative and qualitative data, the framework aims to ensure that mobility projects not only improve overall transportation systems but also empower women through equitable access and participation.

1.2.4 Policy design and gender integration

This study acknowledges the limitations of existing frameworks for integrating gender considerations into smart mobility programs. No single framework offers a perfect solution. Therefore, I propose a novel framework that encompasses the elements of three frameworks discussed previously.

The foundation of this new framework is the Women's Democracy Network (WDN) framework due to its strong emphasis on policy-making processes. This focus is crucial because the framework will be used to analyze policy planning networks in smart mobility initiatives. Additionally, the WDN framework offers a well-structured approach for translating its elements into interview questions. This structure will guide interviews through the problem identification and policy formulation stage, making it easier for interviewees to follow.

The policy cycle serves as the structure for the framework. This simplified framework, as described by Jann & Wegrich (2017), focuses on the general features of the policy process rather than specific actors or institutions. The policy cycle literature typically identifies four major stages: agenda setting, policy formulation, implementation, and evaluation (Birkland, 2019; Höchtl et al., 2016; Howlett et al., 2017; Skok, 1995; Valle-Cruz et al., 2020). Each stage has distinct objectives and tasks. It is important to note that while the framework presents these stages in a sequential order, the policy process can be more complex in reality. Stages may occur simultaneously or non-chronologically (Birkland, 2019; Jann & Wegrich, 2017). Thus, the framework serves as an analytical tool for research purposes rather than a strict reflection of the real-world policy process.

In my study, I focus only on the first two steps in the cycle, which are problem identification and policy formulation. This narrowed scope is applied because both stages relate directly to my research question that asks in the process of designing policies.

Jann & Wegrich's (2017) descriptions will be used to conceptualize the stage of problem identification and policy formulation. The first stage involves problem identification and agenda setting. The way a problem is perceived by the public and media heavily influences how it is recognized and selected for further action. Identifying problems that needs policy interventions shape potential strategies and instruments that will influence policy development in later stages.

A crucial step in this process is moving an issue from its initial recognition, often voiced by affected groups, onto the formal political agenda.

Following agenda-setting is policy formulation, which occurs in the pre-decision phase. This stage involves identifying and crafting policy alternatives to address the problem and then narrowing down these options in preparation for the final decision. Formulating alternatives involves identifying broad approaches to the problem and then designing specific policy tools for each approach (Sidney, 2017). This includes drafting legal or regulatory language and specifying the tools' targets, application timeframe, and effects. Generally, there are policy alternatives in this stage, and an analysis is carried out to decide which one will be adopted in the implementation stage. This process reflects and allocates power among social, political, and economic interests.

Utilizing the policy cycle as a foundational framework, my analysis of gender considerations is integrated throughout two stages: problem identification and policy formulation. This integration involves the application of stage-specific indicators that correspond to tasks of each stage, as previously outlined. A detailed explanation of the framework, including the operationalization of its variables, will be provided within the methodology chapter.

1.3 Guiding hypotheses

In pursuing an answer to my research question *how network structure influences the integration of gender considerations*, I formed four hypotheses for the purpose of guiding my analysis in terms of what is expected to see from analyzing my data, based on theory and literature review present previously in this chapter. These hypotheses are not meant for testing to find either confirmation or negation. Their function is to set expectations and compare with the findings to make implications out of them.

The four hypotheses are structured based on four dimensions of network structure (Park & Park, 2009; Provan & Kenis, 2008), that are key players, centrality, size, and trust.

H1: The more non-state actors dominate as key players in a network, the more gender considerations are integrated into policy design.
H2: The more non-state actors are in a central position in a network, the more gender considerations are integrated into policy design.

H3: The bigger a network is, the richer knowledge it produces, and thus, the more gender considerations are integrated into policy design.

H4: The higher trust among actors a network has, the more it is likely to integrate gender considerations through either agreement, value, belief, or all of this.

Chapter 2: Methodology

This chapter outlines the methodological approach employed in this thesis. It details the study's design in relation to the research question, the rationale, and process for case selection, the chosen methods and sources for data collection, the strategies used to measure relevant concepts and analyze the data, and concludes by acknowledging any limitations inherent to the chosen methodology.

2.1 Research design

This study investigates how network structures influence the integration of gender considerations in smart mobility programs. To explore this phenomenon in its real-world context, a comparative case study design was employed, which is "the systematic comparison of two or more cases obtained through the use of the case study method" (Kaarbo & Beasley, 1999, p. 372). This approach aligns with the research question, allowing for a nuanced understanding through the lens of the previously discussed frameworks.

Since the research delved into process and explanation, a comparative case study design is particularly well-suited (Yin, 2003 as cited in Baxter & Jack, 2008). This approach facilitates an in-depth examination of how network structures handle gender considerations or, conversely, why they might not. Additionally, the research was non-manipulative, examining decisions already made by the involved actors. Data collection involved interviews with relevant stakeholders and analysis of public documents.

A comparative case study was chosen to understand the influence of network structure. This allows for a comparison between Bangkok and Khon Kaen, two smart cities in Thailand, representing distinct network structures within the framework typology. By examining how these cases engage with the gender dimension, the research aims to connect these engagement strategies back to the differing network structures within each city's policymaking process, with the goal of creating policy implications.

In summary, this research employed a comparative case study design, utilizing data from stakeholder interviews and published documents. Qualitative coding analysis will be used to answer the research question. This choice is justified for three reasons. First, comparing cases with differing network structures through key actors, centrality, size, and trust allows for

highlighting potential differences in how these networks engage with gender in designing a policy. Second, semi-structured interviews and published documents are common data collection methods in network analysis studies (e.g. Esmark & Triantafillou, 2007; Hauck et al., 2016; Hu, 2015; Suškevičs et al., 2013), as it helps to focus on relevant information and understand the designing process. Finally, qualitative coding method, with its focus on examining data through specific angles rather than a holistic view (Schreier, 2012), enables a precise analysis aligned with the research question.

2.2 The Comparative Case Study

This sub-section presents the case selection process for this study. First, it outlines the criteria used for identifying suitable cases. Second, it provides an overview of the chosen cases: Bangkok and Khon Kaen. This overview will explore the background of each city within Thailand's local political landscape, its smart city initiatives, and its specific smart mobility project. Establishing this foundation is critical for understanding the subsequent analysis section.

2.2.1 Selection of cases

Having established my research design and analysis method, the next crucial step involves selecting appropriate case studies. A review of existing smart city development literature reveals a significant gap in geographical diversity. Notably, Southeast Asia (SEA) remains underexplored, with studies heavily skewed towards Singapore. However, Singapore's unique political and economic context makes it a less than ideal representative for the region. To address this gap and contribute meaningfully to the field, I chose to investigate cases within SEA.

Several countries in SEA actively pursue smart city initiatives, including Indonesia, Malaysia, and Thailand. Thailand, ranking second in the region on the Smart City Index (IMD World Competitiveness Center & WeGO, 2023), presents a compelling case study. Although trailing Singapore (ranked 7th), Thailand's mid-range position reflects a nation actively developing its smart cities. By analyzing data related to Thailand's smart city and smart mobility programs, valuable insights can be gleaned.

Smart city development occurs at the city level, necessitating a focus on specific urban centers. Thailand's National Strategy on Smart Cities identified seven pilot cities for implementation between 2018 and 2019 (DEPA: Thailand Digital Economy Promotion Agency,

n.d.; Thai Government, 2018). Following a thorough research on data availability, Bangkok and Khon Kaen were chosen as the focal points for this study.

Operating under national directives, individual cities maintain some autonomy due to varying local conditions, e.g., budgets, local authority capacity, strategies, political landscape. This creates a unique opportunity to compare Bangkok and Khon Kaen to shed light on potentially different local governance structures (e.g., government-led vs. partnership-based). This comparative approach allows for observing how these differing network structures engage with the gender dimension, a key aspect of my research question. Ultimately, comparing these two cases revealed the outcomes of different or similar strategies or the potential absence of a specific strategy altogether.

Smart mobility programs in Bangkok and Khon Kaen serve as the focal point of this comparative case study. This choice is driven by two key factors. Firstly, mobility is a crucial dimension of urban development, significantly impacting citizens' daily lives. Secondly, transportation needs often differ based on gender roles (Bridgman et al., 2022). Smart mobility programs, through their technological applications, have the potential to address these diverse needs. Therefore, examining smart mobility programs provides a valuable lens to explore how network structures influence the integration of gender considerations within these initiatives.

2.2.2 Introduction to cases: Bangkok and Khon Kaen

Before delving into specific cases, two national frameworks that guide Thailand's smart city initiatives are introduced: the National Strategy (NS) and the Digital Economy Promotion Agency (DEPA) framework. These frameworks provide the foundation for coordinated efforts across various sectors. In this discussion, I will provide a concise overview of each framework.

Thailand's National Strategy (NS) (2018-2037) serves as a long-term development plan focusing on social, economic, environmental, and political stability (iLaw, 2017). Notably, the NS prioritizes social cohesion and equity, including gender equality and women's empowerment (National Strategy Secretariat Office, 2018). However, this focus on gender equality seems absent in the operational Master Plan, which translates the NS goals into specific development areas like smart cities (Thai Government, 2018).

Smart city development is also guided by the DEPA Smart City Framework, enforced by the Digital Economy Promotion Agency (DEPA) under a National Steering Committee. This

framework incentivizes participating cities with tax breaks, specialist visas, and innovation programs (Nimmanphatcharin et al., 2021). Defining a smart city in the Thai context, it outlines seven development pillars (environment, economy, mobility, etc.) with an emphasis on broad goals. Specific policies are then collaboratively developed by DEPA and local authorities, allowing for context-specific solutions.

Thailand's national frameworks for smart cities, despite a national commitment to the concept, lack explicit plans for gender equality. This is evident in both the National *Strategy* and the DEPA Smart City Framework. This omission highlights the need for research on how local policies within *its* smart city initiatives can specifically address gender equality.

BANGKOK

Bangkok's smart city efforts, mirroring those of other Thai cities, draw from the framework established by DEPA (see previous section) and the National Strategy. The elected governor's vision and the UN's Sustainable Development Goals (SDGs) further guide these initiatives. While several development plans exist, one has been fully implemented and is currently under evaluation: the Phadung Krungkasem Canal area in inner Bangkok. This 9.64 square kilometer zone, covering five districts (Phranakorn, Dusit, Pomprabsatrupai, Pathumwan, Samphantawong, and Bangrak) and housing roughly 107,000 residents, serves as a testing ground for smart city solutions. The BMA is in charge of this initiative, implementing eleven programs across four key areas: environment, energy, mobility, and living.

Focusing on smart mobility, the canal area program consisted of four projects: 1) ICT integration for marine transportation management, 2) CCTV installation for traffic monitoring, 3) real-time traffic tracking via BMA traffic tools, and 4) smart bus stops. These programs aim to establish seamless connectivity within the area, showcasing a blend of various transportation modes offering more convenience and safety in the area (Bangkok Metropolitan Administration, n.d.). Identified actors involved in this program are: Bangkok Metropolitan Administration (BMA), Bangkok Governor, Strategy and Evaluation Department (under BMA), Drainage and Sewerage Department (under BMA), Transportation Department (under BMA), Urban Studies Lab (USL), and residents in the canal area.

The projects listed above and their actors are my empirical data in this research for making Bangkok's case. Despite the program being implemented, this study focused on the designing process of this policy program spanning 2018 to 2024.

KHON KAEN

Khon Kaen's smart city initiative focuses on a single municipality, strategically chosen as a pilot city within the Isaan region due to its existing advanced infrastructure. Their ambitious plan, however, extends beyond the initial municipality. The long-term vision, spanning 20 years, aims to encompass all seven pillars of DEPA's smart city framework across the entire province. A core principle driving Khon Kaen's approach is the "Khon Kaen Model," a local-reliance urban development strategy that emphasizes collaboration between local authorities, businesses, civic organizations, and academia. This collaborative spirit is evident in their first area of focus: smart mobility.

Light Rail Transit (LRT) and Transit Oriented Development (TOD) form the core of Khon Kaen's smart mobility program. Businesses established along the route aim to create a self-sustaining financial system for the project. Profits generated from the economic development spurred by the LRT will then be channeled back into funding other aspects of the city's smart development journey. Key players involved in this program include the provincial administration, municipalities, Khon Kaen Think Tank (KKTT), Khon Kaen Transit System (KKTS), Khon Kaen Community for the Future Foundation, College of Local Administration (Khon Kaen University), and local residents.

The LRT project, TOD, and its network of actors are the focal points making the case for Khon Kaen in my study. The analysis centers on the design process of this initiative, which unfolded between 2017 and 2024.

2.3 Data collection

Data in this research is composed of interviews and publicly available documents that mention smart city and/or smart mobility programs in Bangkok and Khon Kaen. In total, data from four interviews with nine informants and 19 documents were utilized for the analysis. The collected data spans from 2017 to 2024. The time frame starts at the beginning of a discussion about smart mobility programs in each city, according to a published document by the local government: Bangkok started in 2018, while Khon Kaen started around a year earlier in 2017. Both programs are still ongoing at the time of this research being conducted. Thus, the analysis and data collected focused on the design process of the program in each city.

The language of all collected data is Thai, thus, all direct quotes presented in the analysis part were translated by me.

2.3.1 Interviews

My initial research plan focused on interviews as the primary method to understand network structures within smart mobility programs. Group interviews were particularly appealing for three reasons. Firstly, they offered the opportunity to observe the group dynamics of participants within an organization. Secondly, participants in a group setting would share a common background in working on the smart mobility program, fostering richer discussions (Gaskell, 2000). Finally, group interviews offered greater informant convenience.

The sampling strategy is purposive (Etikan et al., 2016) where I did preliminary research to identify actors in each network, then, a list of organizations participating in smart mobility program was made with their contact information, finally I contacted them for the interview request and the organization chose participants they would want to send for the interview. This strategy allowed me to gather information from informants that are relevant to the networks and participate in the policy designing. Thus, despite the collected data being limited, the data is rich and reliable as a result of this sampling strategy.

Despite encountering challenges, four interviews were ultimately conducted, yielding insights from nine informants. These interviews were evenly divided for both cases. Only Khon Kaen lacks the informants from state agencies, but Bangkok has equal informants from both sides. Recognizing the limitations of these interviews, additional data was collected from documents to supplement information missing information. This documentary data also served to verify the information gathered through the interviews.

