Enhancing Stakeholder Collaboration in Risk-Sensitive Urban Planning

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Abstract

The impact of climate change poses serious challenges to sustainable urban development, with people experiencing frequent extreme events such as floods, landslides, heat waves and storms. One of the explanations for the increasing risks and impacts is that the development activities of the countries and disaster risk reduction decision-making processes occur in silos, conducted by different agencies, institutions and other actors with differing priorities, perspectives, and time horizons. Therefore, a multi-agency approach to risk-sensitive urban planning (RSUP) has been recognised as being paramount for building resilience against climate change. Emerging economies struggle more than developed countries to manage urban development by mainstreaming disaster risk reduction (DRR) and climate change adaptation (CCA), as well as managing the negative impact of disasters. Thus, this study investigates the inter-organisational changes required for enhancing multi-agency collaboration when considering the impact of climate-induced risks as a key element in urban planning in the emerging economies context, taking Sri Lanka as a case study.

The study adopted a case study strategy consisting of 20 semi-structured interviews from national and local level experts and 77 document reviews covering policies, laws, urban plans, national documents, and reports, followed by thematic analysis. As a result, the study identified the barriers and enablers for enhancing stakeholder collaboration in RSUP under five themes: administrative environment, working culture, information and knowledge sharing, organisational capacity, and collaboration process. Furthermore, the study used causal loop diagrams (CLD) as a way of capturing and externalising how various practices and interventions can be propagated through the organisational systems to create conditions that influence the implementation of RSUP. This system modelling approach allows policymakers to see the interrelationships and feedback loops that may not be apparent in traditional linear cause-and-effect thinking and, therefore, will help to identify leverage points in the system to create a positive transformation and impact regarding RSUP. This system analysis helped to identify the key policy changes required for facilitating stakeholder collaboration, including the establishment of mandated collaboration procedures with a clear definition of stakeholders' roles and responsibilities, the need for power sharing among key stakeholders, and a requirement for continuous collaborative policy evaluations and updates. The study also investigated a suitable collaborative governance arrangement that is conducive to RSUP. The study shows that a hybrid of hierarchy and network structures with neutral leadership, a

balanced top-down and bottom-up approach, and decentralisation alongside necessary powers is a suitable collaborative governance arrangement for supporting RSUP.

Moreover, this study developed an inter-organisational collaboration maturity grid that will allow organisations to define a pathway to transform their collaboration maturity and to measure it as they transform their practices.

Finally, based on the above outcomes, the study developed a framework that contributes to enhancing stakeholder collaboration in RSUP to support the creation of resilient and sustainable cities and human settlements.

Dedication

"In heartfelt dedication to the individuals and families facing the harsh realities of climate-induced disasters and unwise urban planning, this research aims to illuminate a path towards a more sustainable future."

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List of Abbreviations

AD- Agrarian Department

BOI - Board of Investment

CC - Climate change

CCD - Department of Coast Conservation and Coastal Resource Management

CCS – Climate Change Secretariat

CEA - Central Environment Authority

CIDA - Construction Industry Development Authority

CLD- Causal Loop Diagram

CMM - Capability Maturity Model

CMMI - Capability Maturity Model Integration

DI - Department of Irrigation

DLUPP - Department of Land Use Policy Planning

DM – Disaster management

DMC - Disaster Management Centre

DoA- Department of Agriculture (Soil Conservation division).

DoM - Department of Meteorology

DRR - Disaster risk reduction

DS- District Secretariat office

DVS- Divisional secretariat office

DWL- Department of Wildlife

FD - Forest Department

FREE-CAF- Extended Enterprise-Capability Assessment Framework

GA- Government Agent

GCF- Green Climate Fund

GDP- Gross Domestic Product

GND - Grama Niladhari Division

GSMB - Geological Survey and Mines Bureau

IRDR - Integrated Research on Disaster Risk

ISM- Interpretive Structural Modelling

KP - Kyoto Protocol

LA- Local Authorities

MA - Mahaweli Authority

MC- Municipal councils

NAO- Network Administrative Organisations

NBRO – National Building research organisations

NGO- Non-government organisations

NPD- National Planning Department

NPPC - National Physical Planning Council

NPPD- National Physical Planning Department

QMMG - Quality Management Maturity Grid

RDA - Road   Development Authority

RDD -   Department of road development

RSUP- Risk sensitive urban planning

SL- Sri Lanka

SLLRDC - Sri Lanka Land Reclamation & Development Corporation

SSIM - Structural Self-Interaction Matrix

TC- Town Councils

TMS - Transactive Memory System

UC- Urban councils

UDA- Urban development Authority

UNDRR - United nation office for disaster risk reduction

UNFCCC - United Nations Framework Convention on Climate Change

1 Introduction

1.1 Research motive

The occurrence and magnitude of natural disasters are on the rise. According to Statista (2023), an average of 415 catastrophic disaster events occur annually, creating negative impacts on communities, on nature and on man-made properties. These events result in an average of 0.1% of the global death rate, affecting over 180.68 million people and causing an economic loss that ranges between 0.15% to 0.5% of the global gross domestic product (Jamali et al., 2019; Pielke, 2019; Roser, 2020). Even though many types of research have been undertaken to improve disaster risk reduction (DRR) (Djalante, 2016), progress in the reduction of disaster risk has been limited by the failure to recognise and address urban development processes and climate changes as root courses of the disasters (O'Brien et al., 2012). Furthermore, previous research has mainly focused on DRR rather than on how risks are generated and accumulated particularly through the development projects (Thomalla et al., 2018) that are taking place as a part of post-disaster resettlement and reconstruction (Das & Sharma, 2016) or in response to the demand of urban sprawl (Chang et al., 2019). Rapid and unplanned developments can create or exacerbate disaster risks by: (1) creating surface runoff and flash floods (Cutter et al.,2018) ; (2) having a high density of people and assets in cities with settlements and infrastructure developments in risk-prone areas (Chang et al., 2019; Munene et al., 2018); (3) increasing greenhouse gas emissions that contribute to climate change (Schipper et al., 2016). Furthermore, the impacts of climate change exacerbate disaster scenarios such as floods, heatwaves, and storms, posing serious challenges to sustainable urban development (Buffenbarger, 2015; Intergovernmental Panel on Climate Change [IPCC], 2015; Schipper et al., 2016). Thomalla et al. (2018) explained that one of the reasons for the increasing disaster risks is that DRR, development activities of the countries, and climate change decision-making procedures occur in silos, conducted by various agencies, stakeholders and institutions with varying priorities, viewpoints, perspectives, and time horizons. Thus, harmonising development processes with DRR and climate change adaptation (CCA) is crucial in promoting risk-sensitive urban development (O'Brien et al., 2012; Thomalla et al., 2018).

However, recent studies on subjects such as "creating a disaster resilience built environment" (Malalgoda et al., 2013), "challenges in integrating disaster risk reduction in the built

environment" (Nguyen et al., 2018) and a "resilient environment through the integration of CCA and DRR" (Dias et al., 2019) have highlighted that stakeholder engagement is vital in harmonising the urban development process, DRR and CCA. Furthermore, the studies of Dias et al. (2017) and Thomalla et al. (2018) have pointed out that the lack of stakeholder engagement together with weak collaboration is a prominent barrier to fulfilling global policies (such as the Sendai Framework, the Sustainable Development Goals, and the Paris climate agreement). Therefore, there is an urgent need to bring impetus to current risk-sensitive urban planning and urban development practices.

The research reported by Dwirahmadi et al. (2019) proposes to transform the current silo-based approach to a collaborative governance approach by bringing government and non-government stakeholders collectively together to engage in a collaborative consensus-oriented decision-making process in risk-sensitive urban planning and development (Ansell & Gash, 2007). They argue that such collaborative governance can facilitate a successful partnership among the stakeholders engaged in the development of DRR and CCA (Dwirahmadi et al., 2019). Recent findings reported by Dwirahmadi et al. (2019), Hardoy et al., (2019), and Wijaya (2018) argue that the barriers to implementing collaborative governance are: inadequate collaborative policies; stringent mandates, red tape, and standards that cannot facilitate collaboration among stakeholders; ineffective governance that leads to boundaries between fragmented agencies; weak leadership; and bureaucratic organisational structures; a complex environment of various value systems; mindsets; ego issues; misunderstandings; refusal to share information; a lack of a common platform, and a lack of trust (Kirshen et al., 2018; Munene et al., 2018; Sitas et al., 2016; Sulaiman et al., 2019).

The economic and non-economic impacts of disasters are increasing in both developed and developing countries, and the poorest nations are struggling to maintain their urban development trajectory (Munene et al., 2018; United Nation International Strategy for Disaster Reduction [UNSDR], 2018). Therefore, as discussed earlier, mainstreaming DRR and CC into urban planning, is the best option to reduce the negative impacts of disasters on the urban development trajectory and should be prioritised among the emerging economies. However, existing studies on risk sensitive urban planning indicate that most of the emerging economies face difficulties in bringing stakeholders together to integrate DRR, CCA, and urban planning sectors to create risk sensitive urban planning (Mwenje, 2019; Cuevas et al., 2016; Kehew et al., 2013; Broto et al., 2015; Nguyen, Ginige, & Greenwood, 2018; Nugraha & Lassa Jonatan, 2018; Parthasarathy, 2016; He et al., 2019; Shrestha & Dhakal, 2019;

Shrestha & Dhakal, 2019; Nemakonde Livhuwani & Van Niekerk, 2017). Therefore, emerging economies need to enhance their stakeholder collaboration in risk sensitive urban planning.

Furthermore, it has been revealed that existing policies and laws in the emerging economies do not promote collaboration and have, inevitably, led to weak inter-organisational links among relevant organisations, disharmonised visions, and silo-based working (Shrestha & Dhakal, 2019; Broto et al., 2015; ; Malalgoda & Amaratunga, 2015). In addition, the studies of Djalante, Holley et al., (2013), Thomalla et al. (2018), and Dwirahmadi et al. (2019), conducted in emerging economies, emphasise the urgent need for strengthening collaborative governance to facilitate partnerships and collaboration between relevant stakeholders. However, existing studies are lacking in the promotion of the enhancement of stakeholder collaboration in risk-sensitive urban planning which identifies the stakeholder collaboration context by understanding barriers and enablers including the requirements for policy changes and governance arrangements.

With a view to enhancing stakeholder collaboration, researchers from various fields have recently put forward a few approaches, such as a cross-boundary teaming model (Edmondson & Harvey, 2018), a system design thinking (Stary, 2017), the transactive memory system (TMS) (Liao et al., 2012), adaptive policies (Swanson & Bhadwal, 2009) and a knowledge co-production approach on a digital platform (Blomqvist et al., 2017). However, none of these studies focuses on risk-sensitive urban development nor have any of these methods been applied to enhancing stakeholder collaboration in risk-sensitive urban development.

Moreover, international efforts such as "A framework for global science in support of Risk-informed Sustainable Development and Planetary Health" by the International Science Council, Integrated research on disaster risk (IRDR), and the United Nations Office for Disaster Risk Reduction (UNDRR) in November 2021 indicated fostering interdisciplinary and multi-stakeholder collaboration as one of their research priorities (Handmer et al.,2021).

The above-discussed research gaps and the limitations of existing studies point to the need to transform inter-organisational collaboration in urban planning and development, disaster risk reduction, and the climate change fields to create risk-sensitive urban development.

1.2 Aim and Objectives.

Aim

The current research aims to investigate the inter-organisational changes required for enhancing adaptive collaboration when considering the impact of climate-induced risk as a key element in urban planning in emerging economies using Sri Lanka as a case study. This research also aims to answer the following research questions:

Q1: What are the critical barriers and how do they hinder inter-organisation collaboration in RSUP?

Q2: What enablers can be used to overcome these barriers?

Q3: What policy changes are required and how can they influence inter-organisational collaboration?

Q4: What type of inter-organisational governance structures are suitable for facilitating inter-organisational collaboration?

Q5: How can the collaboration maturity level among organisations be measured to encourage progressive behaviour in practising collaboration?

These research questions will be addressed using the following research objectives.

Key Objectives

- To identify and critically analyse the barriers and enablers of inter-organisational collaboration for implementing risk-sensitive urban planning.
- To identify the policy changes that need to be introduced to overcome critical barriers.
- To explore inter-organisational collaboration structures' requirements and propose a suitable structure to stimulate stakeholder collaboration in risk-sensitive urban planning.
- To develop a tool that will allow organisations to define a pathway to transform their collaboration maturity and to measure it as they transform their practices.
- To develop a framework for enhancing stakeholder collaboration in risk-sensitive urban planning.

1.3 An overview of the research methodology

The current study selected a mono-method qualitative methodological choice with a case study approach. Accordingly, this study adopted various data collection techniques and analysis methods to achieve the research objectives and aim.