In Bangkok, the first interview was with four officials from the Strategy and Evaluation Department (BK_Interview1). Informants are an executive (P1), a middle manager (P2), a male analyst (P3), and a female analyst (P4). The second interview was with a civil organization (BK_Interview2), where informants are one collaborator (P1), and one researcher (P2). On a side note, there was difficulties of identifying network participants beyond BMA due to limited publicly available information. Thus, contact of informants from non-state organization was obtained through my personal network. Both interviews were conducted online via Zoom in Thai, audio recorded with verbal-obtained consent, and lasted on average 55 minutes.

In Khon Kaen, two interviews were conducted. The first was a one-on-one interview with an executive (P1) from a non-state organization involved in the program (KK_Interview1). The second interview (KK_Interview2) involved a president (P1) and a committee (P2) of a

community where the LRT project will pass through. Contacts of the community representatives were obtained through my personal network. So, in this case, the collected data was from the private sector and the civil sector. Still, data from state actors is lacking. Both Khon Kaen interviews were conducted online via Zoom in Thai, audio recorded with consent, and averaged around 50 minutes each.

All interviews were semi-structured, meaning they followed a set of guiding questions developed from conceptual frameworks. These questions covered both network structures and gender considerations within the smart mobility programs. Network structure questions focused on actors, resources, decision-making, leading organization identification, and trust among actors. Gender-related questions were more open-ended, starting with a broad inquiry like "How do you understand gender aspects in your program?" and probing further into gender mainstreaming within problem identification and policy formulation stage when applicable. The list of guiding questions can be found in Appendix I and template of verbal consent script can be found in Appendix II.

Table 2: Summary of interviewed participants

Interview	Participant	Gender	Position level	Organization type
BANGKOK				
BK_Interview1	P1	Male	Executive	State organization
	P2	Male	Middle	State organization
	P3	Male	Analyst	State organization
	P4	Female	Analyst	State organization
BK_Interview2	P1	Male	Collaborator	Civil organization
	P2	Male	Researcher	Civil organization
KHON KAEN				
KK_Interview1	P1	Male	Executive	Private organization
KK_Interview2	P1	Male	Community president	Civil organization
	P2	Female	Community committee	Civil organization

2.3.2 Audio transcription

To capture the interview data, I utilized various software applications due to several challenges. First, some programs struggled with Thai language recognition. Second, MAXQDA,

a program with strong transcription capabilities, offered a limited free trial, and purchasing additional time proved cost-prohibitive.

Therefore, the following approach was adopted: interviews were transcribed using a combination of software, i.e., Microsoft Word online transcription function, MAXQDA AI Transcribe, and Sonix. To ensure accuracy, each transcription underwent a thorough proofreading process. This involved listening back to the audio and making any necessary corrections. Additionally, all transcripts were anonymized by replacing informant identifiers with "participant" and included timestamps for reference.

2.3.4 Data management and anonymization

To ensure participant confidentiality, all interview audio files are stored securely on an external hard drive. These recordings will be deleted immediately following my thesis defense and published. All participants were informed of this process beforehand and provided their informed consent. This consent includes permission for audio recording, exclusion of photos or videos, and anonymized use of their direct quotes in my research.

To further protect participant anonymity, all identifiable information has been removed. Specifically, informants are referenced solely by their position level and organization type. In group interviews, direct quotes are attributed by participant number. These measures guarantee the anonymity of all participants involved in the study.

2.3.5 Documents

Similar to sampling logic for interviews, document sampling is purposive (Etikan et al., 2016). Documents that are included in the dataset, in total, are 17, where eight of it was for the Bangkok case, and the rest were for the Khon Kaen case.

For Bangkok, documents included in the analysis are reports on smart city initiatives in Bangkok (3), internal documents from the Strategy and Evaluation Department (3), and news articles (2). These documents were analyzed to see the overview picture of the network governing smart city initiative as a whole. Some were used for identifying collaborative efforts among actors, and some are used for verifying against interview data.

For Khon Kaen, nine documents were analyzed. Due to lack of interview data from state organizations, this was supplemented by city council debate from 2017 to 2022 that discussed

smart mobility and/or the LRT projects (7), and reports on smart city development and Khon Kaen Model (2).

2.4 Analysis method

This section described the analysis process behind my findings. It provided a step-by-step breakdown of the methods used, including variable measurement, coding procedures, and qualitative coding in analyzing the data. This breakdown aims to offer a clear understanding of how I arrived at my conclusions.

2.4.1 Variable measurement

This study, while qualitative in nature, investigates the potential link between network structure and the integration of gender considerations within smart mobility programs. In essence, it explores how the structure of a network might influence how gender considerations are incorporated into program design.

Following a common research approach, I define two key variables: the factor variable, and the outcome variable. The factor variable in this case is "network structure" while the outcome variable is the "integration of gender considerations." In the following section, I will detail the specific measurements used to capture and analyze both of these variables. These measurements were carefully chosen based on relevant literature and existing frameworks used in real-world applications.

Network structure

Building on the conceptual framework outlined earlier, this chapter delves into the network structure employed for the analysis. The framework draws inspiration from the work of Provan & Kenis (2008) and Park & Park (2009), who proposed three network typologies based on four key characteristics: key players, centrality, size, and trust. This study utilized network analysis at two levels. The first level focused on the overall structure of the network, examining its key characteristics. The second level delved deeper into individual actors within the network, analyzing their specific positions and roles (Burt, 2000; Korhonen et al., 2018).

Beginning with examining key players. This characteristic is determined by identifying the actors involved in the network. I started by comprehensively identifying all actors who play

a role, regardless of their specific function (facilitator, collaborator, or participant). Next, I searched for words or descriptions within the dataset that signify leadership – terms like "leading role," "leader," or "frontrunner." By combining these descriptive elements across interviews and document data, I was able to define their status as a key player. As the typology suggests, a network can have more than one key player.

Next, we turn to centrality. Centrality refers to the extent and nature of an actor's involvement in decision-making processes (Edelenbos & Klijn, 2006). To measure this, I considered three factors: role (Ingold & Leifeld, 2016; Raab et al., 2015), resources (Löblich & Pfaff-Rüdiger, 2011; W. Yoon & Hyun, 2010), and participation level (Edelenbos & Klijn, 2006). Role refers to the role an actor plays within the network, categorized further as facilitator (an actor who actively supports the project through various measures, including legislation and incentives), collaborator (an actor who actively engages with others for resource exchange), and participant (an actor with a more passive role in the network).

Resources within the network can be categorized as knowledge, funding, and authority. To assess participation level, I utilized a simplified five-category version of the participation ladder developed by Arnstein (1969) as cited in Edelenbos & Klijn (2006). This framework outlines different levels of participation, ranging from informing and consulting, where non-state actors provide ideas at the leader's request, to co-producing and co-deciding, where non-state actors collaborate with leaders to define problems, solutions, and ultimately, the decisions themselves (Cardullo & Kitchin, 2019; Fung & Kennedy, 2006; Linders, 2012; Reed, 2008).

Size, as defined by the typology, is a straightforward concept. It refers to the total number of identified actors within the network. Due to limitations in the available data, I opted for a more superficial measure by counting actors based on groups rather than individual organizations. For example, the central government would be counted as one group, the provincial government as another, and so on. Similar to existing literature, the threshold for "few" participants in this study is set at eight organizational groups (Provan & Kenis, 2008).

Finally, trust is an essential network characteristic. Key aspects include agreement trust – "the parties in this project generally live up to the agreements made with each other" – and reliability – "confidence in the reliability of a person or system" (Klijn et al., 2010, p. 10). Therefore, trust will be described qualitatively in the analysis section, based on how actors

discuss each other within the data, including challenges they had in terms of collaboration between actors, and their deliverables per agreements.

Integration of gender considerations

This research delves into how smart mobility programs consider gender by utilizing two key frameworks. The first is feminist urbanism, which provides a lens to examine how actors involved in the program, and within smart cities in general, understand gender. This perspective explores how these actors perceive men and women as users of urban spaces, and critically analyzes how the program itself envisions men and women utilizing its services, going beyond the program's construction or infrastructure.

Complementing this analysis, the Women's Democracy Network (WDN) framework provides guiding questions for problem identification and policy formulation. By applying these questions, the research assesses how planners involved in the program understand and integrate gender considerations. Specifically, it explores how actors conduct research and gather data for the program, whether gender-related indicators are present (and how they are used), and finally, how the program's impact is measured from a gender perspective.

It is important to acknowledge that the WDN framework, summarized in Table 2, is not a rigid or prescriptive tool. It serves as a guide, and a close examination of how actors engage with its principles is employed to provide a comprehensive picture of their approach to gender considerations. This combined analysis using feminist urbanism and the WDN framework will form the foundation of the final report

Table 3: Gender consideration framework

Policy stage	Question(s)	Evaluation
Problem Identification	• How is goal defined? • Does it address the differing impact of the problem on women and men and include a broader commitment to improving gender equality?	Presence/absence of gender perspective in defining problem.
Policy Formulation	• How does the policy address the different interests and needs of women and men?	Presence/absence of gender-sensitive data collection, gender-segregated needs analysis, gender budget

Source: Adapted from Women's Democracy Network (2020)

2.4.2 Qualitative Analysis

In this research, qualitative analysis was applied as a method through coding techniques. The process of data analysis in qualitative research involves organizing the collected data in a way that makes sense. This allows researchers to convert what could be a large amount of data into an analysis that is both understandable and insightful (Gibbs, 2013; Liamputtong, 2009). Thus, it is an overarching method for analyzing qualitative data like what I have, that is, interviews and documents. Meanings of data in my research was obtained through coding technique, with a deductive approach meaning a coding scheme was created before coding process started, or "template coding" (Blair, 2015). The process of coding and coding scheme is discussed in the next section.

4.2.2 Coding process

The coding was done using software assistance called MAXQDA (version 2024) for its robust suite of coding and visualization tools. This software is a popular choice among scholars conducting qualitative and mixed methods research (Derakhshan et al., 2021; Ebekozien, 2021; Fernandez-Rio et al., 2017; Snapp et al., 2015; Yang, 2021).

After gathering data from various sources, such as city council debates, news articles, reports, and interviews (see details in data collection section), all data is in text. I uploaded them into MAXQDA.

Following Elo & Kyngäs (2008), I chose a deductive coding approach and began by developing a coding scheme, also called a "categorization matrix" (ibid). This involved creating categories and subcategories to organize my variables based on the previously described measurements. For instance, the "network structure" variable had four categories (key player, centrality, size, trust) with subcategories to capture specific details. Similarly, the "gender considerations" variable had two categories (problem identification, policy formulation) with subcategories to organize data (full details in Appendix IV).

To ensure thorough analysis, I conducted two close readings of all documents and completed two rounds of coding. After finalizing the scheme, in the first round of coding, I assigned data segments to the created categories if they directly matched or illustrated the category definitions (Polit & Beck 2004). Since my scheme was flexible, data were assigned to categories based on "belonging" to a particular group (Dey, 1993 as cited in Elo & Kyngäs,

2008). The coding unit included relevant words, phrases, and passages that aligned with the scheme. The second round involved revisiting coded segments and incorporating any significant information or observations that emerged during the analysis. This allowed for partial inductive analysis by creating an “observations” category used for further discussion.

2.5 Limitations

Despite careful design, this research has limitations. While the qualitative approach provides valuable insights into the "black box" of policy design, it limits generalizability of the findings. Additionally, data accessibility restricted the amount of data collected and analyzed. Furthermore, the gender aspect was solely examined from the policymakers' perspective, excluding residents – the future users of these services.

Acknowledging these limitations, I have carefully considered them when analyzing and discussing the results. Consequently, the policy recommendations presented are cautiously framed, reflecting the limitations of the study. However, this research opens doors for future endeavors to enrich our understanding of this topic.

Chapter 3: Analysis and Discussion

This is the part where I report the result of the case analysis and discussion comparatively between Bangkok and Khon Kaen cases. The report will be structured according to the dimensions of networks from my conceptual framework (key players, centrality, size, and trust). In each network dimension, I described the result of each case, and, in comparison to each other, and at the end of each section, I discuss how this dimension engages with the integration of gender considerations in their respective smart mobility programs. Lastly, the analysis chapter discussed the potential explanation of relations between network structure and gender considerations and its implication for future policies.

3.1 Key players, roles, and resources

Both Bangkok and Khon Kaen exhibit diverse actors in their smart mobility networks. However, the balance between state and non-state actors differs significantly. Bangkok's network leans heavily towards state actors, who play a dominant role throughout the policy cycle – from formulation to implementation and evaluation. In contrast, Khon Kaen boasts a network with more prominent non-state actors actively participating in the policy cycle, while state actors provide supporting functions.

Bangkok

This dominance of state actors in Bangkok is evident when analyzing the sources. The Bangkok Metropolitan Administration (BMA), the local government encompassing its committees and departments, emerges as one of the leading actors. Public documents and interviews support this, with one informant stating, "there's not so many private sectors involved" (P2, BK_Interview1) in the policy cycle, particularly the Phadung Krungkasem Canal area program.

The state actor in this program is primarily referred to as "BMA" rather than individual organizations. Specific departments or committees under BMA are only named when discussing designated tasks, for example, the Public Works Department was in charge of improving walkways, the Drainage and Sewerage Department provided electric boats for the trial run period, and committees were appointed to work in each project (P1, BK_Interview1).

This approach reflects BMA's self-perception as the leader of smart mobility and other smart city initiatives in the development area. They act as both "collaborator and regulator" (SED_SmartCityHandbook, 2020) for all smart city endeavors in Bangkok. The collaboration aspect involves partnering with NGOs, civic organizations, and international entities like the UK and UN for knowledge exchange. This collaboration is structured with designated committees and organizations fulfilling specific functions. For instance, the Strategy and Evaluation department spearheads smart city policy formulation, program design for each implemented smart dimension, and subsequent evaluation. The department primarily works under frameworks established by DEPA, the National Strategy, and the SDGs. Other departments handle tasks like facilitating legislation (Governor's Office) or providing peripheral support (e.g., drainage and sewerage or transportation Department). Central government agencies also play a role in the policy program; however, it is not an actor in the network but only authorize the projects from the national level and oversee the network at the local level.