In the first stage, the study adopted a systematised literature review to establish a deeper understanding of the theoretical background of the study area and the knowledge gap. The barriers and enablers for stakeholder collaboration in risk-sensitive urban planning were identified to understand the state of stakeholder collaboration in risk-sensitive urban planning in a global context. Then, a detailed investigation was conducted to find approaches to overcome those critical barriers (such as policy-related and governance-related barriers). A second systematised literature review was conducted to understand the theoretical background of collaborative governance arrangements. In addition, the study conducted a third systematised literature review to understand the inter-organisational collaboration maturity levels and indicators to develop an inter-organisational collaboration maturity grid for stakeholder collaboration in RSUP. Furthermore, a narrative literature review was conducted to understand collaborative policy development requirements. These broader literature reviews were helpful in establishing state-of-the-art knowledge on barriers to stakeholder collaboration, policy challenges, inter-organisational structures favourable for collaboration and indicators for measuring the maturity of a given collaboration context. This broader state-of-the-art knowledge was used as the basis for probing the challenges of risk-sensitive urban planning in Sri Lanka through primary data collection.

In the second stage of this study, the primary data was collected in the Sri Lankan context through semi-structured interviews with experts and using document analysis on policies and legislations to achieve the set objectives. The study analysed the primary data using thematic analysis. As a result, barriers and enablers for stakeholder collaboration in RSUP were identified, including suggestions for suitable collaborative governance arrangements and policy requirements. Furthermore, the indicators for assessing the stakeholder collaboration maturity in RSUP were identified from the above primary data findings.

Concurrently, the study adopted a causal loop diagram analysis, following a systems' thinking approach, to structure the narratives received from experts and stakeholders to establish connections between the barriers and to understand the root causes and conditions

that lead to a lack of stakeholder collaboration in risk-sensitive urban planning. This causal loop diagram analysis identified the policy requirements for enhancing stakeholder collaboration in RSUP. Finally, the knowledge gathered through this research was used to establish a framework that proposes various activities that need to be considered in enhancing stakeholder collaboration in RSUP.

All the outcomes of this research were validated by an expert group.

An overview of the research method is presented in the Figure 1-1

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Background study and problem identification

Background study → Research problem established.

Literature review

Barriers and enablers for stakeholder collaboration **(Objective 01)**

Suitable governance arrangements that can foster collaboration among stakeholders **(Objective 2)**

Policy requirements for enhancing collaboration among stakeholders (**Objective 3**)

Identify indicators to assess organisational collaboration maturity **(Objective 4)**

Data collection and analysis (Objective 1-4)

Data collection → Semi structured interviews / Document analysis

Data Analysis → Thematic analysis / Causal loop diagram (system thinking

Synthesis and validation

Synthesis → Triangulation and develop a framework **(Objective 05)**

Validation of outcome → Expert interviews

Conclusion and recommendation

Figure 1-1: Overall research method

1.4 Scope and limitations of the study

The research focuses on inter-organisational changes required for enhancing adaptive collaboration for considering the impact of climate-induced risk as a key element in urban planning in emerging economies using Sri Lanka as a case study area. This study is limited to inter-organisational collaboration (disaster management, climate change, urban planning sectoral organisations). Other stakeholders such as communities or community members, individuals, groups, and politicians are excluded from this study because of its wider scope.

The following Figure 1-2 presents the stakeholders considered in this study. The stakeholders selected for this study have been highlighted in green. As discussed in section 1.5.1, risk-sensitive urban development should consider the urban development, disaster risk reduction, and climate change sectors to build urban environments which are resilient to climate change. Accordingly, this study considered planning and urban development sector organisations, disaster management sectoral organisations, and climate change sectoral organisations as key stakeholders.

Figure 1-2: Selected stakeholders in the study

1.5 Study background

The following sub-sections introduce the basic concepts such as risk-sensitive urban planning, collaborative governance, and stakeholder collaboration levels before presenting the detailed findings of the literature survey.

1.5.1 The Concept of risk-Sensitive urban planning

Urbanisation is a complex process that formally transforms rural areas into urban settlements and includes the movement of the rural population into urban areas (United Nations [UN], 2019). Hansen and Rasmussen (2013) opined that career opportunities, better education, improved public transport and services, and improved health services are the main reasons for urbanisation. The world's urban population has speedily grown since 1950, rising from 751 million to 4.2 billion in 2018 (UN,2019). Globally, 55% of the world's total inhabitants live in urban zones, and it is anticipated this will to rise to 68% in 2050 (UN, 2019). However, urban sprawl causes new unplanned rapid development projects Chang et al. (2019) and Malalgoda et al. (2013) argued that this unplanned rapid urbanisation introduces many physical, social and economic vulnerabilities in terms of climate change.

Rapid and unplanned developments can create or exacerbate disaster risks in many ways, such as creating surface runoff and flash floods (Cutter et al., 2018; Zhou et al., 2019); by having a high density of people and assets in cities with settlements and infrastructure developments in risk-prone areas (Chang et al., 2019; Munene et al., 2018); by increasing greenhouse gas emissions through the construction process and, therefore, contributing to climate change (Schipper et al., 2016), and by creating environmental degradation that contributes to climate change. (Malalgoda et al., 2013). Cutter et al. (2018) argued that development projects with poor land-use choices and inadequate building codes can lead to developments in watersheds and flood-prone areas where mitigation measures are constrained and thus flash flooding can occur. In addition, Zhou et al. (2019) opined that improper drainage planning and lags in upgrading drainage systems in urban developments can cause surface runoff and flood hazards. Dempsey and Jenks (2010) argued that poor quality developments can exacerbate the consequences of natural disasters such as earthquakes. Therefore, proper urban development planning alongside disaster mitigation plans is essential.

Furthermore, unplanned settlements and infrastructure development in risk-prone areas with a high density of people increase the vulnerability to hazards and exacerbate disaster risk (Chang et al., 2019; Munene et al., 2018). Therefore, risk assessment needs to be a crucial part of urban development planning. Unplanned urban development contributes to natural resource consumption and deforestation and can lead to several ecological issues contributing

to environmental degradation and risk caused by climate change such as global warming, lowering the water table and coastal erosion (Pelling, 2003).

Furthermore, urban development construction processes with inappropriate pollution control mechanisms (such as emissions of greenhouse gases and inadequate construction waste management) can contribute to climate change (Schipper et al., 2016). The impacts of climate change can exacerbate disaster scenarios, such as heatwaves, storms and floods, posing critical challenges to sustainable urban development (Buffenbarger, 2015; IPCC, 2015; Schipper et al., 2016; Shafique & Kim, 2018; Zhou et al., 2019). Therefore, it is clear that the reduction of disaster risk and climate change mitigation or adaptation need to be intertwined with urban development (Hardoy et al., 2019). Kelman (2017) argued that proper suitable urban development plans can help to decrease the vulnerability to climate change risks; for example, providing heavy roofs strongly tied up to incorporating useful roof engineering techniques can reduce the vulnerability to tropical cyclones. Therefore, a consideration of climate change adaptation and mitigation in urban development planning can help reduce disaster risks.

At present, there are many global policies, such as the UN Sendai Framework, the Paris Agreement, and the UN Sustainable Development Goals, promote sustainable urban development, including the reduction of disaster risks and climate change mitigation/ adaptation (Kelman, 2017). Fraser et al. (2017) suggested that incorporating disaster risk reduction plans, including climate change adaptation, into urban development processes will assist risk-sensitive and resilient urban development. Furthermore, Leck et al. (2018) argued that risk-sensitive urban developments must consider all the anticipated risks and reduce all accumulated risks when planning new developments. Therefore, this study describes risk-sensitive urban planning as "urban development planning inclusive of climate induced disaster risk reduction and climate change adaptation or mitigation".

1.5.2 Stakeholder collaboration in risk-sensitive urban planning

In the context of societal challenges, stakeholders can be defined as "anyone who has an influence or anyone who can potentially be affected by societal challenges" (Ginige et al., 2018). Such stakeholders can be organisations, sectors, groups, or individuals.

Boughzala and De Vreede (2015) defined collaboration as "a process in which two or more agents (individuals or organisations) share resources and skills to solve problems so that they

can jointly achieve one or more goals. During this process, the agents communicate with each other to coordinate their tasks." Kirshen et al. (2018) suggested that collaboration between related agencies and communities in the urban development process leads to successful risk-sensitive urban development. Thomalla et al. (2018) argued that the reason for the increasing disaster risk in urban environments is the fact that the decision-making processes in urban development, and the activities for the reduction of disaster risk and climate change mitigation or adaptation, are conducted in silos by various stakeholders (agencies, institutions, other actors) who have divergent needs, viewpoints, and attitudes. Furthermore, the involvement of various stakeholders (such as knowledge-based institutions, different levels of government organisations and private organisations, and communities) is crucial for the planning and implementation of risk-sensitive urban development (Malalgoda et al., 2013). This engagement of various stakeholders in urban planning is considered as the stakeholder collaboration in risk sensitive urban planning in this study.

1.5.3 Levels of stakeholder engagement

Stakeholder coordination depends on the level of stakeholder engagement. In the planning process, as indicated in the reports that focus on strengthening stakeholder collaboration in national development planning, the levels of stakeholder engagement in development planning are considered as follows: inform, consult, involve, and collaborate (United Nations in Sri Lanka [UNSL], 2021). Stakeholder coordination levels are referred to in different forms in existing studies as given by the following: consultation, in charge and involvement in decision-making; shared responsibility, and transferred responsibility where full control is transferred to other stakeholders and stakeholders' empowerment can be seen (Ecoregional Conservation Strategies Unit [ECSU], 2000); inform, consult, involve, collaborate, and empower (Jami & Walsh, 2017). In addition, Basco-Carrera et al. (2017) analysed existing studies and proposed a comprehensive stakeholder engagement ladder that consists of the following levels: ignorance, awareness, information, consultation, discussion, co-design, and co-decision making. Furthermore, Basco-Carrera et al., (2017) further developed the nexus between the type of coordination and the level of engagement as follows: unilateral action consisting of levels of ignorance, awareness, and information; coordination consisting of levels of consultation and discussion; collaboration that consists of co-design, and joint action that consists of co-decision making.

Type of cooperation	Unilateral action			Coordination		Collaboration	Joint action
Level of participation	Ignorance	Awareness	Informed	Consultation	Discussion	Co-design	Co-decision making

Figure 1-3: Level of stakeholder engagement

1.5.4 Adopted from Basco-Carrera et al. (2017)Collaborative governance

Collaborative governance is known as a mode of policy and service delivery in which public, private non-profit and private business actors are jointly involved and accountable for the policymaking or service delivery to create public value that could otherwise not be achieved (Voets et al., 2021). Collaborative governance captures a full range of emergent forms of cross-boundary governance, extending beyond the conventional focus on the public manager or the formal public sector (Emerson et al., 2012). In this regard, Voets et al. (2021) stated that such a collaborative governance mode has arisen due to the increase in complex social issues such as migration, climate change, and poverty.

Regarding institutional design or the structural governance point of view of collaborative governance, Voets et al. (2021) stated that collaborative governance is a successor to traditional bureaucratic hierarchal public administration and new market-type public management government. Therefore, Voets et al. (2021) argued that collaborative governance shifts policy and service delivery away from the hierarchal and market-centric settings to a setting in which public, private non-profit and private business actors are jointly involved in, and accountable for, policymaking and service delivery. Furthermore, in collaborative governance, private actors are considered in as broad a range as possible (companies, interest groups, volunteering organisations, and citizens) (Voets et al., 2021). Therefore, typically, collaborative governance is an interactive process in which a myriad of actors with various interests, perspectives, and knowledge are brought together (Bevir, 2012). However, Bevir (2012) argued that, typically, a decentralised approach with public participation can be seen in collaborative governance and, therefore, a collaborative governance structure should have a provision to engage citizens to provide an active role to the public in policymaking or

service delivery; hence, collaborative governance differs from the whole of standard government approaches.

1.6 Chapter breakdown of the thesis

The body of this thesis comprises seven chapters: namely, introduction, literature review, research methodology, Sri Lanka as a research context, analysis and findings, discussion and outcomes, and conclusions.

The first chapter contains an introduction to the research and includes an explanation of the research motive, aim and objectives, the research methodology outline, the scope and limitations, and the chapter breakdown of the thesis.

Chapter two contains the literature review and presents a basic understanding of the relevant concepts of the study and the systematised literature review findings on the barriers and enablers for stakeholder collaboration in risk-sensitive urban planning. It also explores a suitable inter-organisational collaborative governance structure to foster collaboration among stakeholders, and the indicators required to assess inter-organisational collaboration maturity. Furthermore, this chapter contains a narrative review of the required policy changes to facilitate stakeholder collaboration in RSUP.

Chapter three describes the research methods adopted in this study. The research type, the justification of the selection of the philosophical stance, the approach to theory development, the methodological choice, the research strategy, the time horizon selection, the data collection techniques and methods of analysis, and the procedures to validate the study's outcome is provided in this chapter.

Chapter four briefly introduces Sri Lanka and justifies the selection of Sri Lanka as a research context. Furthermore, this chapter contains the findings from reviewing documents on policies, legislation, urban plans, and documents published by the state organisations. Moreover, stakeholder analysis in the Sri Lankan risk-sensitive urban planning context is provided in this chapter.

Chapter five presents the details of the data collection including the respondents interviewed and the documents reviewed, the thematic analysis findings from the document review and from the expert interviews in exploring the stakeholder collaboration context in terms of barriers and enablers, including suitable collaborative governance arrangements and policy

requirements. Furthermore, this chapter presents the policy requirement findings via a causal loop diagram analysis as a systems' thinking approach.