Despite the overwhelming presence of state actors, there is some involvement from non-state actors. The Urban Studies Lab (USL) serves as a collaborator, facilitating citizen engagement and civic innovation through hackathon events. BMA views USL as a partner connecting them with citizens in the Nang Loeng area (P2, BK_Interview1). Essentially, USL offers a citizen participation service within the network. While USL collects data from fieldwork, this data "has not been used much in the process" (P2, BK_Interview1) for problem identification or policy formulation.

In conclusion, Bangkok's smart mobility governance presents a picture with BMA at the helm. The Strategy and Evaluation Department drives most aspects of the policy cycle, with the BMA's legislative body handling legal matters. Peripheral departments have minor roles, and the central government plays an approver and supervisor role. Non-state actors, on the other hand, seem to function more like contracted service providers for citizen participation. Therefore, it could be said that Bangkok's smart mobility network resembles an inter-organizational network heavily dominated by state actors and their subordinate entities.

Table 4: Summary of Bangkok's key player and resource

Key player	Organization type	Resource
Bangkok Metropolitan Administration (BMA)	Local government	Authority, collaboration
Strategy and Evaluation Department (BMA affiliated)	Local government	Policy production
Urban Studies Lab (USL)	Non-profit organization	Civic engagement

Khon Kaen

Khon Kaen, on high-level, is the opposite side of Bangkok, where non-state actors play a leading role in its smart mobility program, particularly the Light Rail Transit (LRT) project. This network is led by two key players: Khon Kaen Think Tank (KKTT) and Khon Kaen Transit System (KKTS).

KKTT, a private company, acts as a "city manager" (P1, KK_Interview1) for the project. They initiated the LRT and developed the Khon Kaen Model, a collaborative approach that involves all sectors to create locally-driven development projects. This model bypasses lengthy bureaucratic processes by not relying solely on central government support. KKTT positions itself as "consulting, supporting, and project mobilization" (KhonKaenSmartCityDevelopment, 2021, p. 22) expertise for urban development in Khon Kaen. However, public understanding of this role seems limited, with some city council members expressing confusion about KKTT's involvement in the LRT project and its overall identity, for instance,

> *"Who will operate [the Light Rail Transit project]? Is it KKTS or KKTT? I saw executives of KKTT advertising everywhere that the project has succeeded so, I do not understand who owns this project" (Council Member, KKMUNI_Debate1, 2019).*

KKTS, on the other hand, plays the operator role. They will provide and manage train services and stations throughout the LRT project's lifecycle (P1, KK_Interview1; Khon KaenSmartCityDevelopment, 2021, p. 68, 88; KKMUNI_Debate1, 2017). Thus, as an operator they are referred to a lot in the debate about this Light Rail Transit (LRT) project. Interestingly, this limited company is a joint venture between the five municipalities where the LRT will operate. Funding comes from the business sector, with a registered capital of five million baht

(around 126,000 euros). This combination raises questions about KKTS's legitimacy due to its ambiguous status. City council debates center on whether KKTS is private or a state enterprise (KKMUNI_Debate1, 2019; KKMUNI_Debate1, 2021, p. 7-8), how the LRT project will be financed, whether it is taxpayer money or not (KKMUNI_Debate1, 2019) and potential conflicts of interest between KKTS and KKTT (KKMUNI_Debate1, 2021).

Beyond these leading organizations, two others contribute crucial resources. The first organization is the Khon Kaen Community for the Future Foundation operating under local media, overlaps with KKTT in policy development. However, the Foundation takes on the vital role of citizen engagement (P1, KK_Interview1; KhonKaenSmartCityDevelopment, 2021, p. 68, 78). As one of the three pillars of Khon Kaen's smart city initiatives, they establish "area-based dialogues," (TheKhonKaenModel, 2019, p. 99) conversations with residents to gather needs and inform policies. Their involvement in the LRT project includes public hearings before construction and targeted resident group discussions (KhonKaenSmartCityDevelopment, 2021, p. 67, 78; P1, KK_Interview1).

Secondly, the College of Local Administration (COLA) at Khon Kaen University also plays a supporting role. While identified as a key contributor to smart city initiatives, their specific contributions include conducting research (including case studies from other countries), co-organizing area-based dialogues, and serving as a central collaboration point for the other three non-state actors (P1, KK_Interview1; KhonKaenSmartCityDevelopment, 2021, p. 93).

However, legal and authorization barriers prevent non-state actors from realizing the LRT project alone. State actors, namely municipalities, play a facilitating role by issuing legal permits, contacting the central government for charters, and legitimizing the project (KhonKaenSmartCityDevelopment, 2021, p. 90; P1, KK_Interview1). Khon Kaen Municipality leads this charge, uniting with four other municipalities – Mueng Sila, Samran, Mueng Kao, and Tha Phra – to form KKTS under the Municipal Act, § 75 (1953). While claiming to overcome bureaucratic hurdles through this united front, this "facilitator resource" comes at the cost of lingering questions about legitimacy. Although it is known for sure that municipalities are network actor, I assume their operation, including legislative and ordinance, is done through KKTS but with fewer bureaucratic obstacles. Thus, I will not separate them into another player group, but count them as KKTS.

Table 5: Summary of Khon Kaen's key player and resources

Key player	Organization type	Resource
Khon Kaen Think Tank (KKTT)	Private organization	Policy production, knowledge
Khon Kaen Transit System (KKTS)	Local government and/or private organization	Authority, funding, operation
College of Local Administration (COLA)	Education	Knowledge, civic engagement
Khon Kaen Community for the Future Foundation	Non-profit organization	Civic engagement

In comparison and gender implications

Both Bangkok and Khon Kaen's smart mobility programs involve similar actors: local government, civic organizations, and academia. However, Khon Kaen stands out with additional participation from the business sector, acting as a funding source.

The key difference lies in leadership. Bangkok's program is spearheaded by the local government, the Bangkok Metropolitan Administration (BMA). Due to their concentrated resources (authority, funding, and some knowledge), BMA takes center stage, with other actors playing a more peripheral role.

In contrast, Khon Kaen's leadership is shared. The private company KKTT plays a significant role alongside KKTS, whose public-private nature creates ambiguity. Nevertheless, it is clear that Khon Kaen embraces a partnership model, with both public and private entities sharing leadership.

When it comes to actors and how they engage with gender aspect in the program, neither network actively involves specific actors advocating for gender equality within the network itself. However, there are subtle differences in approach. When asked about how they understand gender dimension in their program, Khon Kaen sees and incorporates gender considerations as part of their "inclusive growth" strategy, he further elaborate "inclusive includes everyone. Inclusive includes all people, all gender, all ages. So, the Stock Exchange of Thailand did not present themselves as for LGBTQ+ only" (P1, KK_Interview1). Aligned with the UN's Sustainable Development Goals (SDGs) that emphasize gender equality. The informant added, "you know SDGs already have a goal on gender equality, and we followed that" (ibid).

Informants of Bangkok, meanwhile, quickly replied to the same question as "gender and safety in urban areas is significantly related" (P1, BK_Interview). He further elaborated that

"when designing services, we take gender considerations into account, especially under the current administration that our governor pays a lot of attention to gender issues" (ibid). Despite the claim, there are no publicly available documents or news mentioning the engagement process with gender-advocate organizations or citizen engagement activities that include gender aspects in the agenda.

However, the mention of the governor's vision in the Bangkok case is interesting. A participant mentioned that:

> *"The current administration puts an emphasis on LGBTQ and gender diversity. So, in terms of mobility and safety, we take their gender-diverse demands into designing services. Hence, I believe in the future we'll see services integrated with these considerations" (P1, BK_Interview).*

It suggests the governor can significantly influence the prioritization of social issues, ultimately impacting policy decisions. This implies that a different governor might lead to a different focus. Furthermore, this highlights the Bangkok governor's power over city policies and operations, exceeding the typical peripheral role of governors in other provinces appointed by the Ministry of Interior. This distinction can likely be attributed to the fact that Bangkok's governor is elected, unlike those in other provinces.

Interestingly, as evident in the direct quote above, when being asked about gender, informants in both cities seemed to interpret the question as concerning LGBTQ+ participation rather than men's and women's participation. This could be due to the recent prominence of LGBTQ+ rights within Thailand's political landscape (Buranajaroenkij, 2023; Chuaikun & Wijitsopon, 2023; "Marriage Bill Makes Thailand a Regional Outlier," 2024; Teeratanabodee, 2023)

Finally, identifying actors and their roles proved easier in Khon Kaen. Public documents clearly outlined key players, resources, and their functions. In Bangkok, this information required deeper analysis of interview data, as public documents offered a less transparent picture.

In conclusion, my expectation was that networks dominated by non-state actors would be more likely to integrate gender considerations into policy design. While both networks addressed gender in a broad sense, mentioning principles like inclusive growth and SDGs (Khon Kaen) or a

governor's vision (Bangkok), it remained unclear how these principles translated into concrete actions. This vagueness, present in both cases regardless of the key players, leads to somewhat mixed findings. The inclusion of gender is acknowledged, but only to a limited extent, offering marginally better integration than complete omission.

3.2 Centrality

In relation to actors and resources, centrality refers to the influence an actor can have in policy decision-making. This is measured through: role, participation level, and resource combined together to see how central actors are when it comes to decision-making. This will only elaborate on key players listed in the previous section of each case.

Bangkok

The Bangkok Metropolitan Administration (BMA) positions itself as the leader and driving force behind the city's smart city programs (SED_SmartCityHandbook, 2020, p. 48). They act as both "facilitator and regulator" (ibid, p. 23, 43). As a facilitator, they connect different partners to create a smart city ecosystem This includes fast-tracking business registration for smart city solution companies and fostering connections between investors and relevant sectors. As regulators, they utilize technology and innovation to develop smart services. Through these combined roles, they aim to tackle major city challenges like housing affordability, traffic congestion, and pollution (ibid, p. 43).

The BMA, as a large organization, oversees all smart city initiatives. Its influence on decision-making is structured. Policy programs proposed by BMA affiliates need approval from the governor for budget allocation. Then, the programs go before the Bangkok Metropolitan Council (BMC) for member approval. If successful, the program is implemented (BMA_BudgetPlanningMemo, 2024, p. 6) The BMA, particularly its executive and legislative branches, possesses significant authority and funding resources, making them powerful players (Purdy, 2012).

However, for the Phadung Krungkasem Canal smart mobility program, policy development falls under the Strategy and Evaluation department, which acts as a central collaborator with other relevant departments like water management and transportation, along with district offices (P1, BK_Interview1, Pos. 32-33) Interestingly, the Strategy and Evaluation

department holds a unique position: it's the sole entity crafting policies (P1, BK_Interview1, Pos. 37-38). These policies are not entirely new, but rather a combination of elements from existing ones (ibid). There appears to be no set criteria for policy selection, that is, policymaking involves selecting elements from existing policies to create new ones (ibid, Pos. 36-37). This raises concerns about a potential lack of thorough analysis and evaluation of existing policies before crafting new ones.

The Strategy and Evaluation department's primary resource is knowledge. As the information hub, they receive input from the BMA's executive branch, other departments, and even NGOs through civic engagement activities. They acknowledged that the public issues become more complex and new strategies needed to be in place to manage it, thus, they established a platform for exchanging ideas while they play the coordinating role (SED_SmartCityHandbook, 2020, p. 45). This strategy makes them gain access to information and knowledge flow from their collaborative partners.

Exploring further to how they mobilized knowledge, an executive described that, through their coordination, committees working on projects were formed from their selection and get officially appointed by the governor (P1 & P2, BK_Interview1). They further described that committees were consisted of experts in the related field of work, for example, in digital committee, experts of internet infrastructure and digital analysts were there (ibid). This demonstrates that the Strategy and Evaluation Department held enough knowledge, both content-wise and personnel-wise, to oversee committee formation.

This knowledge base allows them to be the sole policy program developer. This centrality stems from their inherent authority within the BMA, their role as an information center, and the knowledge they gather.

The Urban Studies Lab (USL) is the only non-state actor with a visible role in developing smart city initiative in the area. However, their role is limited. They primarily participate in specific tasks within the broader network dominated by BMA departments. USL contributes knowledge gained through citizen engagement activities, such as workshops, for community empowerment, grassroots initiatives (P2, BK_Interview2), and reflecting residents' opinions on the development (P2, BK_Intervie1; BK_News2, 2023, p. 1).

"The engagement activity with the community is that we modified BMA's data collection process into a format where communities can collect and manage data themselves. Our main goal is to enhance the sense of data ownership for community residents" (P2, BK_Interview2).

Compared to the other two players, USL's contribution appears smaller, acting more like a contracted service provider for civic engagement activities for the BMA.

Unpacking the power dynamics, the Strategy and Evaluation department reigns supreme in policymaking within the smart mobility program for the canal area. This dominance stems from their multifaceted role as collaborators, knowledge center, and sole policy developers. While the Governor's vision sets the overall framework, the Strategy and Evaluation department ultimately wields the most power in shaping the program's policies. This can be attributed to the limited resources and information flow within the BMA and USL compared to the dominant department.

Khon Kaen

As identified in key player analysis, Khon Kaen has two main leaders: KKTT, which is a private company, and KKTS, which is a limited company shared and owned by municipalities as they are "the important mechanism behind Khon Kaen urban development into smartness" (KhonKaenSmartCityDevelopment, 2021, p. 68). KKTS position itself as the "driver" and "collaborator" in the network (ibid, p. 86). This means they expect themselves to be at the center of the network where all resources flow through them. Despite this, they seem to be less in the center compared to their partner KKTS in the smart mobility program; this could be due to the fact that KKTT appears to play more of a role in smart city projects as a whole. KKTT is the policy producer in the network (KhonKaenSmartCityDevelopment, 2021, p. 21; P1, KK_Interview1), thus, their level of participation goes beyond consulting, as one would expect from a think tank organization, to producing policy program which entails the LRT project and this level of participation could be related to the resource they hold, which is knowledge and funding as a business-owned think tank (KhonKaenSmartCityDevelopment, 2021, p. 85-86).

Its leading partner, KKTS, although there is no self-claim about how they position themselves in the network, they are seen as one of the leader together with KKTT, as they are the prime driver of LRT project which will be developed and manage by them.

> *"KKTS has three missions: 1) initiate, proceed, and manage the urban transport system in Khon Kaen province, 2) initiate, proceed, and manage Transit-Oriented Development spaces for profit gaining, and 3) control and govern deliverables of partners on infrastructure, train operations, maintenance, services, and commercial development according to agreements" (KhonKaenSmartCityDevelopment, p. 88)*

Thus, their resource is obviously the operation services for LRT project, where the operation covers from construction to managing the train and its TOD projects to gain profit and listed to the stock market (P1, KK_Interview1; KhonKaenSmartCityDevelopment, 2021, p. 86). Additionally to the operation, KKTS also provides funding for the LRT project, nevertheless, due to its ambiguous status of private or public company, data present discrepancy.

> *"For the first question of whether or not we [KKTS] use the municipality's budget, the answer is no, we do not use" (CEO of KKTS, KKMUNI_Debate1).*

> However, KKTS executives also said, in the same debate:

> *"The investment of this project, as I explained, is not a partnership with the private sector. It is invested solely by local administration 100%, and the company will find the finding itself" (ibid).*

Despite the confusion and ambiguity in funding strategy of KKTS, one thing network actors know is that KKTS will fund the proposed smart mobility program. When it comes to participation level, there is no mention about KKTS in policy development, thus, I interpret it as they take care of the implementation of the policy rather than formulation and adoption. Thus, it could be assumed that KKTS is informed about the policy program and then implement it

probably without further influence on the content of the policy itself. As KKTS, in smart mobility dimension, act as an implementation branch of the policy designed by KKTT.

The other two key players which are the foundation and COLA, both are participants in the network and partially collaborators with civic engagement. As they are the two important pillars on civic engagement in organizing area-based dialogue. Both possess resources of knowledge they gathered from those dialogues and pass it to KKTT to formulate the relevant policy (P1, KK_Interview1). Their level of participation engages more on the informing and consulting level, through dialogues that happened around five or six time in Khon Kaen Municipality since the start of the project.

It is worth mentioning that in some topic, for example, who should operate the LRT, citizen representatives like community presidents get to have a vote on this as an informal referendum. So, in some case, individual citizen did have a decisive power to influence the policy partially. Below is an experience of a participant in one of the dialogue activities:

> *"Meetings have different steps, for example, the first meeting we will be informed, then being consulted, and in some topic, we get to vote. Each meeting had different agendas. […] On the LRT project, they first informed us about the project objective, then what will happen next, how we will be affected, and how to adjust ourselves to it" (P1, KK_Interview2).*

All in all, the case of Khon Kaen where two key players are private actors. It can be seen that, the leading role possess knowledge in producing policy on one leg, on the other leg they have authority power from joint venture of municipalities, and both possess funding for the implementation of the smart mobility program.

In comparison and gender implications

Thus, although the leading organization of the two cases are differ, Bangkok is state actor while Khon Kaen is private actor, the leading role all shared the following resources: knowledge, funding and authority. This can be implied that actors that are in a high centrality position might need to have these three resources to be at the center of the network, or, from another aspect, actors with high centrality need to possess as many resources as possible to become the center.

When looking at level of participation, both cases are similar in terms of leading role is the one wielding producing and decisive power to influence the policy while other actors are informed or consulted. Nevertheless, Khon Kaen offers a unique case as one of its leading roles did not have producing or deciding power in the policy since it is in charge of implementation. This can be further explored in the future research.

On centrality and its implication on gender considerations, both cases offer a very obscure vision on this. Gender aspect can be hidden or embedded within actors possessing knowledge or funding where they can pass on their agendas to the receiving side. However, actors with high centrality in both cases are male dominated, at least visible from the informants that were chosen by their organization to respresent in this research, and their resources, be it knowledge or funding, did not hinder any gender aspect inside it at all.

To sum up, in relation to key player, role, and resources, the more gender considerations in policy design was expected to happen in a network where non-state actor holds central power. However, empirically, none of the actors from both networks possess or mobilize their resources to work towards integrating gender considerations. Despite both networks claiming to connect with residents, gender aspect did not arise as working agenda among key actors when designing smart mobility policy.

3.3 Size

When it comes to the size of the network, counted by groups of actors (listed in the table 6), both cases are different. Surprisingly, Bangkok, which is the capital, has only three groups of actors designing this policy program. Meanwhile, Khon Kaen's network has almost doubled in size, with seven groups led by four leaders.

Bangkok

In Bangkok, the process of designing a smart mobility program was handled only by four groups of actors, which is considered a relatively small network with only a few actors. with this number, it could be expected that managing the network will not be as challenging as networks with more actors. Additionally, the three leading organizations, namely BMA, the Strategy and Evaluation Department, and USL, mostly consist of state agencies that work closely. Meetings for discussion and decision-making occurred regularly (P1, BK_Interview1) between the Strategy and

Evaluation Department and other departments, and with BMA on smart city development in the canal area. However, informants could not disclose how regular the discussion was specifically about smart mobility. And since meeting agendas, minutes, and schedules of Strategy Department is only for internal use, further confirmation or negate this claim is not possible.

Besides network management, size also influences knowledge sharing within the network, connected to actor resources. It is expected that the bigger the network is, the more diverse knowledge it has to design a well-informed policy (Korhonen et al., 2018; Vermeiren et al., 2021) and the diversity comes with engaging with more actors. Judging from the size, Bangkok is an exclusive network and its actor that would share new knowledge or insights is only USL who engaged with residents around the canal area. Thus, main knowledge that was used for producing the policy program was from the existing ones circulating inside and between departments in the BMA. An intriguing observation arose from this case that informants mentioned that the smart city initiative in the canal area covered two governors (P2, BK_Interview1), they added further that the new governor (the current one) brings in new knowledge and vision:

> *"Bangkok's strategy, at the end, under both administrations, has different outstanding points. Both bring changes but differ in detail according to policies and capabilities at that moment. […] I think right now, we're being better in modernizing our organization, there are new-generation collogues and we will keep being better under this administration" (P1, BK_Interview).*

So, on the program level, knowledge circulation could be influenced by both governors who oversaw this program.

Khon Kaen

The case has seven groups of actors in the network, with four leading roles. Its size also falls under the number of small networks. Thus, its network management is not challenging. The four main leaders, KKTT, KKTS, the foundation, and COLA reported to work closely as they have a joint office as a center of their operation in Smart City Operation Center (OPCS) locating inside the University of Khon Kaen (KhonKaenSmartCityDevelopment, 2021, p. 91; TheKhonKaenModel, 2019, p. 79). Although there is no spell-out network manager, both KKTT

and KKTS act as collaborators of this network in a different direction, in other words, KKTT handles collaboration between network and private sector, while KKTS handles with state actors like the City Council, provincial administration, and central government (TheKhonKaenModel, 2019, p. 53). No data is available on the regularity of meetings on the LRT project among actors, but also no management challenges were addressed from both the interviews (P1, KK_Interview1) and analyzed document.

When looking at knowledge diversity in the network in relation to size, as Khon Kaen has diverse actors from the private sector, public sector, and civil sector, their body of knowledge is quite rich. The richness is observed through many initiatives that are produced by the network, for example, the Khon Kaen Model which is widely accepted (TheKhonKaenModel, 2019, p. 14) as it is being shared further among other Thai smart cities in national level. In addition to the local development model, establishing a limited company shared by municipalities like KKTS is another exemplar on a national level and is modeled already in several other cities under city development companies,

> *"The collaboration between five municipalities to establish municipality-owned limited company like Khon Kaen Transit System (KKTS) is an important phenomenon, drawing attention from all over the country to the Khon Kaen Model of urban development" (TheKhonKaenModel, 2019, p. 40).*

The Khon Kaen smart mobility program stands out for its innovative Light Rail Train (LRT) project, the first and only intra-city train system outside of Bangkok. This initiative aligns with the Khon Kaen Model, which positions smart mobility as the foundation for the entire smart city development. Notably, the plan aims for financial self-sufficiency, making the city "smart" without relying solely on government support. This case exemplifies a key finding from the literature: networks with a greater diversity of actors (often reflected in size) facilitate a richer flow of knowledge, leading to more informed policy decisions.

Table 6: Summary of stakeholders in Bangkok and Khon Kaen

Bangkok	**Khon Kaen**
1. BMA 2. Departments under BMA 3. NGO (USL) 4. Civil sector	1. KKTT 2. KKTS 3. Provincial administration 4. Municipality administration 5. Civil sector 6. Education 7. Business

In comparison and gender implications

Both Bangkok and Khon Kaen are small networks composed of under eight organization groups, with Khon Kaen having four more actors. Their differences in network size did not rely on the number, but on the knowledge producing and sharing by actors. This is evident in the case of Khon Kaen where they produced more impactful output such as Khon Kaen Model and the city development company modeled after KKTS. Their rich knowledge is a result from having diverse actors beyond state agency collaborating in the network.

Looking at network size and gender considerations, unfortunately, despite the differently rich levels of knowledge both networks produce, none of the knowledge that is being shared really addresses the concerns of gender-based different needs for urban development. In Bangkok case, inference of knowledge production that is related to its diverse (or not) actor was not visible to see, neither in the policy itself nor other outputs from the network. Similarly, in Khon Kaen, where actors produce national-impacted knowledge sharing, neither of them addressed nor pointed out that urban planning also carries gender-differing needs of the citizens, but only coded under some other category that could imply that it would address the gender-based need, for example, safety.

To conclude, the expectation was set for larger network size to be linked to the production of richer knowledge, potentially leading to the integration of gender considerations. This is supported by the observation that network size impacted the quality and quantity of publicly available knowledge. However, the content of this knowledge itself did not explicitly address gender considerations. In the Khon Kaen model, it was implied as one of the goals (reduce inequality), while Bangkok's model omitted the topic entirely. This finding connects back to our earlier discussion of key players, centrality, and now size. These three network characteristics appear to be interconnected and exert influence on each other. Despite the observed link between

size and knowledge richness, the findings revealed no significant difference in strategy between the two networks.

3.4 Trust

In general, both cases demonstrated strong trust among actors that can be described as both agreement trust and reliability. Bangkok where state actors are dominant, trust among BMA and the Strategy and Evaluation Department is quite strong partially due to their tie as governing body (BMA) and subordinate (the department). While Khon Kaen actor's trust is strong between both state and non-state actors, who could be due to several reasons, such as shared members in the organization, personal relations, and shared values among actors.

Bangkok

Among key players, that is BMA, Strategy and Evaluation Department, and USL, agreement trust can be observed through internal memorandum and ordinances from the BMA to the Department and its appointed committee on smart city program. The Department and its committee, although appointed to be in charge of the whole smart city initiatives in the canal area, the objectives and deliverables of all smart dimensions were written within these documents (SED_CommitteeAppointmentMemo, 2021). Thus, in terms of agreement trust, as the network was led by state actors, their agreements rely very much on the written agreement rather than informal agreement like through talking or other type of binding agreement. Meanwhile, on reliability, all four informants expressed the trust among actors that they would fulfill their tasks and deliver deliverables. This came from how they expressed that in order to have the smart mobility project succeeded in implementation, they'd need collaborations from other departments and state agency such as marine police. This could be seen that they know who to turn to when this kind of task needs to be done, and that they can rely on that organization to complete it (P1 & P2, BK_Interview1)

However, despite the expression that actors trust each other in these two dimensions, when they were asked about challenges that happened in completing this project, some concerns regarding collaboration between organizations arose, one is about the isolation of departments where each office works according to their function, when project that required collaboration of several departments comes in, they struggle to find who would be responsible for it and complete

it (P2, BK_Interview1). The informant further expressed that working-in-silos made “moving the project forward delayed” (ibid).

From outsider point of view (BK_Interview2), they expressed two challenges where one aligns with the challenge within BMA, resulted in “BMA structure does not have enough capacity to mobilize projects proposed by anyone, even by the Strategy and Evaluation department (P1, BK_Interview2). Besides the structure, a civil organization they also face with political challenge that also reflects the function in isolation of BMA. He shared that “if we proposed to them via the normal channel, it would be thrown from function to function for a couple of months until we got their feedback” (P2, BK_Interview2). Hence, sometimes they had to go via a “back channel,” but it still posed the constraint of “whom to talk to since each person works for a different function” (ibid).

The concerns raised by the civil actor regarding their limited role as “only a participant in this network” (P1, BK_Interview2) highlight issues of transparency and accessibility within the network. Both the department and the BMA, as a state agency, appear to lack openness about internal operations, particularly regarding decision-making for smart city and smart mobility projects. This lack of transparency is further compounded by the limited availability of detailed information on these projects, with only a few public documents providing insights. Without the interviews with the Strategy and Evaluation department, access to data would be undisclosed.

The challenges addressed by actors revealed an interesting insight since point of views of state actor and non-state actor did not align here. Despite that, both sides shared the common challenge about structure, assuming the bureaucracy of BMA that, on the one hand, caused their own employee workflow to get disrupted. On the other hand, it caused non-state partners to feel left out and question the institution’s competency.

To sum up, trust among actors in Bangkok is strong in both measured items, which means that their strong agreement trust comes from authority binding through an internal memorandum, appointment ordinance, and bureaucratic structures, which reflects more hierarchy and barbaric than how the trust would look in a network. This might be linked back to the network structure of having been led by state actors. Secondly, on reliability trust, actors expressed confidence in other actors’ competence and commitment to providing deliverables as promised (or bound by authority). Despite having some collaboration challenges, the key players have strategies to overcome them and maintain trust among actors.

Khon Kaen

In Khon Kaen case, actors also seem to have strong tie, signifying dense trust among actors. Their relationship could be traced back since before the smart city and smart mobility project started. The civil sector, namely Khon Kaen Community for the Future Foundation, started having their own project on urban development, with local resource only, for almost a decade, then when there was a smart city initiative on the national level, they combine their project to fulfill the smart city agenda,

> *"Local bureaucrats, administrations, organizations, clubs, Chamber of Commerce, and Federation of Industry: these are Khon Kaen people we have gathered since around ten years ago. They understand that urban development by locals is possible" (P1, KK_Interview1)*

The foundation, at its founding time, consisted of various organizations, including local administration and academic staff (KhonKaenSmartCityDevelopment, 2021, p. 67). The early efforts made by the foundation and other civil groups back then were transferred to KKTT in the present. This includes both manpower and knowledge. Thus, KKTT and KKTS who are the leading role in the current network, were part of the local efforts made a decade ago. This helps explain their strong tie between four main actors in the current network: KKTT, KKTS, the foundation, and COLA as they all were part of the foundation before expanding into more organizations like in the present.