Chapter six presents a synthesis and discussion of the research findings by comparing the literature survey results, expert interviews, and document reviews via a data triangulation approach and proceeds to propose a framework to enhance stakeholder collaboration in RSUP. Furthermore, this chapter presents the validation of the research outcomes.

Chapter Seven concludes with the research outcomes and relates them to the research objectives. Furthermore, the contribution by this research to knowledge, and further research proposals are discussed in this chapter.

1.7 Summary.

This chapter presented the study's motive, aim and objectives. Furthermore, it outlines the research method, contribution of knowledge, and the chapter breakdown of the study. The following chapter provides the literature review outcomes of the study.

2 Literature review

2.1 Introduction

Following the introduction of the research described in chapter one, this chapter presents the systematised literature review conducted on the main research themes relevant to the objectives of this study, namely: barriers and enablers for stakeholder collaboration (Section 2.2), suitable inter-organisation structures to facilitate stakeholder collaboration (Section 2.3), policy requirements (Section 2.4); and indicators to assess organisational collaboration maturity in inter-organisational collaboration (Section 2.5).

2.2 Barriers and enablers for stakeholder collaboration

A systematised literature review method was selected to identify the state-of-the-art in barriers and enablers for stakeholder collaboration in risk-sensitive urban planning in the global context. This method adopts a structural approach for the searching and analysing process that makes the literature review process as transparent as possible to enhance the quality of the study (Wamsler et al., 2020). The search process and the selection process adopted in this systematised literature review are presented in Figure 2-1.

The databases used for the literature survey were Scopus, Web of Science, Emerald, Science Direct, Taylor and Francis, Sage Publications, and Google Scholar to capture as much as possible all the relevant literature sources. These data bases were selected based on the guidance from previous researches conducted in this area. The research question "**What are the barriers to, and enablers for, stakeholder collaboration in risk-sensitive urban planning**?" was used to formulate the search terms in this study. The basic search terms captured from the research question were: "stakeholder", "risk-sensitive", "urban development", "collaboration", "decision making", "barriers", and "enablers". These terms were expanded using relevant synonyms of the key terms to capture all relevant research papers (see Appendix A: Search terms). All the selected databases allowed Boolean operators apart from Google Scholar. A manual search was conducted on Google Scholar using the selected key terms.

2.2.1 Selection criteria and process

The derived literature sources from the key terms were filtered using the following exclusion criteria: articles that were not in the English language; and articles published before the year 2010. Only document types such as journal papers, conference papers, published theses, book chapters, books, and reports were included in this study to ensure the quality of the literature. Altogether these processes resulted in 687 articles. These papers were then screened to eliminate any duplications, and this resulted in 584 articles. A preliminary title and abstract screening eliminated 501 articles that had no relevance to stakeholder collaboration and urban planning. Further screening by a brief full-text review further eliminated 30 articles since they did not discuss stakeholder collaboration barriers or enabling solutions for stakeholder collaboration in urban planning that integrated CCA and/or DRR. Finally, 53 articles were selected for in-depth analysis.

Figure 2-1: Screening process of selected literature sources

2.2.2 Barriers to stakeholder collaboration in risk-sensitive urban planning

This section presents the barriers to stakeholder collaboration in risk-sensitive urban planning which were identified through the systematised literature review. The identified barriers have been broadly categorised under five main headings: Administrative barriers, information and knowledge sharing barriers, collaboration process-related barriers, organisational capacity-related barriers, and working environmental related barriers.

2.2.2.1 Administrative barriers

The external barriers that hinder stakeholder collaboration under administrative aspects can be categorised under policies and legislation, governance, and politics, as shown in Table 2-1.

Table 2-1: Administrative Barriers to Stakeholder Collaboration

Theme	Barriers	Source
Policies and legislations	1. Absence or lack of policies that promote collaboration	(Wamsler et al., 2020; Trapp et al.,2017; Shrestha & Dhakal, 2019; Broto et al., 2015; Yumagulova, Vertinsky, 2019); Malalgoda & Amaratunga, 2015; Chu, Brown et al.,2019)
	2. Lack of coherence in government policies and legal instruments	(Webb, Petheram et al., 2014; Bissonnette et al., 2018; Parthasarathy, 2016)
	3. Lack of legislation support, legislative authority to delegate stakeholders' responsibilities and duties	(Malalgoda et al.,2013; Nguyen et al., 2018; Wamsler et al.,2014; Forino et al., 2018).
	4. Lack of defined financial plans and implementation roles	(Rendon et al.,2016)
	5. Policies and laws do not support required informal collaboration	(Yumagulova & Vertinsky,2019)
Governance	1. Lack of clear-cut responsibilities and overlapping responsibilities among stakeholders make the system ineffective and less accountable.	(Malalgoda et al.,2013; Nguyen et al., 2018; Chu, Brown et al.,2019; Webb, Petheram et al., 2014; Forino et al., 2018; Rendon et al., 2016; Malalgoda et al., 2014; Therrien et al.,2018; Mwenje, 2019).
	2. Rigid formal governance structures	(Munene et al., 2018; Webb, Bai et al., 2018)

Theme	Barriers	Source
	3. Lack of coordination mechanisms in governance arrangement	Nguyen et al., 2018; Shrestha &Dhakal, 2019; Leck et al., 2018; Taylor, 2016)
	4. Lack of leadership among stakeholders	(Malalgoda, Amaratunga, 2015; Chu, Brown et al.,2019; Malalgoda et al., 2014; Coaffee et al., 2016; Uittenbroek, et al., 2014)
	5. Disagreement in the selection of key leading organisations for collaboration	(Trapp et al.,2017)
	6. The unsupportive organisational structure for collaboration	(Taylor, 2016; Uittenbroek, et al.,2014)
	7. Organisational staff's existing roles and responsibilities that do not allow or support collaboration activities	(Uittenbroek, 2016)
Politics	1. Lack of political guidance /support/leadership/willpower for planning and implementation	(Nguyen et al., 2018; Trapp et al.,2017; Malalgoda et al., 2014; Therrien et al., 2018; Taylor, 2016; Coaffee et al., 2016; Torabi et al., 2018; Uittenbroek, et al., 2014)
	2. Political interference	(Malalgoda et al., 2013; Trapp et al.,2017; Forino et al., 2018; Mwenje, 2019).
	3. Competing interests and visions among politicians	(Mwenje, 2019)
	4. Thematically structured political committees	(Valencia et.al, 2019)

The review shows that current contemporary policies and legislation that set the legal environment do not mandate stakeholder collaboration in risk-sensitive urban planning, hindering inter-organisational linkages and the development of innovative solutions (Trapp et al.,2017; Broto et al., 2015; Yumagulova & Vertinsky, 2019) The lack of policies that promote collaboration (Wamsler et al., 2020; Trapp et al.,2017; Shrestha & Dhakal, 2019; Broto et al., 2015; Yumagulova & Vertinsky, 2019; Malalgoda, Amaratunga, 2015; Chu, Brown et al.,2019) has inevitably led to weak inter-organisational links among relevant organisations, disharmonised visions, and silo-based working. In addition, incoherent government policies and legal instruments create separate mandates for different ministries (Webb, Petheram et al., 2014; Bissonnette et al., 2018; Wamsler et al., 2014; Forino et al., 2018) which influence different visions and interests in individual organisations (Nemakonde

& Van Niekerk, 2017; Farrell, 2010) as well as seeming to contribute to the lack of clarity in roles and responsibilities in the decision-making (Webb, Petheram et al., 2014). Shrestha and Dhakal (2019) have found that weak coordination among ministries acts as a political barrier and leads to policies and activities that promote silo working in each ministry. This situation is fuelled by the deficiency in legislation and legislative authority to delegate stakeholder responsibilities and duties in a coherent manner to support collaboration (Malalgoda et al., 2013; Nguyen et al., 2018; Wamsler et al., 2014; Forino et al., 2018), and the ineffective mainstreaming of legal instruments and strategies (Bissonnette et al., 2018). This condition implies that even though some stakeholders have an interest and desire to implement collaborative initiatives, they are not able to fulfil their aspirations since their responsibilities are not adequately delegated by law (Nguyen et al., 2018). Moreover, a lack of defined financial plans and their implementation roles in policies (Rendon et al., 2016) and a lack of support for informal collaborations (Yumagulova & Vertinsky, 2019) hinder effective collaboration processes. Therefore, there is a need for clear policies and legislation to enforce risk-sensitive urban planning involving relevant stakeholders from various sectors and disciplines (Nguyen et al., 2018).

The presence of overlapping responsibilities among stakeholders is recognised as a prominent barrier in governance (Malalgoda et al., 2013; Nguyen et al., 2018; Chu, Brown et al.,2019; Webb, Petheram et al., 2014; Forino et al., 2018; Rendon et al. 2016; Malalgoda et al., 2014; Leck et al. 2018; Therrien et al., 2018; Mwenje, 2019). These studies emphasise that current governance structures do not clarify roles, leading to ill-defined responsibilities, fragmentation, and overlapping responsibilities among government ministries and organisations. This condition creates difficulties for various stakeholders to implement complex and broad interventions and create less accountable governance arrangements (Chu, Brown et al.,2019). Such ambiguity in roles and responsibilities impacts upon RSUP which requires stakeholder collaboration across jurisdictional and organisational boundaries (Webb, Petheram et al., 2014). Moreover, Forino et al. (2018) state that senior government staff are experiencing vagueness in governance procedures and their responsibilities, are without having authority in decision-making, leading to uncertainty and a standstill. Furthermore, the rigidness of formal governance structures has been identified as a barrier to progress (Munene et al., 2018; Webb, Bai et al., 2018). Munene et al. (2018) stated that stringent mandates, standard operating procedures, and red tape within complex government systems offer little flexibility, hindering informal collaborative actions (Nguyen et al., 2018). Another

key barrier that is evident due to weak governance is hierarchical governance with top-down coordination (Taylor, 2016) that overlooks horizontal and vertical integration among stakeholders (Nguyen et al., 2018; Leck et al., 2018; Coaffee et al., 2016). This situation causes a lack of coordination in governance arrangements (Nguyen et al., 2018; Shrestha & Dhakal, 2019; Leck et al., 2018) and results in poor feedback from subordinate units to the central authority regarding existing problems with respect to collaboration practices (Taylor, 2016).

Many researchers have recognised the lack of leadership among stakeholders as a key barrier (Malalgoda, Amaratunga, 2015; Chu, Brown et al., 2019; Malalgoda et al., 2014; Coaffee et al., 2016; Uittenbroek, et al., 2014). Furthermore, disagreements regarding which leading organisations should be collaborating to implement risk-sensitive urban development bring uncertainty to the multi-stakeholder collaboration process (Trapp et al., 2017). In addition to these inter-organisational level governance barriers, intra-organisational level governance barriers have been identified. The weak and unsupportive existing organisational structures that do not prioritise collaborative initiatives are recognised as a key barrier (Taylor, 2016; Uittenbroek, et al., 2014). This barrier exists due to the strict allocation of existing roles and responsibilities with routines which does not allow for collaborative tasks, practices, or initiatives (Uittenbroek, et al.,2014; Uittenbroek, 2016). This situation provides opportunities for departments to dismiss collaborative tasks as something outside their remit (Uittenbroek, 2016).

The research uncovered four critical barriers under the theme of politics. Weak political guidance and support, leadership, and willpower to plan and implement risk-sensitive urban planning due to the unimportance of collaborative initiatives in the political agenda (Uittenbroek, et al., 2014) is a prominent barrier within this theme (Nguyen et al., 2018; Trapp et al.,2017; Malalgoda et al., 2014; Therrien et al., 2018; Taylor, 2016; Coaffee et al., 2016; Torabi et al., 2018; Uittenbroek, et al., 2014). The impact of weak leadership is further exacerbated due to the existence of political interference in the decision-making process in urban development (Malalgoda et al., 2013; Trapp et al.,2017; Forino et al., 2018; Mwenje, 2019).

As a result, politically motivated development objectives tend to force stakeholders to disregard the quality of outputs or equity in development projects (Trapp et al.,2017; Mwenje, 2019). Other barriers under the politics theme are competing interests and visions

among politicians (Mwenje, 2019) and thematically structured political committees not designed to take a holistic approach to development (Valencia et al., 2019).

2.2.2.2 Working environment-related barriers in stakeholder collaboration

Working culture barriers that hinder stakeholder collaboration in risk-sensitive urban development can be categorised as organisational culture-related, intrinsic, professional-related, and organisational interest-related barriers that determine the working context of stakeholder collaboration, as shown in Table 2-2.

Table 2-2: Working environment barriers in stakeholder collaboration.