Because their strong trust comes from their shared experience, their agreement trust does not rely on written ones but also by shared value of urban development with local power and consensus was made through multiple times of area-based dialogues:

> *"We started with this first pillar; we needed dialogue to happen first. In Khon Kaen, we talked a lot because this is the most important thing. Then, when we talked often enough about mobility and transportation, the second pillar came: we have a shared vision. We shared a vision of what a good city is. A good city is not having multiple beltways, but a good city is that we have a good transportation system where we can travel within the city in under 20 minutes without having to use personal cars" (P1, KK_Interview1).*

Their shared vision seems to reach down to the community level when representatives were asked about how things would change with this intervention, his answer aligned with objective of the project,

> *"Having more convenient, mass transportation is a good thing, in my opinion. Our community housed a lot of residents, and we would benefit from less traffic jams and connection with Laotian train route in the future" (P1, KK_Interview2)*

On trust and reliability, Khon Kaen also demonstrates strong trust. From actor point of view, KKTT and KKTS have clear boundaries for their scope of work (P1, KK_Interview1; CEO of KKTS, KKMUNI_Debate1, 2019) where KKTT takes care of mobilizing the project on the policy level, while KKTS oversees implementation of the project (ibid). Reliability in the network is strong from actor's point of view.

How actors addressed challenges in collaboration is also intriguing. When the participant was asked about this, he replied immediately, "there is none; there is no challenge in the network because it comes from outside of Khon Kaen" (P1, KK_Interview1). The participant then elaborated more that these challenges as,

> *"First, some agencies in central government just do not want the Khon Kaen Model to happen because it is a disruptive model […] Second, politicians in the parliament see the model as 'upstaging' for a local development" (P1, KK_Interview1).*

Beyond personal perception, in documents, challenges are described with the bureaucratic structure that caused delay or extra work (KhonKaenSmartCityDevelopment, 2021, p. 100, 122). Thus, challenges faced by actors in the network are not about or within the network itself, but it engages with the institution and national level politics, which could reflect back to why the network of private-led happened in the first place.

To conclude, trust in Khon Kaen network is dense and shows in strong ties among actors, both in agreement trust and reliable. Two explanations can be drawn from the data: first, because current network actors used to work on local development initiative since before smart city concept introduced on the national agenda, and second, trust and strong tie are results from the dialogue happening between relevant stakeholders across all sectors from state to private and to civil.

In comparison and gender implications

Looking at trust in Bangkok and Khon Kaen, both networks show high density of trust both in agreement and reliability. Bangkok where state agency is leading the network, agreement trust formed based on official written agreements, while Khon Kaen, where private leads, demonstrate through shared experience and vision. Meanwhile on reliability, both networks are similar in terms of trusting actors on relevant task that they have competence and will complete the agreed deliverables. On challenges, Bangkok state actors expressed those challenges laid in the institutional structure, which reflected in unsettling collaboration among actors, while private actors faced both institution structure and political challenges, making them feel left out and not as a part of the clustered state agency. Khon Kaen shared similar challenges but more on structure and politics at the national level and how local-level initiatives are perceived.

While trust appears high in both networks, it seems to have different implications when considering gender. Despite the dense network structure in both cities, which should facilitate the free exchange of information and agendas, discussions on gender seem entirely absent. This suggests that gender equality might not be a top priority for the actors involved. In a dense network, agreements on shared goals, such as the commitment to gender equality outlined in the National Strategy and SDGs, which are common development frameworks for both cities, could be reached and implemented more swiftly. However, the lack of any discussions or even hinted agendas surrounding gender suggests otherwise.

Based on my initial hypothesis, I anticipated that networks with higher trust levels would be more likely to integrate gender considerations. This is because trust can be built through shared agreements, values, or beliefs, potentially leading to a focus on gender equality. However, the empirical data from both cases revealed no mention of gender considerations. Interestingly, both networks exhibited high levels of density. While one network built trust through agreements, the other achieved it through shared values. Despite this, neither network seemed to have established agreements or values related to promoting gender equality through smart mobility policies.

3.5 Discussion: Network structure and integration of gender considerations

A comparison of Bangkok and Khon Kaen's smart mobility programs revealed a troubling similarity in their approach to gender. While both networks mentioned how network characteristics like key players and size might relate to gender, there was a complete lack of engagement with gender considerations in the crucial dimensions of centrality and trust.

3.5.1 Key players and size

The limited evidence suggesting some relation between key players, network size, and gender integration was concerning. Gender appeared as an afterthought, included under broad topics like "inclusion" or "equality" in program objectives without elaboration on how it factored into program design discussions. This superficiality suggests a potential lack of diversity among key actors or limited knowledge sharing restricted to their circle. Consequently, other actors with valuable insights on gender might be excluded from agenda setting.

This aligns with studies by Uteng (2021) and Uteng & Turner (2019) highlighting a knowledge gap among key players. This gap could explain a focus on cost-benefit analyses and infrastructure over the experiences of city residents when designing smart mobility policies. The interview participants, with only one woman per case, further suggest a potential dominance of men in decision-making positions. This lack of gender awareness could stem from poor data collection, a crucial element for designing gender-sensitive policies (Asian Development Bank, 2013; Daly, 2005; Women's Democracy Network, 2020).

Both networks relied on competent actors for citizen engagement, prioritizing expertise over gender-specific data collection. Extensive dialogues were conducted, likely due to large network sizes and resources. However, there's no mention of collecting gender-segregated needs assessments from residents. This raises concerns that even with good intentions, gender issues might not be effectively addressed. In the worst-case scenario, gender might be entirely overlooked, potentially placing Bangkok and Khon Kaen among "gender-blinded" smart cities (Fernanda Medina Macaya et al., 2021).

3.5.2 Centrality and trust

The complete absence of gender discussions in relation to centrality and trust within both networks is a significant concern. Regardless of who held central positions (state or non-state actors), there was no connection between centrality and integrating gender considerations. This could be linked to the strong bonds of trust within the networks. Tight relationships among key players might have inadvertently created a closed system. This system, with its imbalanced distribution of trust towards outsiders, could explain the lack of focus on gender.

Collaboration and sharing information are crucial for influencing network beliefs and values (Prell et al., 2009; Simpson & de Loë, 2017). However, strong ties among central actors might have excluded diverse perspectives, resulting in the complete absence of gender considerations in these two dimensions.

The fact that both the Strategy and Evaluation department (Bangkok) and KKTT (Khon Kaen) held central decision-making power but did not consider gender in policy design is particularly troubling. One would expect a single central authority to simplify gender integration, compared to networks where multiple actors hold power and potentially clash on gender issues. A deeper look within these organizations, examining both structure and individual stakeholders, might be necessary. Is the issue a lack of women in decision-making bodies or a perception that gender is not a priority despite its direct relevance to their mobility projects?

Overall, both networks, despite operating under a national framework promoting gender equality, failed to integrate gender considerations into smart mobility programs. Gender considerations were either hidden under broad terms like “inclusion” or completely absent. This falls far short of true gender integration in smart mobility development, a field that relies heavily on understanding diverse citizen needs. While the network structures of the two cases differed, the results regarding gender integration reveal a disturbingly similar approach. This suggests that even different structures might not lead to different approaches when it comes to gender inclusivity.

3.6 Policy recommendations

This section outlines recommendations for developing more gender-responsive smart mobility policy designs in both the studied cities and others embarking on similar initiatives.

These recommendations are informed by the research analysis, the Women's Democracy Network's framework, and feminist urbanism principles.

1. Building Awareness and Representation: The first step is fostering a strong understanding of the connections between gender and mobility. This can be achieved through training for relevant personnel within organizations. Training should cover topics such as gender, safety, and urban mobility; how policy interventions can enhance safety and livability for women and LGBTQ+ populations; and the importance of incorporating women's lived experiences beyond statistics. Additionally, promoting women's participation in decision-making roles, whether through quotas or other mechanisms, would bring their perspectives directly to the table.

2. Data Collection and Analysis: Effective identification of gendered issues in mobility requires robust data collection practices. Currently, Thai provinces lack systematic data collection, leading to data unavailability for crucial projects. This data is often compartmentalized, not standardized, and inaccessible to the public. To address this, a systematic data collection approach should be implemented, ensuring sex-disaggregated data is gathered across all levels of government, from national to village. This data should not only focus on major cities but encompass diverse geographical areas. Such comprehensive and standardized data collection would be beneficial beyond gender issues, impacting policy areas like healthcare and social programs for an aging population. In addition to quantitative data, incorporating qualitative data through focus group interviews can provide valuable personal experiences. This fosters empathy with residents who will utilize the services and encourages citizen participation in problem identification, ensuring issues are truly reflected from their perspective. Gender analysis should also be conducted using the collected data to evaluate gender dimensions and identify specific policy issues.

3. Policy Interventions based on Data and Gender Analysis: Informed by data and gender analysis, policy interventions can be tailored to address identified needs. These interventions might include extending public transportation operation hours, expanding routes to cover rural areas, or implementing responsive safety features that allow women to quickly reach authorities in case of emergencies.

Ultimately, gender-sensitive mobility policy interventions strive to create a feeling of safety and belonging in urban spaces for all residents. Men, who may prioritize speed and have less complex travel patterns, can still be accommodated through existing infrastructure like

highways and roads. Women, who often rely on public transportation due to affordability and frequent trips, should have access to reliable and safe options. Gender-responsive policies are not about favoring one group over another; they aim to create a truly livable city for everyone.

Conclusion

This thesis embarked on a journey to explore the intricate relationship between network governance structures, gender considerations, and smart mobility programs. The research puzzle stemmed from a concerning reality – smart cities, despite their promise of innovative solutions, are often criticized for being gender-blind. This oversight is particularly problematic, considering that mobility is a daily necessity, and women and men exhibit distinct travel patterns and needs within the urban landscape. Smart mobility programs designed to address urban transport challenges were expected to bridge the gender gap.

Traditional, government-led urban planning often struggles with complex issues like transportation and gender equality. To address these "wicked problems," a new approach called network governance has emerged. This involves collaboration between diverse groups like government, businesses, and citizen organizations.

This research explores the potential of network governance to overcome the gender bias found in smart city initiatives. While smart mobility programs seem like innovative solutions, their implementation can overlook women's needs. This research sought to address this gap in existing literature, where the interplay between network structures and gender-inclusive policy design remains under-explored.

Drawing on network theory, particularly the typologies of Provan & Kenis (2008) and Park & Park (2009), the study examined the influence of network structure on the integration of gender considerations. This theoretical framework provided a lens to analyze the collaborative dynamics within network governance. Additionally, feminist urbanism, which critiques traditional planning approaches that neglect women's needs, served as a critical foundation for understanding the gendered nature of mobility.

The methodology employed a qualitative approach, utilizing group interviews with key stakeholders and document analysis of relevant reports. The interviews, conducted with nine individuals representing different stakeholder groups involved in smart mobility programs, provided valuable insights into perspectives and experiences. Additionally, 17 documents, program reports, news articles, and, city council debates were analyzed via a coding technique

guided by pre-established coding frameworks. This data sources ensured a comprehensive understanding of the research question.

The central research question guiding this study was: **how do different network structures influence the integration of gender considerations in smart mobility programs?** The findings, based on the analysis of the collected data, offer a nuanced answer that challenges initial assumptions. While network structures in both cases are different in key players and network size, no significantly different strategy found when it comes to engaging with gender considerations. Regarding centrality and trust, both cases showed a complete absence of relations. All in all, in the studied cases, different network structures did not seem to influence the integration of gender considerations.

These findings offer valuable insights for designing smart mobility programs. While a smaller network with a clear leader may seem to streamline communication and decision-making, it could also unintentionally exclude diverse voices and perspectives. Conversely, the lack of a significant connection between network centrality and trust underscores the importance of cultivating a culture of collaboration and open communication within networks and organizations, regardless of their structure.

Building upon this research, future studies could investigate deeper into specific network structures. A starting point could be a research question like: *how does centrality within a network influence inclusive policy design processes*? This could be further explored by examining different aspects of centrality and their relationship to inclusivity. Social network analysis (SNA) with a larger participant pool could be used to identify patterns of interaction within the network, if any. Additionally, researchers could employ various centrality measurement methods beyond SNA, such as UCInet or other tools. Finally, future research could explore different case selections. Comparative studies with a successful and unsuccessful case might reveal key factors influencing inclusivity. Alternatively, large-scale, mixed-method studies could be conducted with a broader range of cases. This research opens exciting possibilities for future exploration in the field of network structure and inclusive policy design.

In conclusion, this research has shown that network structures, while not a guarantee for gender-inclusive smart mobility programs, can play a role in fostering a collaborative environment conducive to integrating gender considerations. Moving forward, the focus should not solely be on network structure, but on cultivating a culture of inclusion within these networks. By prioritizing collaborative communication, building trust, and actively engaging diverse stakeholders, particularly women's organizations, smart mobility programs can truly live up to their promise of creating a more equitable urban experience for all.

This research contributes to ongoing efforts to bridge the gap in literature on network governance and inclusive policy design, and gender and mobility. Through inclusive planning and collaborative governance, we can pave the way for a future where mobility fosters opportunity, connection, and a sense of belonging for all.

Reference

Ahvenniemi, H., & Huovila, A. (2021). How do cities promote urban sustainability and smartness? An evaluation of the city strategies of six largest Finnish cities. *Environment, Development and Sustainability*, *23*(3), 4174–4200. https://doi.org/10.1007/S10668-020-00765-3/TABLES/4

Alami, A. N. (2017). The Implementation of Gender Mainstreaming in ASEAN. *IKAT: The Indonesian Journal of Southeast Asian Studies*, *1*(2), 185–207. https://doi.org/10.22146/IKAT.V1I2.32360

Anthopoulos, L. G. (2015). Understanding the Smart City Domain: A Literature Review. *Public Administration and Information Technology*, *8*, 9–21. https://doi.org/10.1007/978-3-319-03167-5_2

Arnstein, S. R. (1969). A Ladder Of Citizen Participation. *Journal of the American Institute of Planners*, *35*(4), 216–224. https://doi.org/10.1080/01944366908977225

Arup, UNDP, & University of Liverpool. (2022). *Cities Alive*.

Asian Development Bank. (2013). *Gender tool kit: Transport—Maximizing the benefits of improved mobility for all*. Asian Development Bank.

Asteria, D., Jap, J., & Utari, D. (2020). A Gender-Responsive Approach: Social Innovation for the Sustainable Smart City in Indonesia and Beyond. *Journal of International Women's Studies*, *21*(6). https://vc.bridgew.edu/jiws/vol21/iss6/12

Aurigi, A. (2016). No need to fix: Strategic inclusivity in developing and managing the smart city. *Digital Futures and the City of Today*.

Ayres, S. (2022). A decentred assessment of the impact of 'informal governance' on democratic legitimacy. *Public Policy and Administration*, *37*(1), 22–45. https://doi.org/10.1177/0952076720904991

Bangkok Metropolitan Administration. (n.d.). *บทสรุปผู้บริหาร: แผนการพัฒนา โครงการพัฒนเมืองอัจฉริยะเพื่อสนับสนุนการพัฒนาพื้นที่โดยรอบคลองผดุงกรุงเกษม โดย กรุงเทพมหานคร [Executive Summary: Smart City Development plan for developing area around Pradung Krungkasem Canal by BMA]*.

Batty, M., Axhausen, K. W., Giannotti, F., Pozdnoukhov, A., Bazzani, A., Wachowicz, M., Ouzounis, G., & Portugali, Y. (2012). Smart cities of the future. *The European Physical Journal Special Topics*, *214*(1), 481–518. https://doi.org/10.1140/epjst/e2012-01703-3

Baud, I., Jameson, S., Peyroux, E., & Scott, D. (2021). The urban governance configuration: A conceptual framework for understanding complexity and enhancing transitions to greater sustainability in cities. *Geography Compass*, *15*(5). https://doi.org/10.1111/GEC3.12562

Bauriedl, S., & Strüver, A. (2020). Platform Urbanism: Technocapitalist Production of Private and Public Spaces. *Urban Planning*, *5*(4), 267–276. https://doi.org/10.17645/up.v5i4.3414

Berardo, R. (2009). Processing complexity in networks: A study of informal collaboration and its effect on organizational success. *Policy Studies Journal*, *37*(3), 521–539. https://doi.org/10.1111/j.1541-0072.2009.00326.x

Birkland, T. A. (2019). An Introduction to the Policy Process: Theories, Concepts, and Models of Public Policy Making: Fifth Edition. *An Introduction to the Policy Process: Theories, Concepts, and Models of Public Policy Making: Fifth Edition*, 1–413. https://doi.org/10.4324/9781351023948/INTRODUCTION-POLICY-PROCESS-THOMAS-BIRKLAND

Blair, E. (2015). A reflexive exploration of two qualitative data coding techniques. *Journal of Methods and Measurement in the Social Sciences*, *6*(1), 14–29. https://doi.org/10.2458/AZU_JMMSS_V6I1_BLAIR

Blanco, I. (2015). Between democratic network governance and neoliberalism: A regime-theoretical analysis of collaboration in Barcelona. *Cities*, *44*, 123–130. https://doi.org/10.1016/j.cities.2014.10.007

Brčić, D., Slavulj, M., Šojat, D., & Jurak, J. (2018). *The Role of Smart Mobility in Smart Cities*. 1601–1606. https://doi.org/10.5592/CO/CETRA.2018.812

Brenner, N. (2009). What is critical urban theory? *City*, *13*(2–3), 198–207. https://doi.org/10.1080/13604810902996466

Bridgman, J., Woodcock, A., & Gut, K. (2022). How can Gender Smart Mobility become a More Intersectional form of Mobility Justice. *International Conference on Gender Research*, *5*(1), pp65-71. https://doi.org/10.34190/ICGR.5.1.236

Buranajaroenkij, D. (2023). CIVIL SOCIETY AND GENDER ADVANCEMENT IN THAILAND. *Routledge Handbook of Civil and Uncivil Society in Southeast Asia*, 205–222. https://doi.org/10.4324/9780367422080-16/CIVIL-SOCIETY-GENDER-ADVANCEMENT-THAILAND-DUANGHATHAI-BURANAJAROENKIJ

Burt, R. S. (2000). The Network Structure Of Social Capital. *Research in Organizational Behavior*, *22*, 345–423. https://doi.org/10.1016/S0191-3085(00)22009-1

Carboni, J. L., Siddiki, S., Koski, C., & Sadiq, A. A. (2017). Using Network Analysis to Identify Key Actors in Collaborative Governance Processes. *Nonprofit Policy Forum*, *8*(2), 133–145. https://doi.org/10.1515/NPF-2017-0012

Cardullo, P., & Kitchin, R. (2019). Being a 'citizen' in the smart city: up and down the scaffold of smart citizen participation in Dublin, Ireland. *GeoJournal*, *84*(1), 1–13. https://doi.org/10.1007/S10708-018-9845-8/TABLES/2

Castro, C. V., Carney, C., & de Brito, M. M. (2023). The role of network structure in integrated water management: a case study of collaboration and influence for adopting nature-based solutions. *Frontiers in Water*, *5*, 1011952. https://doi.org/10.3389/FRWA.2023.1011952/BIBTEX

Chang, D. T. (2018). Gender Mainstreaming and Gender Policies in Contemporary Taiwan. *Journal of International Women's Studies*, *19*(6). https://vc.bridgew.edu/jiws/vol19/iss6/22

Chang, J. in, Choi, J., An, H., & Chung, H. Y. (2022). Gendering the smart city: A case study of Sejong City, Korea. *Cities*, *120*. https://doi.org/10.1016/J.CITIES.2021.103422

Cho, B., Noh, I. H., Roggio, A. M., & Luna-Reyes, L. F. (2023). Exploring the impact of collaboration processes on policy networks success: a case study of food policy councils. *Public Management Review*. https://doi.org/10.1080/14719037.2023.2241047

Chuaikun, D., & Wijitsopon, R. (2023). A corpus-based study of LGBT-related news discourse in Thailand's and international English-language newspapers. *Applied Linguistics Review*, *14*(4), 967–991. https://doi.org/10.1515/APPLIREV-2021-0036/MACHINEREADABLECITATION/RIS

Cutts, B. B., Muñoz-Erickson, T. A., & Shutters, S. T. (2015). Public Representation in Water Management—A Network Analysis of Organization and Public Perceptions in Phoenix, Arizona. *Society and Natural Resources*, *28*(12), 1340–1357. https://doi.org/10.1080/08941920.2015.1020581

Daly, M. (2005). Gender Mainstreaming in Theory and Practice. *Social Politics: International Studies in Gender, State & Society*, *12*(3), 433–450. https://doi.org/10.1093/SP/JXI023

Dameri, R. P. (2017). *Smart City Implementation*. https://doi.org/10.1007/978-3-319-45766-6
DEPA: Thailand Digital Economy Promotion Agency. (n.d.). *Handbook for Smart City Planning*.
Derakhshan, A., Kruk, M., Mehdizadeh, M., & Pawlak, M. (2021). Boredom in online classes in the Iranian EFL context: Sources and solutions. *System*, *101*, 102556. https://doi.org/10.1016/j.system.2021.102556
Dutton, J., Tomaselli, C., Koshy, M., Agnello, K., Johnston-Zimmerman, K., Morphet, C., & Horwood, K. (2022). Feminist Planning and Urbanism: Understanding the Past for an Inclusive Future. *The Palgrave Encyclopedia of Urban and Regional Futures*, 1–19. https://doi.org/10.1007/978-3-030-51812-7_22-2
Ebekozien, A. (2021). A qualitative approach to investigate low-cost housing policy provision in Edo State, Nigeria. *International Planning Studies*, *26*(2), 165–181. https://doi.org/10.1080/13563475.2020.1779671
Economic and Social Council. (2008). *The Inland Transport Committee and gender issues in transport*.
Edelenbos, J., & Klijn, E. H. (2006). Managing stakeholder involvement in decision making: A comparative analysis of six interactive processes in the Netherlands. *Journal of Public Administration Research and Theory*, *16*(3), 417–446. https://doi.org/10.1093/jopart/mui049
Edelenbos, J., & van Meerkerk, I. (2018). Finding common ground in urban governance networks: what are its facilitating factors? *Journal of Environmental Planning and Management*, *61*(12), 2094–2110. https://doi.org/10.1080/09640568.2017.1383232
Elo, S., & Kyngäs, H. (2008). The qualitative content analysis process. *Journal of Advanced Nursing*, *62*(1), 107–115. https://doi.org/10.1111/J.1365-2648.2007.04569.X
Emerson, K., & Nabatchi, T. (2015). *Collaborative governance regimes*. Georgetown University Press. https://experts.syr.edu/en/publications/collaborative-governance-regimes
Eriksson, H., Conand, C., Lovatelli, A., Muthiga, N. A., & Purcell, S. W. (2015). Governance structures and sustainability in Indian Ocean sea cucumber fisheries. *Marine Policy*, *56*, 16–22. https://doi.org/10.1016/j.marpol.2015.02.005
Esmark, A., & Triantafillou, P. (2007). Document Analysis of Network Topography and Network Programmes. In *Methods in Democratic Network Governance*. https://doi.org/10.1057/9780230627468_5
Etikan, I., Musa, S. A., & Alkassim, R. S. (2016). Comparison of Convenience Sampling and Purposive Sampling. *American Journal of Theoretical and Applied Statistics*, *5*(1), 1–4. https://doi.org/10.11648/j.ajtas.20160501.11
European Commission. (2005). *EQUAL Guide on Gender Mainstreaming*. Luxembourg: Office for Official Publications of the European Communities.
European Institute for Gender Equality. (n.d.). *What is gender mainstreaming*. European Institute for Gender Equality. Retrieved November 26, 2023, from https://eige.europa.eu/gender-mainstreaming/what-is-gender-mainstreaming?language_content_entity=en
Fasting, S., Bacudo, I., Damen, B., & Dinesh, D. (2021). Climate Governance and Agriculture in Southeast Asia: Learning From a Polycentric Approach. *Frontiers in Political Science*, *3*, 698431. https://doi.org/10.3389/fpos.2021.698431
Fernanda Medina Macaya, J., Ben Dhaou, S., & Cunha, M. A. (2021). Gendering the Smart Cities: *14th International Conference on Theory and Practice of Electronic Governance*, 398–405. https://doi.org/10.1145/3494193.3494308

Fernandez-Rio, J., Sanz, N., Fernandez-Cando, J., & Santos, L. (2017). Impact of a sustained Cooperative Learning intervention on student motivation. *Physical Education and Sport Pedagogy*, *22*(1), 89–105. https://doi.org/10.1080/17408989.2015.1123238

Fung, A., & Kennedy, J. F. (2006). Varieties of Participation in Complex Governance. *Public Administration Review*, *66*(SUPPL. 1), 66–75. https://doi.org/10.1111/J.1540-6210.2006.00667.X

Gaskell, G. D. (2000). Individual and Group Interview. In *Qualitative Researching with Text, Image and Sound : A Practical Handbook for Social Research* (pp. 38–56). Sage.

Gazley, B., Chang, W. K., & Bingham, L. B. (2010). Board Diversity, Stakeholder Representation, and Collaborative Performance in Community Mediation Centers. *Public Administration Review*, *70*(4), 610–620. https://doi.org/10.1111/J.1540-6210.2010.02182.X

Georgios, C., & Barraí, H. (2023). Social innovation in rural governance: A comparative case study across the marginalised rural EU. *Journal of Rural Studies*, *99*, 193–203. https://doi.org/10.1016/j.jrurstud.2021.06.004

Gibbs, G. R. (2013). Qualitative Analysis. In K. Charmaz & R. Thornberg (Eds.), *The SAGE Handbook of Qualitative Data Analysis* (p. 277). SAGE Publications Ltd. https://books.google.fi/books?id=R-6GAwAAQBAJ

Grimm, R., Fox, C., Baines, S., & Albertson, K. (2013). Social innovation, an answer to contemporary societal challenges? Locating the concept in theory and practice. *Innovation: The European Journal of Social Science Research*, *26*(4), 436–455. https://doi.org/10.1080/13511610.2013.848163

Gunawardena, C., & Jayaweera, S. (2008). *Gender Mainstreaming: Does it Happen in Education in South Asia?* United Nations Children's Fund, Regional Office for South Asia.

Hall, R. E., Bowerman, B., Braverman, J., Taylor, J., Todosow, H., & Von Wimmersperg, U. (2000). The vision of a smart city. *The Vision of a Smart City*. https://www.osti.gov/biblio/773961

Hauck, J., Schmidt, J., & Werner, A. (2016). Using social network analysis to identify key stakeholders in agricultural biodiversity governance and related land-use decisions at regional and local level. *Ecology and Society*, *21*(2). https://doi.org/10.5751/ES-08596-210249

Havet, N., Bayart, C., & Bonnel, P. (2021). Why do Gender Differences in Daily Mobility Behaviours persist among workers? *Transportation Research Part A: Policy and Practice*, *145*, 34–48. https://doi.org/10.1016/j.tra.2020.12.016

Höchtl, J., Parycek, P., & Schöllhammer, R. (2016). Big data in the policy cycle: Policy decision making in the digital era. *Journal of Organizational Computing and Electronic Commerce*, *26*(1–2), 147–169. https://doi.org/10.1080/10919392.2015.1125187

Hopkins, D. (2010). Planning a City through "Dialogue": Deliberative policy-making in action in Western Australia. *Urban Policy and Research*, *28*(3), 261–276. https://doi.org/10.1080/08111146.2010.490619

Hovik, S., & Stokke, K. B. (2007). Network governance and policy integration - The case of regional coastal zone planning in Norway. *European Planning Studies*, *15*(7), 927–944. https://doi.org/10.1080/09654310701356647

Howlett, M., McConnell, A., & Perl, A. (2017). Moving Policy Theory Forward: Connecting Multiple Stream and Advocacy Coalition Frameworks to Policy Cycle Models of Analysis. *Australian Journal of Public Administration*, *76*(1), 65–79. https://doi.org/10.1111/1467-8500.12191

Hu, Q. (2015). Conducting Content Analysis of Documents in Network Research: A Review of Recent Scholarship. *Complexity, Governance & Networks*, *2*(1). https://doi.org/10.7564/14-cgn11

Huseyin, D. (2023, July 27). *Most female passengers feel unsafe on public transport, WSP survey reveals*. Local Transport Today.

iLaw. (2017). *ยุทธศาสตร์ชาติ 20 ปี คืออะไร? เข้าใจกันแบบย่อๆ [What is 20-Year National Strategy]*. ILaw.