Theme	Barriers	Source
Organisational culture	1. Traditional silo-based organisational capabilities and thinking	(Trapp et al., 2017; Webb, Petheram et al., 2014; Farrell, 2010; Uittenbroek, 2016)
	2. Following old routine practices	(Farrell,2010)
Intrinsic barriers	1. Lack of enthusiasm and commitment to collaborative initiatives	(Trapp et al., 2017; Shrestha & Dhakal, 2019; Rendon et al., 2016; Uittenbroek, 2016)
Profession related barriers	1. Competing interests and competition	(Trapp et al., 2017; Farrell, 2010)
	2. Fear of losing power	(Trapp et al., 2017)
Organisational interests	1. Competing interests	(Shrestha & Dhakal 2019; Forino et al.,2018; Rendon et al., 2016; Therrien et al.,2019; Uittenbroek, 2016; Giordano et al, 2020)
	2. Different sectoral needs, interests, and issues	(Hardoy et al.,2019; Bissonnette et al., 2018; Farrell, 2010; Walsh et.al, 2013)
	3. Unrecognised common interests	(Trapp et al., 2017)

The current entrenched organisational culture and practices that strongly lead to silo-based working arrangements and routines create a significant barrier to collaborative initiatives and stifle innovation, collaboration, and learning (Trapp et al., 2017; Webb, Petheram et al., 2014; Farrell, 2010; Uittenbroek, 2016) Since stakeholders have been habituated in silo-based practices for a long time, changing this silo-based working culture is challenging and would take time to overcome (Rendon et al., 2016). Moreover, stakeholders build their expectations upon their current routines which do not allow for changing their preferences and responding to the expectations of others (Uittenbroek, 2016). This condition remains the same, without any progress, due to traditional silo-based organisational capabilities and thinking (Trapp et

al., 2017; Webb, Petheram et al., 2014), old routines and practices (Farrell, 2010) and unsupportive organisational structures (Uittenbroek, 2016).

The lack of enthusiasm and commitment to collaborative initiatives (Trapp et al., 2017; Shrestha & Dhakal, 2019; Rendon et al., 2016; Uittenbroek, et al.,2014) is a fundamental barrier, which is further exacerbated by misperceptions and the lack of understanding of the benefits of collaboration (Rendon et al., 2016; Torabi et al., 2018). Due to conflicting interests resulting from incompatible business models or competitive cultures, stakeholders are more likely to influence planning processes that favour their own interests rather than collaboration (Trapp et al.,2017). This bias creates conflicts among stakeholders hence disrupting the collaboration process (Trapp et al., 2017). In addition, the fear of losing power, or the degradation of power, due to the need for new inter- and intra-organisational structures and rearrangements of collaborative planning procedures that could potentially lead to changes and overlaps in existing job positions, authority and organisational functions can bring resistance to collaboration (Trapp et al., 2017). As a result, stakeholders tend to believe that collaborative initiatives may create competition among their professions and cause them to lose their powers. This belief can easily provoke an obstructive attitude among stakeholders (Trapp et al., 2017; Farrell, 2010). Hence, demonstrating personal benefits and eliminating job insecurity concerns are fundamental to ensuring stakeholder buy-in for collaboration in risk-sensitive urban development.

Moreover, with the existence of competing interests, objectives, and mandates, organisations tend to focus mainly on improving their own sector over others (Shrestha & Dhakal, 2019; Forino et al., 2018; Rendon et al., 2016; Therrien et al., 2018; Uittenbroek, et al., 2014; Giordano et al 2020). Different sectoral needs and interests tend to generate contradicting opinions and priorities of their sectoral needs (Walsh et.al, 2013; Trapp et al., 2017; Bissonnette et al., 2018; Farrell, 2010), hence weakening the need for collaboration (Rendon et al., 2016) in order to achieve long-term goals that cross different sectorial boundaries.

2.2.2.3 Information and knowledge-sharing-related barriers

Information and knowledge sharing are identified as another key area that influences stakeholder collaboration effectiveness in risk-sensitive urban planning, as shown in Table 2-3.

Table 2-3:Information and knowledge sharing barriers.

Theme	Barriers	Source
Information and knowledge-sharing-related barriers	1. Limited coordination and breakdown of the communication among many fragmented actors at different levels.	(Leck et al., 2018; Sitas et al., 2016)
	2. Lack of information sharing between stakeholders	(Hardoy et al.,2019; Giordano et al, 2020)
	3. Communication breakdowns due to scepticism, use of jargon and different official language	Forinoet al.,2018; Walsh et.al, 2013)
	4. Lack of knowledge sharing	(Mwenje, 2019; Sitas et al., 2016)

The deficiencies in communication and coordination among the key organisations are vital areas that need addressing to strengthen collaboration and information and knowledge sharing in risk-sensitive urban planning. Some of the major symptoms of these deficiencies include inefficient internal and external communication among stakeholders (Trapp et al., 2017; Shrestha & Dhakal, 2019; Yumagulova & Vertinsky, 2019; Rendon et al., 2016) due to limited coordination (Leck et al., 2018) and breakdown in communication (Sitas et al., 2016) among a large number of fragmented actors at the national and local government level; a lack of information sharing between stakeholders (Hardoy et al., 2019; Giordano et al, 2020) due to insufficient specification and identification of information needs (due to the heterogeneity of the information requirements); communication breakdowns due to scepticism and use of jargon (Forino et al., 2018; Walsh et.al, 2013) and usage of different languages which creates misunderstandings among actors (Sitas et al., 2016). Such a lack of communication and coordination further enforces the silo-based approach and hinders knowledge sharing in addressing complex social and environmental problems (Mwenje, 2019; Sitas et al., 2016). All of these barriers are considered as inter-organisational level barriers other than communication breakdowns due to scepticism, use of jargon and different official language which can be considered as a personal level barrier.

2.2.2.4   Collaboration process-related barriers

Collaboration process-related barriers are identified as another set of barriers that determine the process followed in the stakeholder collaboration, as shown in the Table 2-4.

Table 2-4: Collaboration process-related barriers

Theme	Barriers	Source
Collaboration processes	1. Involvement in a large number of organisations	(Malalgoda, Amaratunga, 2015; Malalgoda et al., 2014)
	2. A long-term and inelastic collaborative process	(Trapp et al.,2017)

Due to weak policies and governance, efficient collaboration processes to tackle collaborative initiatives that focus on long-term planning are not well-established (Mwenje, 2019). As a result, the execution of complex urban development projects requiring the involvement of many stakeholders that consider equity, disaster risks, and climate change are difficult to materialise (Malalgoda, Amaratunga, 2015; Malalgoda et al., 2014). Furthermore, organisations are reluctant to participate in collaborative initiatives due to their need for long-term commitment and inflexibility (Trapp et al.,2017). As a result, conventional urban planning that focuses on silo-based practices seems to be the norm. These barriers are considered inter-organisational level barriers influenced by external barriers.

2.2.2.5 Organisational capacity-related barriers in stakeholder collaboration

The barriers that exist within organisational capacity can be categorised under organisational resource capacities and the knowledge barriers of the organisational staff, as shown in Table 2-5.

Table 2-5: Organisational capacity-related barriers

Theme	Barriers	Source
Organisational resource capacity	1. Lack of financial and human resources	(Malalgoda et al.,2013; Nguyen et al., 2018; Trapp et al.,2017; Shrestha & Dhakal,2019; Webb, Petheram et al., 2014; Rendon et al., 2016; Therrien et al., 2019; Torabi et al. 2018; Valencia et al., 2019; Uittenbroek, 2016; Kehew et al., 2013).
	2. Inadequate technical capacity to collaborate	(Hardoy et al. 2019; Rendon et al., 2016)
Knowledge barriers	1. Lack of knowledge of stakeholders	(Malalgoda et al., 2013; Malalgoda, Amaratunga, 2015; Mwenje,2019)
	2. Stakeholders' reluctance to undertake exploratory learning	(Uittenbroek, 2016)

Stakeholders are reluctant to take on collaborative responsibilities due to a lack of resources, such as inadequate finance, limited time, and insufficient skilled and experienced staff in the organisations (Malalgoda et al., 2013; Nguyen et al., 2018; Trapp et al.,2017; Shrestha & Dhakal, 2019; Webb, Petheram et al., 2014; Rendon et al., 2016; Therrien et al., 2019; Torabi et al., 2018; Valencia et al, 2019; Uittenbroek, 2016). In addition, organisations tend to struggle with their technical capacity to generate and share relevant information according to collaborative needs (Hardoy et al., 2019; Rendon et al., 2016). The organisational resource capacity theme incorporates intra-organisational level barriers. In addition, this study identified the knowledge-related barriers of organisational staff. These knowledge-related barriers are considered as a key determinant of the organisational capacity to perform collaborative tasks.

The knowledge gap among stakeholders poses another barrier to stakeholder collaboration in RSUP (Malalgoda et al., 2013; Malalgoda & Amaratunga, 2015; Mwenje, 2019); it is identified as a key barrier in the knowledge related theme and is referred to more by the existing literature sources than any other barrier in this theme. This incompetence creates many challenges, such as unawareness of the common interests of other organisations (Mwenje, 2019); the urgency of collaboration needs (Trapp et al.,2017; Uittenbroek, et al.,2014; Hegger et al., 2014); misperception, and a lack of understanding of the risks, cost and non-monetary benefits associated with collaborative initiatives (Trapp et al.,2017; Rendon et.al, 2016; Mwenje, 2019; Torabi et al., 2018). This situation is worsened due to the stakeholders' reluctance to participate in exploratory learning processes involving pilot projects to gain experience and knowledge (Uittenbroek, 2016). These different views and understandings create disparate visions among stakeholders, resulting in negative influences on collaborative initiatives (Munene et al., 2018; Bissonnette et al., 2018). This knowledge deficiency is further exacerbated by the lack of knowledge sharing among stakeholders (Mwenje, 2019; Sitas et al., 2016).

2.2.3 Enablers identified for stakeholder collaboration in risk-sensitive urban planning.

This study has identified 48 enablers that can be used as the catalyst to overcome the barriers associated with stakeholder collaboration in risk-sensitive urban planning . The following section discusses how these enablers can be utilised to overcome the identified barriers under the five themes identified above in planning section 2.2.2.

2.2.3.1 Enablers for overcoming administrative barriers.

Policies and legislation, governance-related and political barriers were identified as administration-related barriers. The enablers to overcome these barriers are shown in Table 2-6.

Table 2-6: Enablers to overcome administrative barriers.

Theme	Enablers	Source
Political related barriers	1. Bridge different political interests and values	(Chu, Schenk et al., 2018)
	2. Secure political will and commitment	(Shrestha & Dhakal, 2019; Mwenje,2019; Valencia et al., 2019)
	3. Seek the support and approval of dedicated politicians	(Wamsler et al.,2014)
	4. Introduce and encourage an apolitical approach.	(Yumagulova & Vertinsky, 2019; Ahn & Schmidt, 2019)
Policies and legislation-related barriers	1. Harmonise and strengthen the laws and policies that can support collaboration	(Walsh et.al, 2013; Wamsler et al. 2020; Trapp et al., 2017; Shrestha & Dhakal, 2019; Bissonnette et al., 2018; Mwenje, 2019; Torabi et al. 2018; Uittenbroek, et al., 2014; Uittenbroek, 2016; Amaratunga et al., 2018; Taylor, 2017; Parthasarathy, 2016; Papa et al., 2015)
	2. Introduce policies and legislations to mainstream collaboration	(Farrell, 2010; Uittenbroek, 2016).
	3. Ensure policies provide space for setting up informal structures that promote collaboration.	(Yumagulova & Vertinsky, 2019; Smedby & Neij, 2013)
	4. Policies need to guide the funding requirement of the collaboration needs	(Rendon et al., 2016)
	5. Provide guidance and support that assists policymakers' awareness	(Webb, Petheram et al., 2014)
	6. Policy development with stakeholder involvement	(Sitas et al., 2016; Kehew et al., 2013)
	7. Develop and implement adaptive policy.	(Swanson & Bhadwal, 2009)
Governance related barriers	1. Create collaborative governance structures that remove traditional power-based relationships.	(Trapp et al.,2017; Hegger et al., 2014; Howell & Wilson, 2019; Diep, 2018).
	2. Adopt accountable governance mechanisms.	(Chu, Brown et al.,2019; Coaffee et al., 2016)

Theme	Enablers	Source
	3. Shift towards flexible and self-organised network governance	(Taylor, 2016; Nugraha & Lassa, 2018)
	4. Establish decentralised organisational arrangements linked with the centralised system.	(Trapp et al.,2017)
	5. Incorporate formal and informal ways of inter-organisational arrangement in collaborative governance.	(Yumagulova & Vertinsky, 2019; Wamsler et al., 2014; Forino et al., 2018; Smedby& Neij, 2013; Uittenbroek, et al., 2013)
	6. Establish a dedicated coordination organisation for leadership	(Trapp et al.,2017; Shrestha & Dhakal, 2019; Webb, Petheram et al., 2014; Forino et al.,2018; Webb, Bai et al., 2018; Valencia et.al, 2019; Hegger et al. 2014; Nugraha & Lassa, 2018)
	7. Engage neutral partners to facilitate multi-stakeholder collaboration processes.	(Munene et al., 2018)
	8. Re-organise or set up new structures with clear rules and responsibilities for promoting collaborative working.	(Uittenbroek, 2016)

Bridging different political interests and values (Chu, Schenk et al., 2018) can eliminate conflicts among political leaders that arise due to their sector-based political disputes, hence removing the barriers to collaboration. In addition, securing political will and commitment (Shrestha & Dhakal, 2019; Mwenje, 2019; Valencia et.al, 2019) and seeking the support and approval of dedicated politicians are necessary for implementing collaborative initiatives (Wamsler et al., 2014). In contrast, Ahn and Schmidt (2019) and Yumagulova and Vertinsky (2019) suggested that an apolitical approach is the best way to carry out collaboration processes, thus without any political influences.