IMD World Competitiveness Center, & WeGO. (2023). *IMD Smart City Index Report 2023*.

Ingold, K., & Leifeld, P. (2016). Structural and Institutional Determinants of Influence Reputation: A Comparison of Collaborative and Adversarial Policy Networks in Decision Making and Implementation. *Journal of Public Administration Research and Theory*, *26*(1). https://doi.org/10.1093/jopart/muu043

Ingram, M., Ingram, H., & Lejano, R. (2014). What's the story? Creating and sustaining environmental networks. *Environmental Politics*, *23*(6), 984–1002. https://doi.org/10.1080/09644016.2014.919717

Iqbal, S., & Woodcock, A. (2023). What inhibits the progress of early-career women in Karachi? Studying the effects of socio-spatial mobility barriers on women's employment. *Work*, *76*(2), 877–893. https://doi.org/10.3233/WOR-210919

Isett, K. R., Mergel, I. A., Leroux, K., Mischen, P. A., & Rethemeyer, R. K. (2011). Networks in Public Administration Scholarship: Understanding Where We Are and Where We Need to Go. *Journal of Public Administration Research and Theory*, *21*(suppl_1), i157–i173. https://doi.org/10.1093/JOPART/MUQ061

ITF. (2018). *Women's Safety and Security: A Public Transport Priority*.

Jann, W., & Wegrich, K. (2017). Theories of the Policy Cycle. In F. Fischer & G. J. Miller (Eds.), *Handbook of Public Policy Analysis*. Routledge. https://doi.org/10.4324/9781315093192

Kaarbo, J., & Beasley, R. K. (1999). A Practical Guide to the Comparative Case Study Method in Political Psychology. *Political Psychology*, *20*(2), 369–391. https://doi.org/10.1111/0162-895X.00149

Keupram, P., Teerawat, P., & Hirunjaru, S. (2023). *Get Home Safe Project* [Interactive Campaign Website]. Silpakorn University.

Klijn, E. H. (2008). Governance and Governance Networks in Europe. *Public Management Review*, *10*(4), 505–525. https://doi.org/10.1080/14719030802263954

Klijn, E. H., Edelenbos, J., & Steijn, B. (2010). Trust in Governance Networks. *Http://Dx.Doi.Org/10.1177/0095399710362716*, *42*(2), 193–221. https://doi.org/10.1177/0095399710362716

Klijn, E. H., & Koppenjan, J. (2016). *Governance Networks in the Public Sector*.

Klijn, E.-H., Edelenbos, J., & Steijn, B. (2010). Trust in Governance Networks. *Administration & Society*, *42*(2), 193–221. https://doi.org/10.1177/0095399710362716

Korhonen, J., Giurca, A., Brockhaus, M., & Toppinen, A. (2018). Actors and politics in Finland's forest-based bioeconomy network. *Sustainability (Switzerland)*, *10*(10), 3785. https://doi.org/10.3390/su10103785

Lee, J., Babcock, J., Pham, T. S., Bui, T. H., & Kang, M. (2023). Smart city as a social transition towards inclusive development through technology: a tale of four smart cities. *International Journal of Urban Sciences*, *27*(S1), 75–100. https://doi.org/10.1080/12265934.2022.2074076

Levy, C. (2013). Travel choice reframed: "deep distribution" and gender in urban transport. *Environment and Urbanization*, *25*(1), 47–63.

https://doi.org/10.1177/0956247813477810/ASSET/IMAGES/LARGE/10.1177_0956247813477810-FIG3.JPEG
Liamputtong, P. (2009). Qualitative data analysis: conceptual and practical considerations. *Health Promotion Journal of Australia*, *20*(2), 133–139. https://doi.org/10.1071/HE09133
Linders, D. (2012). From e-government to we-government: Defining a typology for citizen coproduction in the age of social media. *Government Information Quarterly*, *29*(4), 446–454. https://doi.org/10.1016/J.GIQ.2012.06.003
Listerborn, C. (2015). Feminist struggle over urban safety and the politics of space. *Http://Dx.Doi.Org/10.1177/1350506815616409*, *23*(3), 251–264. https://doi.org/10.1177/1350506815616409
Listerborn, C., & Neergaard, M. (2021). Uncovering the 'Cracks'? : Bringing Feminist Urban Research Into Smart City Research. *ACME: An International E-Journal for Critical Geographies*, *20*(3), 294–311. https://urn.kb.se/resolve?urn=urn:nbn:se:mau:diva-44734
Löblich, M., & Pfaff-Rüdiger, S. (2011). Network analysis: A qualitative approach to empirical studies on communication policy. *International Communication Gazette*, *73*(7). https://doi.org/10.1177/1748048511417159
Maccallum, D., Moulaert, F., Hillier, J., & Vicari, S. (2023). Social Innovation and Territorial Development. *Social Innovation and Territorial Development*. https://boa.unimib.it/handle/10281/11041
Marriage bill makes Thailand a regional outlier. (2024). *Emerald Expert Briefings*, *oxan-es*(oxan-es). https://doi.org/10.1108/OXAN-ES286140
MINT.einander Konferenz. (2019). *MINT.einander im digitalen Wandel Konferenz 8. - 9.5. 2019*. Allianz Pro Schiene.
Montefrio, M. J. F., & Sin, H. L. (2019). Elite governance of agritourism in the Philippines. *Journal of Sustainable Tourism*, *27*(9), 1338–1354. https://doi.org/10.1080/09669582.2019.1621327
Moser, C., & Moser, A. (2005). Gender mainstreaming since Beijing: A review of success and limitations in international institutions. *Gender & Development*, *13*(2), 11–22. https://doi.org/10.1080/13552070512331332283
Moulaert, F., Martinelli, F., González, S., & Swyngedouw, E. (2007). Introduction: Social Innovation and Governance in European Cities. *Http://Dx.Doi.Org/10.1177/0969776407077737*, *14*(3), 195–209. https://doi.org/10.1177/0969776407077737
National Strategy Secretariat Office. (2018). National Strategy 2018-2037. In *Office of the National Economic and Social Development Board*.
Neirotti, P., De Marco, A., Cagliano, A. C., Mangano, G., & Scorrano, F. (2014). Current trends in Smart City initiatives: Some stylised facts. *Cities*, *38*, 25–36. https://doi.org/10.1016/J.CITIES.2013.12.010
Nimmanphatcharin, N., Prathombutr, P., Siddhichai, S., A, N., & Treethidtaphat, W. (2021). Smart City Initiatives in Thailand: Key Concepts and Methods. *Hitachi Review*, *70*(1), 106–107.
Öberg, M., Nilsson, K. L., & Johansson, C. M. (2018). Complementary governance for sustainable development in transport: The European TEN-T Core network corridors. *Case Studies on Transport Policy*, *6*(4), 674–682. https://doi.org/10.1016/J.CSTP.2018.08.006
OECD. (2023). *Toolkit for Mainstreaming and Implementing Gender Equality 2023*. OECD. https://doi.org/10.1787/3ddef555-en

Oudshoorn, N., Rommes, E., & Stienstra, M. (2004). Configuring the User as Everybody: Gender and Design Cultures in Information and Communication Technologies. *Http://Dx.Doi.Org/10.1177/0162243903259190*, *29*(1), 30–63. https://doi.org/10.1177/0162243903259190

Park, H. J., & Park, M. J. (2009). Types of Network Governance and Network Performance: Community Development Project Case. *International Review of Public Administration*, *13*, 91–105. https://doi.org/10.1080/12294659.2009.10805142

Parnell, K. J., Pope, K. A., Hart, S., Sturgess, E., Hayward, R., Leonard, P., & Madeira-Revell, K. (2022). 'It's a man's world': a gender-equitable scoping review of gender, transportation, and work. *Ergonomics*, *65*(11), 1537–1553. https://doi.org/10.1080/00140139.2022.2070662

Pattberg, P. (2010). Public-private partnerships in global climate governance. *Wiley Interdisciplinary Reviews: Climate Change*, *1*(2), 279–287. https://doi.org/10.1002/wcc.38

Peake, L. (2016). The Twenty-First-Century Quest for Feminism and the Global Urban. *International Journal of Urban and Regional Research*, *40*(1), 219–227. https://doi.org/10.1111/1468-2427.12276

Peake, L., Koleth, E., Tanyildiz, G. S., Reddy, R. N., & Patrick, D. (Eds.). (2021). *A feminist theory for our time : rethinking social reproduction and the urban* (1st ed.). John Wiley & Sons. https://www.wiley.com/en-ie/A+Feminist+Urban+Theory+for+Our+Time%3A+Rethinking+Social+Reproduction+and+the+Urban-p-9781119789147

Prabhakar, S., & Nimesh, A. (2022). *Migrating Women in Smart City: An Issue of Gender Inequality*. https://papers.ssrn.com/abstract=4495167

Prell, C., Hubacek, K., & Reed, M. (2009). Stakeholder Analysis and Social Network Analysis in Natural Resource Management. *Society and Natural Resources*, *22*(6), 501–518. https://doi.org/10.1080/08941920802199202

Priya Uteng, T. (2021). Gender gaps in urban mobility and transport planning. In *Advances in Transport Policy and Planning* (Vol. 8, pp. 33–69). Elsevier B.V. https://doi.org/10.1016/bs.atpp.2021.07.004

Provan, K. G., & Kenis, P. (2008). Modes of Network Governance: Structure, Management, and Effectiveness. *Journal of Public Administration Research and Theory*, *18*(2), 229–252. https://doi.org/10.1093/JOPART/MUM015

Purdy, J. M. (2012). A Framework for Assessing Power in Collaborative Governance Processes. In *Public Administration Review* (Vol. 72, Issue 3). https://doi.org/10.1111/j.1540-6210.2011.02525.x

Qian, Z. (2023). Collaborative Neighbourhood Governance: Investigating Two Types of Resettlement Neighbourhoods in Suburban Shanghai, China. *Urban Policy and Research*, *41*(4), 434–451. https://doi.org/10.1080/08111146.2023.2276448

Quélin, B., & Smadja, I. (2021). *The sustainable program of six leading cities*.

Raab, J., Mannak, R. S., & Cambré, B. (2015). Combining structure, governance, and context: A configurational approach to network effectiveness. *Journal of Public Administration Research and Theory*, *25*(2). https://doi.org/10.1093/jopart/mut039

Reed, M. S. (2008). Stakeholder participation for environmental management: A literature review. *Biological Conservation*, *141*(10), 2417–2431. https://doi.org/10.1016/J.BIOCON.2008.07.014

Reggi, L., Dawes, S. S., & Gil-Garcia, J. R. (2022). The effects of open government data on the inclusiveness of governance networks: Identifying management strategies and success factors. *Information Polity*, *27*(4), 473–490. https://doi.org/10.3233/IP-220004

Rhodes, R. A. W. (1997). Understanding governance: policy networks, governance, reflexivity and accountability. *Organization Studies*, *20*(3), 394–396.

Sangiuliano, M. (2017). *Smart Cities and Gender: main arguments and dimensions for a promising research and policy development area*. Office of the Commissioner for Human Rights (OHCHR), United Nations. https://www.ohchr.org/sites/default/files/Documents/Issues/Women/WRGS/GenderDigital/MariaSangiuliano.pdf

Sasanapitak, A., & Amornsiriphong, S. (2020). *Smart City: The Role To Create Justice And The Promotion Of Gender Equality*. https://www.academia.edu/download/65366339/IS_02_PP._352_362.pdf

Schreier, Margrit. (2012). *Qualitative Content Analysis in Practice*. 1–280.

Sidney, M. S. (2017). Policy Formulation: Design and Tools. In F. Fischer & G. J. Miller (Eds.), *Handbook of Public Policy Analysis* (pp. 79–87). Routledge. https://doi.org/10.4324/9781315093192

Sietchiping, R., Permezel, M. J., & Ngomsi, C. (2012). Transport and mobility in sub-Saharan African cities: An overview of practices, lessons and options for improvements. *Cities*, *29*(3), 183–189. https://doi.org/10.1016/j.cities.2011.11.005

Simpson, H. C., & de Loë, R. C. (2017). The agricultural community as a social network in a collaborative, multi-stakeholder problem-solving process. *Water (Switzerland)*, *9*(10), 750. https://doi.org/10.3390/w9100750

Skok, J. E. (1995). Policy Issue Networks and the Public Policy Cycle: A Structural-Functional Framework for Public Administration. *Public Administration Review*, *55*(4), 325. https://doi.org/10.2307/977123

Snapp, S. D., Hoenig, J. M., Fields, A., & Russell, S. T. (2015). Messy, Butch, and Queer: LGBTQ Youth and the School-to-Prison Pipeline. *Journal of Adolescent Research*, *30*(1), 57–82. https://doi.org/10.1177/0743558414557625

Snyder, M. G. (1995). Feminist theory and planning theory: lessons from feminist epistemologies. *Berkeley Planning Journal*, *10*(1), 91–106. https://doi.org/10.5070/BP310113063

Suškevičs, M., Tillemann, K., & Külvik, M. (2013). Assessing the relevance of stakeholder analysis for national ecological network governance: The case of the Green Network in Estonia. *Journal for Nature Conservation*, *21*(4). https://doi.org/10.1016/j.jnc.2012.12.007

Swyngedouw, E. (2005). Governance Innovation and the Citizen: The Janus Face of Governance-beyond-the-State. *Http://Dx.Doi.Org/10.1080/00420980500279869*, *42*(11), 1991–2006. https://doi.org/10.1080/00420980500279869

Teeratanabodee, W. (2023). Thailand's 2020–2021 Pro-Democracy Protests: Diversity, Conflict, and Solidarity. *Journal of Contemporary Asia*. https://doi.org/10.1080/00472336.2023.2258131

Thai Government. (2018). *National Strategy No. 6 On Landscape and Smart City (BE 2561-2580)*. The Secretariat of the Senate.