It is essential to establish a sound legal environment that gives the decision-makers the authority to implement collaboration practices in development initiatives (Malalgoda & Amaratunga, 2015). Existing laws and policies are more geared towards supporting silo-working approaches through mandates given to various organisations and do not encourage formal collaborative actions (Wamsler et al., 2020; Trapp et al., 2017; Shrestha & Dhakal, 2019; Broto et al., 2015; Yumagulova & Vertinsky, 2019; Malalgoda & Amaratunga, 2015;

Chu, Brown et al.,2019). Therefore, laws and policies that mediate institutional boundaries between related organisations (Wamsler et al., 2020; Papa et al., 2015) with a view to harmonising and strengthening current collaboration practices among different sectors are essential (Walsh et.al, 2013; Wamsler et al., 2020; Trapp et al., 2017; Shrestha & Dhakal, 2019; Bissonnette et al., 2018; Mwenje, 2019; Torabi et al., 2018; Uittenbroek, et al., 2014; Uittenbroek, 2016; Hegger et al., 2014; Amaratunga et al., 2018; Taylor, 2017; Parthasarathy, 2016). This harmonisation needs to provide a legal framework (Rendon et al., 2016; Farrell, 2010) to develop formal collaborative processes which can integrate overlapping responsibilities among different governances (Bissonnette et al., 2018). Forming formal agreements between the organisations through a memorandum of understanding and service-level agreements can help foster collaborative initiatives (Nemakonde & Van Niekerk, 2017). However, strengthening legislation is not enough to change stakeholder behaviour with regards to adopting collaboration practices. It requires an entrenching collaboration culture at the departmental level (Farrell, 2010) to push the collaborative routines that can force actors to change their habituated silo-based working patterns (Farrell, 2010; Uittenbroek, 2016). Therefore, the introduction of policies and legislation to mainstream collaboration is vital. Beyond this, it is essential to ensure policy plans for setting up informal structures that promote collaboration (Yumagulova & Vertinsky, 2019, Smedby& Neij, 2013) to create flexibility in the collaborative process. In addition, policies need to guide the funding requirement of the collaboration needs (Rendon et al. 2016). Moreover, it is important to provide guidance and support for policymakers and engage stakeholders during the consultation phase of policymaking to capture formal and informal collaborative requirements and create awareness among policymakers (Sitas et al., 2016; Kehew et al., 2013). Creating adaptive policies (Swanson & Bhadwal, 2009) is a crucial enabler in coping with the complexity, dynamics, and uncertainties evident in the risk-sensitive urban planning and development domain. Adaptive policies offer many positive features for creating a collaboration culture, such as self-organisation and social networking capacity, decentralised governance to the lowest and most effective jurisdictional level, variation in policy responses, formal policy review and continuous improvement (Swanson & Bhadwal, 2009).

Collaborative governance arrangements are considered essential to enhance stakeholder collaboration in risk-sensitive urban development (Valencia et.al, 2019; Diep, 2018) since stakeholder collaboration requires governance arrangements that can offer mechanisms to

handle tensions and conflicts among collaborative partners and promote cross-organisational collaboration and joint problem-solving practices (Trapp et al., 2017). Collaborative governance arrangements should introduce new institutional arrangements that remove traditional power-based relationships (Trapp et al., 2017; Hegger et al., 2014; Howell & Wilson, 2019; Diep, 2018) and support multilevel power-sharing among stakeholders (Nugraha & Lassa, 2018) with accountable mechanisms (Chu, Brown et al.,2019; Coaffee et al., 2016). Therefore, current hierarchical mode governance structures need to be modernised with flexible and self-organised network governance (Taylor, 2016; Nugraha & Lassa, 2018) or with decentralised organisational arrangements linked with a centralised system (Trapp et al., 2017) that allows all relevant stakeholder participation (Wijaya, 2018) at appropriate stages in the design and planning cycle, with transparency. In addition, studies (Chu, Brown et al.,2019; Coaffee et al., 2016) have emphasised the need for ensuring that institutional arrangements have clear structures with proper task distribution without any overlaps or conflicts to avoid the dysfunction of the existing actors' roles. On the other hand, Smedby and Neij (2013) and Yumagulova and Vertinsky (2019) have argued that the creation of informal relationships or networks is essential for successful collaboration since they offer informal approaches for handling sensitive issues among stakeholders and allow informal changes in the formal agreements and policy documents when necessary (Wamsler et al., 2014). Therefore, there is a need to step beyond the formal governance structures and introduce informal structures that can support stakeholder collaboration (Bissonnette et al., 2018). Many researchers (Yumagulova & Vertinsky, 2019; Wamsler et al., 2014; Forino et al., 2018; Smedby & Neij, 2013; Uittenbroek, et al., 2013) argue that both formal and informal organisational arrangements are essential in collaborative governance to support stakeholder collaboration.

The establishment of a dedicated coordination organisation that can offer high-level strategic coordination and guidance would be an appropriate enabler to enhance stakeholder collaboration (Trapp et al., 2017; Shrestha & Dhakal, 2019; Forino et al., 2018; Webb, Petheram et al., 2014; Valencia et.al, 2019; Nugraha & Lassa, 2018). This coordinating entity can be an institution or a committee with a specific cross-sectoral mandate and sufficient powers to drive collaborative initiatives. Alternatively, appointing a leader who can be an individual or organisation to provide cross-organisational leadership (Webb, Petheram et al., 2014; Hegger et al., 2014) can also help to supervise and monitor the collaborative process. Moreover, engaging neutral partners who have the capacity to facilitate the multi-stakeholder

collaboration process (Munene et al., 2018) can also help to overcome leadership-related barriers.

The existing organisational structures enforce strict responsibilities hindering collaboration. Therefore, the current organisational structures need to be re-organised to improve collaborative awareness and practices among the staff by introducing collaborative tasks with clear roles and responsibilities that can support collaboration (Uittenbroek, 2016).

Even though there are enablers proposed by existing studies (especially for overcoming the critical barriers relating to policies and legislation and collaborative governance, such as having supportive policies with coherence and adaptiveness and establishing collaborative governance for RSUP) there is no detailed study which proposes a comprehensive policy requirement or proposes suitable collaborative governance with key elements such as suitable mechanisms and types of structure. Therefore, this study confirms the need for a detailed investigation into identifying policy requirements and collaborative governance in RSUP.

2.2.3.2 Enablers for overcoming working environment-related barriers.

The identified enablers to overcome working environmental issues are given in Table 2-7

Table 2-7:Enablers to overcome working environment barriers.

Barriers' theme	Enablers	Source
Organisational interest	1. Establish synergies by creating a joint vision among organisations	(Walsh et.al, 2013; Uittenbroek, 2016)
	2. Harmonise and strengthen policies and laws that support collaboration	(Walsh et.al, 2013; Wamsler et al., 2020; Trapp et al.,2017; Shrestha & Dhakal, 2019; Bissonnette et al., 2018; Mwenje, 2019; Torabi et al. 2018; Uittenbroek, et al., 2014; Uittenbroek, 2016; Hegger et al., 2014; Amaratunga et al., 2018; Taylor, 2017; Parthasarathy, 2016)
Organisational culture	1. Establish collaborative practices as regular routines	(Uittenbroek, 2016)
	2. Encourage top management to influence the change in culture	(Uittenbroek, 2016)
	3. Incorporate responsibilities for collaborative tasks along with their official job description.	(Wamsler et al., 2014)
Stakeholders' intrinsic barriers	1. Establish indicators to monitor progress and ensure participation	(Walsh et.al, 2013; Valencia et.al, 2019)

	2. Offer incentives and rewards for their collaborative performance	(Trapp et al.,2017; Torabi et al. 2018; Farrell, 2010; Hegger et al., 2014; Pieterse et al., 2018).
	3. Address personal interests and concerns regarding collaboration	(Nemakonde & Van Niekerk, 2017)
Profession related barriers	1. Acknowledge and enable power sharing, shared responsibility, and accountability towards other stakeholders who are important in multilevel governance.	(Nugraha & Lassa, 2018; (Jayasinghe et al., 2020).
	2. Raise awareness of the positives and negatives of collaborative ventures to reduce hesitancy in collaborative working.	(Broto et al.,2015)

The organisational interest-related barriers that arise due to different sectoral interests and focuses can be overcome by establishing a common vision for different sectors (Walsh et.al, 2013) and harmonising and strengthening the laws and policies that can support collaboration (Walsh et.al, 2013; Wamsler et al., 2020; Trapp et al., 2017; Shrestha & Dhakal, 2019; Bissonnette et al., 2018; Mwenje, 2019; Torabi et al., 2018; Uittenbroek, et al., 2014; Uittenbroek, 2016; Hegger et al., 2014; Amaratunga et al., 2018; Taylor, 2017; Parthasarathy, 2016) .

Following well-defined routines in collaboration tasks can bring consistency in coordination with other stakeholders and creates a collaborative culture in organisations (Uittenbroek, 2016) This cultural change can be further facilitated by changing organisational rules and regulations and allocating available resources towards collaboration (Sitas et al., 2016). Moreover, establishing collaborative practices as regular routines (Sitas et al., 2016) can encourage top management to influence culture change (Sitas et al., 2016) and incorporate collaborative work tasks in staff's official job descriptions (Wamsler et al., 2014). The influence of top managers is one of the enablers that can help to transform silo-based organisational culture into collaborative culture.

Overcoming stakeholders' intrinsic barriers is challenging since they are embedded in their personal characteristics. The introduction of indicators to monitor stakeholder involvement (Walsh et.al, 2013; Valencia et.al,, 2019) in the collaboration process and the provision of incentives and rewards based on their collaborative performance (Trapp et al., 2017; Torabi et al., 2018; Farrell, 2010; Hegger et al., 2014; Pieterse et al., 2018), as well as addressing their personal interests and concerns for collaboration   (Nemakonde & Van Niekerk, 2017)

can be a strong pull towards improving collaboration, regardless of their intrinsic barriers. Furthermore, inter-organisational collaboration requires multilevel governance which involves power-sharing, shared responsibility, and accountability toward all stakeholders (Jayasinghe et al.,2020). Therefore, acknowledging and enabling such governance characteristics can help to reduce the fear of losing power (Nugraha & Lassa, 2018). Moreover, raising awareness of both the positives and negatives within collaborative endeavour (Broto et al., 2015) is also vital to overcoming profession-related barriers relating to power-sharing, job insecurities, and competition. Overcoming people's intrinsic, professional, and cultural-related barriers creates a supportive working environment for positive collaboration and enhances stakeholder collaboration.

2.2.3.3 Enablers for overcoming information and knowledge-sharing barriers.

The enablers to overcome the information and knowledge sharing barriers are given in Table 2-8.

Table 2-8:Enablers to overcome information and knowledge sharing barriers.

Theme	Enablers	Source
Communication and coordination-related barriers	1. Establish formal agreements for information sharing	(Walsh et.al, 2013)
	2. Improve understanding of the information needs and requirements among organisations.	(Giordano et al, 2020)
	3. Establish regular and transparent information flows and communication among organisations.	(Valencia et.al, 2019)
	4. Encourage knowledge sharing	(Stepanova et al., 2020)
	5. Collaborative knowledge brokering with the help of an expert	(Webb, Petheram et al., 2014; Sitas et al., 2016)
	6. Facilitate knowledge co-production through formal and informal social relationships.	(Dias et al., 2019; Shrestha & Dhakal 2019; Yumagulova & Vertinsky, 2019; Chu, Brown et al.,2019; Sitas et al., 2016; van de Ven et al., 2016)
	7. Implement measures to address the knowledge gap, build trust, clarify uncertainties, and bridge values.	(Yumagulova & Vertinsky, 2019; Chu, Schenk et al.,2018)

The introduction of mechanisms that can facilitate communication across organisational boundaries is a significant enabler for enhancing the willingness to collaborate (Giordano et al, 2020; Ahn & Schmidt, 2019). However, this requires legal enforcement of formal agreements to overcome reluctance in information sharing (Walsh et.al, 2013). The reluctance to data share can be avoided by having a clear understanding of the required information from the collaborating organisations and the benefits (Giordano et al, 2020). Furthermore, the establishment of regular and transparent information flows and communication can lead to better coordination and collaboration among the stakeholders (Valencia et.al, 2019).

The lack of multidisciplinary knowledge or knowledge deficiency that typically exists among stakeholders from different disciplines can be addressed by introducing knowledge-sharing opportunities (Stepanova et al., 2020) and collaborative knowledge brokering with the assistance of experts (Webb, Petheram et al., 2014; Sitas et al., 2016). Furthermore, activities for building trust among stakeholders, clarifying uncertainties, and understanding different values can help establish a sound foundation for collaboration among various stakeholders (Yumagulova & Vertinsky, 2019; Chu, Schenk et al., 2018). Collaborative learning activities such as policy experiments, joint fact-finding, role-play simulation exercises, and brainstorming workshops are some of the participatory methods that can be used to introduce collaborative working styles. These methods bring together various ideas and comprehensive information to introduce collaborative decision-making processes (Walsh et.al, 2013). Moreover, such methods facilitate horizontal learning (Torabi et al., 2018; Amaratunga et al., 2018); create formal and informal relationships and networks; improve coordination among stakeholders; enable trust-based knowledge co-production; enhance knowledge-to-action translation; enable joint problem exploration and solution development, and help to identify equitable collaboration processes (Dias et al., 2019; Shrestha & Dhakal, 2019; Yumagulova & Vertinsky, 2019; Chu, Brown et al., 2019; Sitas et al., 2016; van de Ven et al., 2016). The introduction of such knowledge development activities for stakeholders allows organisations to overcome their structural and cultural barriers, and communication and coordination barriers, due to a lack of knowledge and awareness.

2.2.3.4 Enablers for overcoming collaboration process-related barriers.

The identified enablers to overcome collaboration process barriers are given in Table 2-9.

Table 2-9:Enablers to overcome collaboration process barriers.

Theme	Enablers	Source
Collaboration process	1. Nurture trust-based relationships	(Walsh et.al, 2013; Yumagulova &Vertinsky, 2019; Sitas et al., 2016)
	2. Select appropriate stakeholders and maintain continuous engagement	(Giordano et al, 2020)
	3. Establish reporting mechanisms and assessments of progress	(Nugraha & Lassa, 2018)
	4. Anticipate and manage conflicts.	(Webb, Petheram et al., 2014)

Fostering trusted relationships (Walsh et.al, 2013; Yumagulova & Vertinsky, 2019; Sitas et al., 2016) among stakeholders is a key enabler for the long-term collaboration and learning process with the involvement of many stakeholders. Such trusted relationships can be formed by creating a safe space to collaborate on projects while respecting the views of others (Sitas et al., 2016) with the support of policies, laws, and transparent and accountable collaborative governance with power sharing. In addition, selecting appropriate stakeholders and maintaining continuous engagement (Giordano et al, 2020) and anticipating and managing conflicts (Wamsler et al., 2014) is essential to accomplishing long-term collaboration initiatives. Moreover, establishing reporting mechanisms and assessments of progress (Nugraha & Lassa, 2018) has also been identified as an essential approach in assessing a system's effectiveness and in making improvements.

2.2.3.5 Enablers for overcoming organisational capacity-related barriers.

The identified enablers to overcome organisational capacity related barriers are given in Table 2-10.

Table 2-10:Enablers to overcome organisational capacity-related barriers.

Theme	Enablers	Source
Organisational resource capacity	1. Identify and provide essential technical and financial resources to build organisational capacity for collaboration.	(Valencia et.al, 2019; Nemakonde & Van Niekerk, 2017)

Theme	Enablers	Source
	2. Better financial planning to optimise the available funds to support collaboration requirements.	(Coaffee et al., 2016; Nemakonde & Van Niekerk, 2017; Pieterse et al., 2018)
	3. Recruit additional skilled staff to strengthen collaboration capacity	(Wamsler et al.,2014**;** Taylor, 2017)
	4. Introduce digital technology to improve efficiency.	(Walsh et.al, 2013; Coaffee et al., 2016; Monteiro et al., 2015; Kuller at el., 2019; Baloye & Palamuleni, 2016; van de Ven et al., 2016)
	5. Allocate funding for building collaboration capacity through policies	(Kehew et al., 2013)
Knowledge related barriers	1. Build capacity through knowledge development and training programmes	(Walsh et.al, 2013; Broto et al., 2015; Malalgoda & Amaratunga, 2015; Chu, Brown et al.,2019; Malalgoda et al., 2014; Uittenbroek et al., 2014; Uittenbroek, 2016; Nugraha & Lassa, 2018)

Identifying and providing essential technical, financial and human resources is crucial to uplifting organisational capacity to achieve collaborative goals (Wamsler et al., 2014; Nemakonde & Van Niekerk, 2017; Taylor, 2017). Better financial planning and the efficient use of resources for multiple uses could potentially address funding issues for implementing collaborative practices (Coaffee et al., 2016; Nemakonde & Van Niekerk, 2017; Pieterse et al., 2018). In addition, recruiting additional qualified staff would help handle overloaded collaborative tasks (Wamsler et al., 2014; Taylor, 2017). Furthermore, the use of digital technology, such as online collaborative platforms (Webb, Petheram et al., 2014; Forino et al., 2018; Monteiro et al., 2015), can reduce the overheads associated with collaborative working and decision-making involving geographically dispersed stakeholders (Walsh et.al, 2013; Coaffee et al., 2016; Monteiro et al., 2015; Kuller et el., 2019; Baloye & Palamuleni, 2016; van de Ven et al., 2016). Moreover, policy plans must ensure funding allocations (Kehew et al., 2013) to uplift organisational capacity for collaborative working.

Knowledge is a crucial enabler in stakeholder collaboration since it allows staff or collaborative members to communicate and digest complex information, including utilising advanced technologies and tools to bring innovation (Webb, Petheram et al., 2014). Building capacity through knowledge development increases the commitment and involvement of the

collaborative members (Walsh et.al, 2013; Broto et al., 2015; Malalgoda & Amaratunga, 2015; Chu, Brown et al., 2019; Malalgoda et al., 2014; Uittenbroek, et al., 2014; Uittenbroek, 2016; Nugraha & Lassa, 2018) since it improves their understanding of the importance of urban resilience (Coaffee et al., 2016), the urgency for collaboration initiatives, and the roles and responsibilities in the collaboration process (Walsh et.al, 2013; Uittenbroek, et al., 2014). Moreover, training programmes provide collaborative members with soft skills (Amaratunga et al., 2018; Taylor, 2017), leadership and team-working skills (Malalgoda et al., 2014; Amaratunga et al., 2018) and negotiation skills (Walsh et.al, 2013; Sitas et al., 2016) which are important when collaborating with other organisations. Such capacity development can simplify and smooth collaboration processes, avoiding conflicts arising due to a lack of collaboration skills (Walsh et.al, 2013; Malalgoda & Amaratunga, 2015).

Stakeholder collaboration is a key challenge in creating transformation in urban development procedures with the inclusiveness of DRR and CCA. Findings show that to have a successful collaboration across sectoral boundaries, organisations need to overcome various barriers, as discussed above.

An interpretive structural modelling (ISM) approach was applied to identify the key driving barriers to stakeholder collaboration in RSUP. As a result, the following diagram was developed to show the hierarchy of the barriers based on their driving powers and the dependence powers of each of the barrier themes (see Figure 2-2).

Figure 2-2: Hierarchical diagram of the barriers

Legend: 1. Policies and legislation-related barriers; 2. Governance-related barriers; 3. Politics-related barriers; 4. Leadership-related barriers; 5.Organisational interest-related barriers; 6. Information and knowledge sharing barriers; 7. Collaboration processes-related barriers; 8.Organisational structural related barriers; 9. Organisational culture-related barriers; 10.Organisational resource capacity-related barriers; 11. Intrinsic barriers; 12. Profession-related barriers; 13. Knowledge related barriers.

According to the ISM findings, politics, policy and legislation, and governance are major driving barriers that need to be eliminated with high priority to avoid or minimise the arousal of the other barriers they drive. These findings also indicate the importance of overcoming policies and legislation-related barriers and governance-related barriers to avoid or minimise the arousal of other barriers which are driven by them. The detail application of ISM is provided in Appendix B: Interpretive structural modelling approach application.

2.2.4 State of the art of stakeholder collaboration in RSUP in emerging economies.

The literature review identified the barriers for stakeholder collaboration in risk sensitive urban planning in the global context, including both developing and developed countries. Based on the analysis, the study found that developing countries can face barriers with regard to stakeholder collaboration, and that emerging economies face basic critical issues in this area. For example most of the southern emerging economies, including Mozambique, South Africa, Vietnam, Rwanda, Philippines, Mexico, China, India, Nepal and Sri Lanka, face basic level barriers for bringing stakeholders together for RSUP such as a lack of collaborative policies, a lack of coherence and integration among government policies and laws, a lack of legislative support and legislative authority to delegate stakeholders' responsibilities and duties towards collaboration activities, political interference, the following of old routines and practices, unsupportive organisational governance and a lack of supportive arrangements for collaboration, a lack of leadership to implement collaborative initiatives together, and a lack of organisational capacity (Broto et al., 2015; Nguyen et al., 2018; Mwenje, 2019; Malalgoda et al., 2013; Farrell,2010; Nugraha & Lassa, 2018; Shrestha & Dhakal, 2019; He et al., 2019; Parthasarathy, 2016; Kehew et al., 2013). At the same time, the northern developed countries including Canada, Germany, the Netherlands and the United Kingdom face issues such as the availability of funds, the integration of informal collaboration mechanisms into existing arrangements, issues in the selection of collaborative leaders, and issues in knowledge productions' processes for further improvements in terms

stakeholder collaboration in RSUP (Yumagulova & Vertinsky, 2019; Trapp et al.,2017; van de Ven et al., 2016; Uittenbroek, 2016). It is evident that emerging economies face primary level barriers that should be dealt with high priority to enhance the risk sensitive urban planning as a step in reducing climate induced disaster risks.

In the above context, existing studies discuss the barriers and enablers for stakeholder collaboration in RSUP. However, the existing studies are lacking in identifying the critical barriers or driving barriers, and the connections between the barriers in order to understand how each barrier influences other barriers and influences the system as a whole that leads to stakeholder collaboration in RSUP. This study believes that the identification of a stakeholder collaboration system and how such barriers influence them need to be understood to enable the identification of the driving barriers. This identification of the driving barriers is important to eliminate those high driving barriers with high priority among others as a first step in enhancing stakeholder collaboration in RSUP.

As discussed above, the study wanted to gain an in-depth understanding of the stakeholder collaboration context and the barriers which prevail in the emerging economies. These are countries which face basic level problems and are facing a higher level of impact than the developed countries, since they are facing many barriers in stakeholder collaborationsuch as the interconnections among the barriers, how these barriers influence the stakeholder collaboration context, and the critical barriers or driving barriers that hinder stakeholder collaboration in RSUP; these barriers need to be focused upon with high priority. Among the emerging economies this study has chosen Sri Lanka as a case study for an in-depth understanding (a justification of the selection of Sri Lanka is given in the section 4.7).

2.3 Suitable governance arrangements that can foster collaboration among stakeholders.

A second systematised literature review was conducted to capture the state-of-the-art in suitable governance arrangements for supporting inter-organisational collaboration. The search process and the selection process adopted in this systematised literature review are presented in Figure 2-3. The databases used for the literature survey were Scopus and Web of Science. The research question "What are the suitable formal and informal inter-organisational collaborative structures to enhance collaboration? " was used to formulate the search terms in this study. The basic search terms captured from the research question were:

"formal" and "informal" and "inter-organisation" and "collaboration" and "structure" and "enhance". These terms were further expanded using relevant synonyms of the key terms to capture all relevant research papers as follows: ("formal" OR "informal") AND ("inter-organisational" OR "inter-institutional" OR "Organi$ation*" OR "Institution*" OR "governance") AND ("Structure*" OR "Arrangement*" OR "Mechanism*" OR "System*" OR "network") AND ("Stimulat*" OR "enhanc*" OR "Increas*" OR "Improv*" OR "Develop*") AND ("Collaboration").

2.3.1 Selection criteria and process

The literature sources captured from the key terms were filtered out using the following exclusion criteria: (a) articles that were not in the English language; (b) articles published before the year 2010 in order to avoid bringing up too many articles and to focus on recent articles that are based on modern organisational theories. This resulted in 1003 articles; 870 were considered for further analysis after removing duplications. After reviewing the titles and the abstracts, only 354 articles relevant to inter-organisational collaborative arrangements or structures were chosen for further analysis. After full-text screening, only 33 articles were selected since the other articles did not meaningfully discuss the type or features of inter-organisational collaborative structures or governance arrangements. Further, 4 articles found through a reference search were added, making the total number of articles to be analysed to be 37. This process is summarised in Figure 2-3.

Figure 2-3: Screening process of selected literature sources

2.3.2 Types of inter-organisational collaboration structures

Organisational theories mostly focus on three ideal types of organisational structure, each relying on a particular form of governance to coordinate activities. These types of structures were found to be hierarchical (relies on authority and centralised control), market (relies on prices and dispersed competition), and network (relies on trust across a web of association) (Bevir, 2012). As shown in Figure 2-4, organisational governing structures which provide

coordination among actors in various forms with their own features can be placed in a spectrum.

Figure 2-4: Spectrum of primary organisational governing structures

Adopted from Bervir (2012)

Hierarchical structures lead to strong line ministries with well-established vertical coordination and weak horizontal coordination. Such vertical coordination produces fragmented departments (departmentalism), tunnel vision, and vertical silos, creating insufficient horizontal coordination. Therefore, hierarchical structures tend to experience challenges in horizontal coordination (Lagreid & Rykkja, 2015). The key characteristics of a hierarchical governance model are accountability, formal or bureaucratic features, dependent or authoritative relationships, information deficits, and vague and inconsistent objectives (Sorensen & Gudmundsson, 2010).