The ASEAN Post. (2020, August 9). *A Dangerous Place For Indonesian Women*. The ASEAN Post.

Torfing, J. (2005a). governance network theory: towards a second generation. *European Political Science*, *4*(3), 305–315. https://doi.org/10.1057/palgrave.eps.2210031

Torfing, J. (2005b). Governance network theory: Towards a second generation. *European Political Science*, *4*(3), 305–315. https://doi.org/10.1057/palgrave.eps.2210031

Torfing, J., & Ansell, C. (2017). Strengthening political leadership and policy innovation through the expansion of collaborative forms of governance. *Public Management Review*, *19*(1), 37–54. https://doi.org/10.1080/14719037.2016.1200662

True, J., & Mintrom, M. (2001). Transnational Networks and Policy Diffusion: The Case of Gender Mainstreaming. *International Studies Quarterly*, *45*(1), 27–57. https://doi.org/10.1111/0020-8833.00181

Tyagi, N., & Das, S. (2017). Gender mainstreaming in forest governance: analysing 25 years of research and policy in South Asia. *International Forestry Review*, *19*(2), 234–244. https://doi.org/10.1505/146554817821255132

UK Government, & DEPA. (2020). *Smart City Handbook: Thailand Smart City Handbook: Thailand*.

UNESCAP. (2022). *Increasing the use of smart mobility approaches to improve traffic conditions in urban areas of South-East Asia : policy guidelines*.

University of Oxford Research Support. (2021). *Informed consent*. University of Oxford. https://researchsupport.admin.ox.ac.uk/governance/ethics/resources/consent#collapse281101

Uteng, T. P., & Turner, J. (2019). Addressing the linkages between gender and transport in low- and middle-income countries. *Sustainability (Switzerland)*, *11*(17). https://doi.org/10.3390/su11174555

Valle-Cruz, D., Criado, J. I., Sandoval-Almazán, R., & Ruvalcaba-Gomez, E. A. (2020). Assessing the public policy-cycle framework in the age of artificial intelligence: From agenda-setting to policy evaluation. *Government Information Quarterly*, *37*(4), 101509. https://doi.org/10.1016/J.GIQ.2020.101509

Vermeiren, C., Raeymaeckers, P., & Beagles, J. (2021). In search for inclusiveness: vertical complexity in public-nonprofit networks. *Public Management Review*, *23*(2), 189–209. https://doi.org/10.1080/14719037.2019.1668471

Walby, S. (2005). Introduction: Comparative gender mainstreaming in a global era. *International Feminist Journal of Politics*, *7*(4), 453–470. https://doi.org/10.1080/14616740500284383

Wang, H., & Ran, B. (2023). Network governance and collaborative governance: a thematic analysis on their similarities, differences, and entanglements. *Public Management Review*, *25*(6), 1187–1211. https://doi.org/10.1080/14719037.2021.2011389

Wang, Z., Liu, J., & Pavlićević, D. (2018). Democratic Localism: The Case of Grassroots Self-Governance in Urban China. *Chinese Political Science Review*, *3*(2), 129–153. https://doi.org/10.1007/S41111-018-0097-Z

Women's Democracy Network. (2020). *Gender-Responsive Policymaking Handbook*. International Republican Institute.

Yang, E. C. L. (2021). What motivates and hinders people from travelling alone? A study of solo and non-solo travellers. *Current Issues in Tourism*, *24*(17), 2458–2471. https://doi.org/10.1080/13683500.2020.1839025

Yoon, S. Y., Zelt, T., & Narloch, U. (2021). *Smart City Pathways for Developing Asia: An Analytical Framework and Guidance*. https://doi.org/10.22617/WPS200342-2

Yoon, W., & Hyun, E. (2010). Economic, social and institutional conditions of network governance: Network governance in East Asia. *Management Decision*, *48*(8). https://doi.org/10.1108/00251741011076753

Appendix I – Guiding interview questions

The questions consist of three parts— (1) informant information, (2) governance-related questions, and (3) gender aspect questions

Informant information

Please introduce yourself, your management level, and your organization type

Please indicate your role in policy planning of [province]

Governance questions

<u>overview of policy cycle and processes</u>

Please give an overview from start to end of when [your province] is initiating a new policy. This can include legislative frameworks, organization processes, line of command (if any)

leading to *smart mobility* program(s) in [province]

Overview: Please give an overview of *smart mobility* program you take part in— what is it, what leads to this program, its objectives, what stage in the policy cycle it is in, what are projects included in this program, what is its progress as of now?

Role and experience: Please specify your role in this program— examples of tasks and/or accomplishments. What is your experience working in this program and network?

Network actors and leading role: What are organizations involved in this program as far as you are aware? what are their roles? What is the criteria for actors to be involved in the program? In your experience, which organization plays the leading role in this program and why? Which organization plays a facilitating role?

Trust: How do you and other actors coordinate with each other in this program? What are the challenges working together? How would you describe trust among actors?

Gender dimension in policy

Problem identification: How are the problem and goal defined in this program? Who are your target groups? (primary, secondary) How do you understand the gender aspect in your program?

Design: What data are included to design the program? How did you design the budget allocation in the design process?

Appendix II – Template of verbal consent script

Template was taken from the University of Oxford Research Support‘s guidance on obtaining participant’s consent orally.

Introduction: Hello, my name is Kavisara Thitasut. I’m currently a Master’s student at the Johan Skytte Institute of Political Studies, University of Tartu in Politics and Governance in the Digital Age.

- **Project details and aims**: In my study, I want to investigate the relations between governance network structure and how it engages with the gender dimension in policy planning in the context of Smart Mobility programs in Bangkok and Khon Kaen. I’m interested in policy-making actors and processes with a focus on the gender dimension of the process. Thus, interviewing persons involved in policy-making is very crucial to my research. If you choose to be a part of this project, here is what will happen:
- **Interviews/ surveys/ tasks description**: I will have a conversation with you for around 45 to 60 minutes via Zoom call where I will ask a range of questions about Smart Mobility program in your province, policy-makers in this program (networks), an overview of policy-making processes, and how gender dimension has been integrated during policy cycle of this program.
- **Data sharing/ access/ confidentiality**: The interview data will be used for analysis in the master thesis, including quotations, which will be anonymized to protect your identity if you agree. The data you give will form the basis of my Master’s Thesis.

(*****) On a practical level, solely the researcher (me) will have access to raw research data, and the analyzed anonymized information will be accessible to the supervisor and the published thesis.

- **Data storage**: I will store your data safely and confidentially in an external hard disk, encrypted with a password, and will keep the research data only until the thesis is defended and published. Then, the data will be deleted immediately.
- **Audio/ video recording/ photos/ notes**: With your permission, I would like to make an audio recording of our discussion to make sure I’m getting an accurate record of the

interview. No photos or video recordings are made. In addition to that, I will take notes on my laptop as well.

- **Keeping contact details:** I would also like your permission to keep your contact details only until the thesis is defended and published. So I can re-contact you to clarify the information you gave me in your interview.
- **How identifiable you will be**: Your personal information will be anonymized. However, I'd like to use your level of management (top or middle management) and organization type (governmental, private, NGOs) for data credibility.
- **Risks**: The following risks are involved in taking part, e.g., an interview could cover sensitive information about your organization. In order to reduce any potential risks, you can choose not to answer any questions you don't want to, pause for a break, or stop the interview altogether.
- **Rights**: You don't have to take part; you can ask me any questions you want before or throughout; you can also withdraw at any stage of the interview without giving a reason. After the interview, you can withdraw your information/data until 10 May 2024, before it is anonymized.
- **Publication plans**: The project will be published on a thesis website of the University of Tartu.
- **Complaints/ concerns procedure**: If you have any complaints or concerns, please feel free to contact me via email: kavisara.thitasut@ut.ee.
- **Questions/ concerns**: Do you have any questions?
- Are you happy to take part?
- Do you give your permission for me to interview you and take an audio record of you?
- Do you give me permission to quote you directly without identifying you?

Ok, thanks, let's start.

Appendix III – List of analysis document

Document	Year	Publisher	Document type	Reference name in analysis
Bangkok				
Budget Planning Memorandum	2024	Strategy and Evaluation Department	Memorandum (internal)	BMA_BudgetPlanningMemo
Committee Appointment Memorandum	2024	Strategy and Evaluation Department	Memorandum (internal)	CommitteeAppointmentMemo
Proposal: Smart City Development around Phadung Krungkasem Canal	2021	Strategy and Evaluation Department	Proposal (internal)	SED_CanalDevelopmentProposal
Smart City Handbook Bangkok – Interviewed Questions	2020	Strategy and Evaluation Department & DEPA	Handbook	SED_SmartCityHandbook
Bangkok Metropolitan Council (BMC) Annual Activity Report	2020	BMC	Report	BMC_AnnualReport
Bangkok Metropolitan Council (BMC) Annual Activity Report	2018	BMC	Report	BMC_AnnualReport
Summary on Engagement Activity with state, private, and citizen in designing canal area	2023	Urban Studies Lab (USL)	News article	USL_CivicEngagement
"Safe and Sound:" on Livable City for Women	2022	BMA	News article	BMA_CitySafetyForWomen
Khon Kaen				
Khon Kaen Smart City Development	2021	OPCSmartCity	Book	KhonKaenSmartCityDevelopment

The Khon Kaen Model	2019	College of Local Administration, University of Khon Kaen & Konrad-Adenauer-Stiftung	Book	TheKhonKaenModel
Minutes of the Khon Kaen Municipality Council meeting (First Ordinary Session of the year 2017)	2017	Khon Kaen Municipality	City council debate	2017_KKMUNI_Debate
Minutes of the Khon Kaen Municipality Council meeting (First Ordinary Session of the year 2019)	2019	Khon Kaen Municipality	City council debate	2019_KKMUNI_Debate1
Minutes of the Khon Kaen Municipality Council meeting (First Ordinary Session No. 2/2019)	2019	Khon Kaen Municipality	City council debate	2019_KKMUNI_Debate2
Minutes of the meeting of the Khon Kaen Municipality Council (3rd Ordinary Session, No. 2/2019)	2019	Khon Kaen Municipality	City council debate	2019_ KKMUNI_Debate3
Minutes of the Khon Kaen Municipality Council meeting (First Ordinary Session of the year 2021, No. 1/2021)	2021	Khon Kaen Municipality	City council debate	2021_KKMUNI_Debate1
Minutes of the Khon Kaen Municipality Council meeting (Opening Session of the year 2021)	2021	Khon Kaen Municipality	City council debate	2021_KKMUNI_Debate2
Minutes of the Khon Kaen Municipality Council meeting (First Ordinary Session of the year 2022)	2022	Khon Kaen Municipality	City council debate	2022_KKMUNI_Debate

Appendix IV - Coding scheme

Category	Sub-category	Description	Examples
Key player	-	Actor(s) in the leading role of designing smart city and/or mobility program	"Khon Kaen Think Tank (KKTT) plays a very important role in mobilizing the strategy for smart city development in Khon Kaen. One can say that, without KKTT, smart city development in Khon Kaen or Thailand will not be substantial like today."
Centrality	Role	Duty an actor fulfill in a network, in relation to other actors	"Bangkok as facilitator, which refers to an organization facilitating the processes of smart city development in each smart dimension. For example, providing fast track for company registration for business providing smart solutions."
	Resource	Capital that actor possesses and shared with the network. This could be authority, funding, operation, or knowledge	"KKTS, after listed to the market, will gain wealth. This money will be contribute to develop other smart dimensions of Khon Kaen."
	Participation	Level of participation of an actor in policy design. This could be ranged from informed to co-deciding	"In some agenda, we get to be consulted, in other agenda we get to vote. It depends on agendas of each meeting"
Trust	Agreement trust	Actors have agreement among each other in fulfilling their roles. This could be formal written agreement or informal agreement	"If we want to become s smart city, for example, in smart mobility, there are criteria to follow, assigned to the working committee to mobilize the project and find solutions."
	Reliability	Confidence in the reliability of a person or system	"In our district there is one partner, USL Urban Studies Lab, which is an NGO funded by Ford Foundation fron tm the US, they took part in organizing activities to gather citizen's opinion."

	Challenge	Resistance or constraint in working in this network and/or mobilizing the project	"With this structure, the project cannot be realized that much. That is the challenge. It is when they ask us to form a policy but they cannot realize it fully because they lack capacity"
Actor	State actor	Actor that is affiliated to local government, or central government, and is part of the network	Bangkok Metropolitan Administration, Khon Kaen Municipality
	Non-state actor	Actor that is NOT affiliated to local government, or central government, and is part of the network	Urban Studies Lab, Khon Kaen Think Tank, College of Local Administration
Observation	-	Interesting information relating to policy design. It could be something that might influence the process.	" We are trying to wrap up everything that reflects originality of Bangkok to make it smart. And in the latest management agenda, we're working toward smart city which is a livable city for everyone. This is the agenda of Chadchart Administration."
Gender considerations	-	Attitudes, opinion, strategy actor uses to address gender aspect in policy design	"The weak point of Bangkok is about safety and economic stability which makes the city vulnerable to women's everyday life. Policy team of Chadchart, thus, propose 9 ways of making the city livable for women."

Non-exclusive license to reproduce thesis and make thesis public

I, Kavisara Thitasut, (personal code: 49610090096) herewith grant the University of Tartu a free permit (non-exclusive license) to the work created by me *Gender Blind Spot? Network Structure and Gender in Smart Mobility: Bangkok and Khon Kaen, Thailand*, supervisor Kristina Muhhina, and Heiko Pääbo,

- reproduce, for the purpose of preservation, including for adding to the DSpace digital archives until the expiry of the term of copyright;
- to make the work specified in p. 1 available to the public via the web environment of the University of Tartu, including via the DSpace digital archives until the expiry of the term of copyright;
- I am aware of the fact that the author retains the rights specified in p. 1;
- I certify that granting the non-exclusive license does not infringe other persons' intellectual property rights or rights arising from the personal data protection legislation.