A market structure, on the other hand, is an abstract idea of an ideal marketplace where prices and competition take place. Here coordination occurs for the exchange of goods, and actors are isolated and largely independent. As a result, social bonds and trust are relatively low in the market structure. Unlike hierarchy, the market structure provides a degree of coordination without guidance, and here the competition drives the innovations. Therefore, the market structure is unsuitable for governance where competition is absent (Bevir, 2012). Bervir (2012) further argued that hierarchy and market are two ends of the spectrum, and all other hybrid forms of organisational structure fall somewhere in the middle. Organisational theorists focus on hybrid forms to overcome the limitations of both the hierarchy and the market. As a result, for example, the network has emerged as the third main form of organisational structure (Bevir, 2012).

Networks are considered more suitable for solving complex problems, ensuring commitment, and establishing a shared identity among actors in collaboration (Khayatzadeh-Mahani et al., 2019; Paulsson et al., 2018; Rondelez, 2018; Van Dijk & Winters-van, 2009).

Therefore, networks are established to enhance vertical and horizontal collaboration (Lagreid & Rykkja, 2015; Paulsson et al., 2018; Sorensen & Gudmundsson, 2010) and are suggested as an ideal form of governance for solving complex problems collaboratively. Networks are formed with a high level of trust among actors, and actors are interdependent, instead of being under central control, thus having the freedom to experiment and innovate (Bevir, 2012). However, the effectiveness and performance of network governance is still questionable (Rondelez, 2018) due to a lack of accountability (Sorensen & Gudmundsson, 2010), hence requiring proper network management. As a result, two styles of network governance management have emerged, shared and brokered, to ensure the effectiveness of collaboration. Within these two management styles, three types of network governing structures are evident in the literature: (1) self-governance network, which does not have any formal entity to drive network members from the top. Here, the shared responsibility can be taken up by members, each taking on specific responsibilities; therefore, this structure heavily depends on the participation of members; (2) lead organisation-governed networks that refer to a centralised form of network governance with one leading entity. Generally, this leading entity can be one of the collaborative members who offers a greater contribution financially or politically, and (3) network administrative organisation (NAO) governed network where an external organisation who is not a network member leads the network. This external leader is often a government or a non-profit organisation (Provan & Kenis, 2008; Rondelez, 2018). However, Bevir (2012) argued that even though there is an agency to monitor and coordinate the network, other actors in the network will still try to manage it in some form. In essence, in terms of managing large-scale collaborative members, decentralised networks that enable self-governance face difficulties as the more people who become involved, the more there are opportunities for misunderstandings, and it becomes more difficult to achieve consensus without any centralised control (Brafman & Beckstrom, 2006). Therefore, it can be argued that lead organisation-governed networks and network administrative organisation (NAO) governed networks are more suitable for managing large-scale collaborative arrangements due to their centralised features (Provan, & Kenis, 2008).

2.3.3 Key features of an inter-organisational collaboration structure.

This section analyses the important characteristics of collaborative governance structures which support and facilitate multi-dimensional stakeholder collaboration.

2.3.3.1   Vertical and horizontal integration

Both vertical and horizontal interconnections and links are essential for healthy stakeholder collaboration. Whilst vertical collaboration links together different administrative levels of government such as national, regions, zones, provinces, districts, and municipalities, horizontal collaboration integrates different sectors and organisations. Therefore, this vertical and horizontal integration can be considered as having two basic dimensions of collaboration. Vertical integration refers to the act of creating alignment and coordination across different governmental levels, leveraging each respective level's potential through collective efforts, and promoting a top-down and bottom-up information exchange (C40 cities climate change leadership group, 2020). For example, the bottom-up approach of city initiatives will influence national action, and the top-down approach of country-level frameworks will influence local actions. Here the optimum outcome is more likely to be achieved through a balanced combination of both approaches (C40 cities climate change leadership group, 2020, 2020). However, the extent of vertical integration might differ from country to country based on their governance context. Jiren et al. (2018) argued that effective vertical integration should connect all different governance scales rather than just interacting with others at the same level or the level immediately above or below. It is evident that vertical integration in an inter-organisational structure varies depending on the level of interaction across the scale. A study by Dobre et al., (2018) argued that the verticality or hierarchical attributes of governance can be analysed based on the centralised or decentralised features of the governance arrangement. The centralised process shows the hierarchical attributes of the governance structure, and the decentralised process shows the flattened attributes of the governance structure. For example, even though the network structure is meant to be flattened if the ownership of the center authority prevails, the network will not be fully flattened, hence displaying centralised and hierarchical structural features (Faul, 2016). Faul (2016) opined that flattening formal and informal network structures, which provide equal powers among stakeholders, is essential for effective collaboration and in order to avoid some actors, who have centralised powers, enjoying the benefits of hierarchical structures in inter-organisational collaboration. Jiren et al. (2018) supported this view and argued that although centrality help integrates diverse sectors, it is associated with several disadvantages, such as

power abuse, centralised decision-making, and withholding of essential information. The dominance of powerful actors could overrule other stakeholders, and, therefore, collaboration among stakeholders can be affected due to the breakdown in trust. Therefore, the upheld consent among researchers is that the centrality feature in the a collaborative network is not suitable for effective collaboration as opposed to a decentralised co-management governance system which is much more favourable for stakeholder collaboration since it offers a power balance and a combination of top-down and bottom-up approaches (Petursson et al., 2016). However, it is important to note that, as viewed earlier, this pure decentralised approach is only suitable for a small number of collaborative members, for example, a self-governance network, and not suitable for large collaborative arrangements that require a suitable governance mechanism to control the network that creates centrality. Accordingly, this study argues vertical integration is possible in the structural type in which hierarchical or centralised features can be seen; for example, hierarchy, lead organisation-governed networks, and network administrative organisation (NAO) governed network structural types represents the verticality. Similarly, the vertical integration concept or verticality will not take place in the structures in which pure decentralisation can be seen, for example, self-governance network structures.

Horizontal integration involves connections between government ministries and sectoral departments, sometimes including external stakeholders such as academia, business and industry, non-profit organisations, and citizen groups (C40 cities climate change leadership group, 2020, 2020). This horizontal integration supports cross-boundary and cross-sector collaboration and increases heterogeneity in the collaboration network to enhance innovation.

2.3.3.2 Leadership

Although leadership is considered essential for stakeholder collaboration, the lack of leadership is identified as a critical barrier to stakeholder collaboration Uittenbroek, et al.,2014). This leadership can take different forms, such as key actor leadership (Rouillard & Spray, 2017), which can be seen in lead organisation-governed networks (Provan & Kenis, 2008; Rondelez, 2018), boundary-spanning organisational leadership (Dow et al., 2013), steering committee (Gilfillan et al., 2017), or external entity such as network administrative organisation (NAO) (Provan & Kenis, 2008; Rondelez, 2018). Among these leadership modes, NAO and Steering committee leadership are identified as successful inter-organisational collaboration leadership arrangements (Gilfillan et al., 2017; Lagreid & Rykkja, 2015) since they facilitate equity and power sharing among the stakeholders.

2.3.3.3 The need for boundary-spanning network behaviour and bridging organisations.

A boundary organisation, which is also known as a bridging organisation or intermediate organisation, is essential as trusted local intermediaries in collaborative arrangements, to overcome institutional gaps and enhance collaboration (Rahman et al., 2017; Rouillard & Spray, 2017). Moreover, because this boundary-spanning structure provides formal and intensive coordination across organisational boundaries (Lee et al., 2010), it is important to have a dedicated inter-organisational collaboration structure with boundary-spanning organisations to handle formal agreements, initiate collaboration, perform intermediary functions, manage relationships with stakeholders, and promote effective collaborations (Lee, 2014).

Boundary spanners are essential to play a key translating and bridging role and foster both formal and informal relationships by creating trustful relationships among collaborative members. This trust helps to develop mutual strength to increase cooperation, integrated solutions, and decision-making (Edelenbos & van Meerkerk, 2015). Since trust is a key element in informal network structures, boundary spanners are important in forming and stimulating informal spaces of interaction by creating conditions for trust development among network actors (Edelenbos & van Meerkerk, 2015). Moreover, this high level of trust development helps the creation of the necessary links among groups, sectors, networks, and organisations. Boundary spanners contribute to effective decision-making policies and adaptation policies to achieve sustainable outcomes (Bowen et al., 2014).

The primary responsibility of boundary organisations is to link organisations across jurisdiction or boundaries, such as donor agencies, academics, policymakers, communities, and other actors vertically and horizontally as a network in integrated decision-making (Armitage et al., 2015; Huitema & Turnhout, 2009). For example, NGOs are often identified as boundary-spanning organisations which fill the gap between stakeholders, community, and local actors (Farooqi, 2016). For the effective function of boundary organisations, they require skills, experience, and involvement in higher and lower levels of governance (Armitage et al., 2015; Huitema & Turnhout, 2009). These boundary spanners need to be specialised to cope with various boundary needs and collaboration forms to perform the additional bridging and brokering activities necessary to span across closed clusters and fill the structural holes in the inter-organisational collaboration (Edelenbos & van Meerkerk, 2015). Moreover, leadership, one of the main features discussed in section 2.3.3.2, can be seen as an important function of these boundary organisations. These bridging organisations

can be inter-agency leadership teams which have representatives from different sectors which can bring multiple agencies together (Dow et al., 2013). Trust and boundary-spanning leadership are considered essential in stakeholder collaboration to stimulate and consolidate coordination and interaction between different actors.

2.3.3.4 Heterogeneity and subgroups

According to scholars, the heterogeneity of collaborative actors facilitates the sharing of knowledge, resources, information, and inter-organisational learning that can lead to innovative solutions (Powell & Grodal, 2006). In contrast, homophily in a network limits the innovative ability of networks due to the existence of similar knowledge, information, resources, and uniform ideas which results in a minimal range of ideas (Bodin & Crona, 2009; Newman & Dale, 2005). Therefore, encouraging and establishing heterogeneity in a collaborative network facilitates innovation and experiments that assists in answering complex problems (Hölscher et al., 2019). To support this, Therrien et al., (2019) argued that having peripheral organisations with enough distance and thematic sub-groups in the collaborative network which can be coordinated through boundary organisations is essential to avoiding the homogenisation of ideas. Therefore, collaboration across different sectors, actors, and different administrative boundaries can boost heterogeneity in collaboration.

In essence, inter-organisational collaboration can be covered via two dimensions: vertical integration and horizontal integration. Vertical integration is essential for cross-scale collaboration, and horizontal integration is essential for cross-sector and cross-boundary collaboration (which can occur among different administrative boundaries). Therefore, vertical and horizontal integration are the main variables supporting inter-organisational collaboration.

The vertical integration concept is applicable in structural arrangements where only verticality or centrality prevails. Therefore, vertical interaction is not applicable in flat networks and isolated organisations where centrality is absent. Vertical coordination can be seen among hierarchical structures that facilitate top-down or bottom-up coordination; this feature is considered as "one-way interaction" in this study. However, either top-down, or bottom-up is seen as low vertical integration since the proper combination of top-down and bottom-up coordination can lead to optimum vertical integration that supports balanced top-down and bottom-up approaches in decision-making (C40 cities climate change leadership group, 2020,2020). Hierarchical structures can also facilitate balanced top-down and bottom-up approaches with intermediate-level interactions in the hierarchy, which can be referred to

as a hierarchy with "two-way interaction". However, the structural features that facilitate direct interaction among various administrative scales can be referred to as a hierarchy with "unified vertical integration". This feature can be seen in heterarchy structures (Cumming, 2016) which promote high vertical integration. According to Jiren et al. (2018), effective vertical integration should connect all the administrative levels in the governance rather than just above and below the immediate administrative level. In addition, where the vertical connection among all the administrative levels is absent, the availability of boundary organisations to create vertical connections can be considered an important factor in strengthening vertical integration since boundary organisations can fulfil this requirement by connecting different administrative levels. However, it can be argued that the level of vertical integration which is facilitated by boundary organisations is considerably less than the vertical integration created by direct connection among various administrative scales. In essence, vertical integration varies from low to high within an organisational structure, as shown in Figure 2-5.

The horizontal integration variables depend on the horizontal connection among different sectors, different actors, and different administrative boundaries. Boundary organisations play an important role in helping to connect different types of organisations across sectors and boundaries. Therefore, the availability of boundary organisations is important in facilitating horizontal integration where direct connections are not available. The heterogeneity of organisations in collaboration is seen as a crucial factor in bringing innovative solutions to solve complex problems through collaboration. Collaboration across different sectors, actors, and different administrative boundaries can boost heterogeneity in collaboration. Therefore, the high heterogeneity of collaborative organisations can be seen as a vital indicator of a successful high level of horizontal integration. The heterogeneity of the collaborative governance arrangement can be boosted by keeping thematic subgroups in an inter-organisational collaborative arrangement rather than having similar types of organisations (Therrien et al., 2019). In general, silo-based organisational arrangements lack horizontal integration (Scott.I & Gong, 2021) and, in contrast, networked organisational arrangements facilitate horizontal integration by coordinating with various sectors and across boundaries. Therefore, it can be concluded that the term "silo" represents no/low horizontal integration, and the term "networked" represents a high degree of horizontal integration.

The leadership feature is not discussed separately under each integration criterion since leadership can be seen as a common factor in increasing both vertical and horizontal integration in governance arrangements. However, it is important to note that, as an exception

within a collaborative arrangement, the self-governance network does not have any leadership in it.

2.3.4 Discussion on organisational structures and features

Figure 2-5 presents a framework that captures an organisational structure's vertical and horizontal integration characteristics based on identified structural features that assist in understanding how they lead to a low, medium, and high level of collaboration. To develop the framework, horizontal and vertical integration are considered in the X and Y axes respectively. Vertical integration varies from low to high, through the Y axis, based on the features represented in the framework and is named "no vertical interaction", "one-way interaction", "two-way interaction", and "unified vertical integration", based on the above discussion. Similarly, horizontal integration varies from low to high, through the X axis, based on the features represented in the framework and named as "Silo" and "Networked" as per the discussion above.

Vertical integration (y-axis, from bottom to top: No vertical coordination, one way coordination, Indirect two-way coordination, Direct two-way coordination)

Horizontal integration (x-axis, from left to right: Silo, Networked)

7 — Directly integrated hierarchy
- The direct connection can be seen among all administrative levels in the governance
- Centralisation can be seen
- No horizontal connections can be seen among different sectors, actors, and/or administrative boundaries.
- No/low heterogeneity

8 — Heterarchy
- The direct vertical connection can be seen among all administrative levels in the governance
- Centralisation can be seen
- Many well-established direct horizontal connections can be seen among different sectors, actors, and administrative boundaries.
- Heterogeneity can be seen

5 — Indirectly integrated hierarchy
- The indirect connection can be seen among all administrative levels in the governance
- Centralisation can be seen
- No horizontal connections can be seen among different sectors, actors, and/or administrative boundaries.
- Boundary organizations may be available to facilitate vertical coordination
- No/low heterogeneity

6 — Lead agency or NAO governed network
- The indirect vertical connection can be seen among all administrative levels in the governance
- Centralisation can be seen
- Many well-established horizontal connections can be seen among different sectors, actors, and administrative boundaries.
- Boundary organizations may be available to facilitate vertical and horizontal coordination
- Heterogeneity can be seen

3 — Hierarchy
- One-way vertical connection can be seen among immediate administrative levels in the governance
- Centralisation can be seen
- No horizontal connections can be seen among different sectors, actors, and/or administrative boundaries.
- No boundary organizations available to facilitate cross scale and horizontal coordination
- No/very low heterogeneity

4 — Hierarchy and supplementary network
- Vertical connection can be seen among immediate administrative levels in the governance
- Centralisation can be seen
- Boundary organizations may be available to facilitate horizontal coordination.
- Many well-established horizontal connections can be seen among different sectors, actors, and administrative boundaries.
- Heterogeneity can be seen

1 — Isolated Entity/ Market
- Organisations are isolated
- Independency can be seen
- No vertical coordination can be seen
- No horizontal coordination can be seen

2 — Self-governance network
- No vertical connection can be seen
- Horizontal connections can be seen among different sectors, actors, and/or administrative boundaries.
- Boundary organisations may be available to facilitate horizontal coordination.
- Heterogeneity can be seen
- Decentralisation can be seen
- Leadership cannot be seen

Figure 2-5: Framework to determine the collaboration levels based on the structural features.

Various organisational structural types that promote coordination can be mapped to the segments in the framework in terms of supporting collaboration. Therefore, the framework can be used to place each structural type in one of the segments based on its characteristics

and, as a result, the connection between the level of collaboration and structural type with characteristics can be understood.

Segment 1 from the framework indicates no vertical and horizontal coordination which leads to isolated organisations where organisations do not consider collaboration, and this can be seen as a market structure. Segment 2 represents pure horizontal coordination and no vertical coordination. In this stage, there is no control, centrality, or hierarchy that prevails among organisations. Therefore, this is considered a self-governance network in which collaborative members have the same powers and equality in collaborative initiation.

Segment 3 represents one-way vertical coordination among intermediate levels and no horizontal coordination. General hierarchical structures fall into this category as this structure hinders horizontal coordination and facilitates one-way coordination, such as pure top-down or bottom-up among all the administrative levels. Segment 4 represents the horizontal coordination features in addition to the features of segment 3, which means the organisations in the hierarchical arrangement are collaborating horizontally due to a network structure at one or more administrative levels. However, the hierarchical structure still prevails. This structure is referred to as a hierarchy with a supplemental network.

Segment 5 represents the two-way vertical coordination among the intermediate levels but with horizontal coordination. Hierarchical structures with balanced top-down and bottom-up approaches among intermediate levels can fall into this category. Here, the intermediatory organisations in the hierarchy or in any other boundary spanning organisation support vertical collaboration by interconnecting all the intermediate levels. This structure is referred to as an "indirectly integrated hierarchy" since the interaction between the various administrative levels are established indirectly through an organisation. Similarly, segment 7, an advanced version of segment 5, provides a high vertical integration of hierarchy with direct coordination among the various administrative levels. The study names the structure with this characteristic as a "directly integrated hierarchy".

Segment 6 consists of similar features as those given in segment 5 and, in addition, also consists of indirect horizontal coordination features among organisations. This study argues that lead organisation network arrangements and network administrative organisation governed network arrangements can fall into this category because these structures are showing hierarchical or centralised features and consisting of indirect coordination among the organisation as justified follows: (1) both networks have centralisation that represents hierarchical features (Borgatti et al., 2009); (2) the networks are highly brokered, with few direct organisation-to-organisation interactions and network participants; (3) indirect forms of

coordination characterise the networks through mutual adjustment, shared norms, trust, and reputation (Provan & Kenis, 2008). Moreover, these network types can have one or more (polycentric) centrality points. However, in special cases, depending on the situation, networks can have direct connections among organisations. These formal direct networks with centrality can be viewed as a heterarchy structure since heterarchy is a co-existence of a hierarchy and network system between the actors with direct interactions (Cumming, 2016; Wilson & Hölldobler, 1988; Stephenson, 2009). Furthermore, this heterarchy structure can also have one or more central points (Cumming, 2016). By giving the above justification, it can be argued that lead organisation governed networks and network administrative organisation governed networks fall under segment 6 and, similarly, heterarchy falls into segment 8 with high vertical and horizontal integration with direct vertical and horizontal coordination. The above discussion regarding organisational structure types with the collaborative arrangements is graphically presented in Figure 2-6.

Figure 2-6:General structural arrangement of each segment

It can be argued that market structure (segment 1), which hinders coordination among isolated entities, is not suitable for collaborative arrangements since it has no vertical and horizontal integration. The self-governance network structure (segment 2) is unsuitable for inter-organisational arrangements in which centrality or hierarchical features is not prevail. Hierarchy (segment 3), indirectly integrated hierarchy (segment 5), and directly integrated

hierarchy structures (segment 7) are suitable for creating vertical coordination but fail in horizontal integration. Therefore, they are not suitable for inter-organisational collaboration. However, the hierarchy and supplementary network structure (segment 4) can facilitate low horizontal integration and high vertical integration and can be considered to provide a medium level of collaboration across administrative scales, boundaries, sectors, and actors. Both the lead agency or NAO-governed network structure (segment 6) and the heterarchy structure (segment 8) can facilitate high vertical and horizontal integration and, therefore, can facilitate high collaboration across administrative scales, boundaries, sectors, and actors. However, since a heterarchy structure can facilitate direct coordination among all collaborative members, a heterarchy structure is considered the ideal structural arrangement to facilitate inter-organisational collaboration.

2.4 Policies and legislation requirements for enhancing collaboration among stakeholders.

Policies-related barriers are identified as one of the critical barriers to enhancing stakeholder collaboration in risk-sensitive urban planning. Current policies, and legislation that set the legal environment do not mandate stakeholder collaboration in risk-sensitive urban development, hindering inter-organisational linkages and innovative development solutions (Broto et al., 2015; Trapp et al., 2017; Yumagulova & Vertinsky, 2019). The lack of policies that promote collaboration (Broto et al., 2015; Chu, Brown et al.,2019; Malalgoda & Amaratunga, 2015; Shrestha & Dhakal, 2019; Trapp et al., 2017; Wamsler et al., 2020; Yumagulova & Vertinsky, 2019) has inevitably led to weak inter-organisational links among relevant organisations, different visions, and silo-based working. In addition, incoherent government policies seem to contribute to the lack of clarity in decision-making roles and responsibilities (Webb, Petheram et al., 2014). Shrestha and Dhakal (2019) have found that weak coordination among ministries is a political barrier and leads to policies and activities that promote silo working in each ministry. This situation is fuelled by a deficiency in legislation and legislative authorities to delegate stakeholder responsibilities and duties in a coherent manner to support collaboration (Forino et al., 2018; Malalgoda et al., 2013; Nguyen et al., 2018; Wamsler et al., 2014) and, additionally, by a deficiency in effective mainstreaming of legal instruments and strategies (Bissonnette et al., 2018). This condition implies that even though some stakeholders have an interest and desire to implement collaborative initiatives, they are not able to fulfil their aspirations since their responsibilities are not adequately delegated by law (Malalgoda et al., 2013). Moreover, the existence of separate mandates for the different ministries influences different visions and interests of individual organisations (Farrell, 2010; Nemakonde & Van Niekerk, 2017), especially in developing countries. Hence, there is a need for policies, acts, and legislation to enforce risk-sensitive urban development implementation involving the relevant stakeholders from various sectors and disciplines (Malalgoda et al., 2013). Most of the previous studies have suggested that the harmonisation of policies from different sectors is essential to implement collaborative procedures without conflicts (Amaratunga et al., 2018; Bissonnette et al., 2018; Hardoy et al., 2019; Hegger et al., 2014; Mwenje, 2019; Parthasarathy, 2016; Shrestha & Dhakal, 2019; Taylor, 2017; Torabi et al., 2018; Trapp et al., 2017; Uittenbroek, 2016; Uittenbroek et al., 2014; Wamsler et al., 2020). In support of this, the 2030 agenda for

sustainable development suggested the requirement of interaction among policy domains (Karlsson-Vinkhuyzen et al., 2018). Therefore, this section investigates the state-of-the-art thinking in policy changes which are required to enhance stakeholder collaboration in risk sensitive urban development and the approaches to policy development (with policy coherence and consistency) with the alignment of all relevant collaborative sectors.

2.4.1 Limitations and requirements in policymaking

The main limitations in policy development are the lack of collaborative policies to break the silos, a lack of mainstreaming, and missing coherence among different policy domains, thus hindering collaborative initiatives (Wamsler et al., 2020; Trapp et al.,2017; Shrestha & Dhakal, 2019; Broto et al., 2015; Yumagulova & Vertinsky, 2019; Malalgoda & Amaratunga, 2015; Chu, Brown et al., 2019). Therefore, it is important to have sectoral expertise to establish coherent policies (Nilsson & Persson, 2017; Webb, Petheram et al., 2014; Bissonnette et al., 2018). According to Nilsson & Weitz (2019), at present, most of the policymaking procedures focus on gathering the required information and developing policies using the Delphi technique, where system thinking and cognitive structural thinking are lacking. Therefore, achieving policy coherence has been a difficult task (Nilsson & Weitz, 2019). This situation creates conflicts among different sectoral domains in terms of overlapping responsibilities and interference with the primary duties of different sectors. These conditions potentially create conflicts in multi-stakeholder collaboration. The public policy development process for decision-making in complex problems is not straightforward; it involves various diverse stakeholders, interests, opinions, ideas, knowledge, frequent disturbance, and slow progression. Therefore, policy processes are complex, dynamic, and chaotic (Nilsson & Weitz, 2019). Policymaking needs to investigate all domains related to policy implementation and its impact, avoiding policy overlapping and improving coherence. Although the importance of policy integration and coherence is understood, practical progress towards developing integrated policies with coherence is limited. One of the reasons for this is that widely used technical approaches for policymaking assumes that policies can quickly adjust to resolve a problem once the cross-sectoral interaction data is obtained. However, according to Nilsson & Weitz (2019) and Weitz et al. (2017), positive differences in practical decision-making and policy development require essential inputs such as trust, learning, and ownership. Therefore, there is a need to intensify participation in essential policy-making processes (Pogrebinschi & Ryan, 2018).

Furthermore, Nilsson & Weitz (2019) argued that dealing with various tradeoffs in policymaking (which considers diverse values, views, and the legitimate interest of different stakeholders) need to be incorporated with the input of technical experts. Public hearings, consultations, seminars, and online portals for public debate are general sources where multi-stakeholders can be involved and provide information to policy-making in practice (Nilsson & Weitz, 2019). All relevant stakeholders and technical experts need to be involved in the relevant stage to identify all governing trade-offs, requiring an analytic deliberative approach to policymaking.

Moreover, Swanson and Bhadwal (2009) stressed the importance of adaptive policies as a suitable way to handle complex problems in dynamic conditions. Adaptive policies are created to support and handle complex, dynamic, and uncertain conditions. Adaptive policies predict the conditions that lie ahead in the design stage. These anticipating conditions can be categorised into three types: (1) Anticipating condition that the system is well understood; (2) Anticipating condition that the system is not yet understood well but will be understood over time; (3) Unanticipated conditions (system not so well understood). Since adaptive policies focus on these various conditions, they provide space to solve complex problems and provide successful outcomes in unanticipated settings. If the system is well understood, the policy can be fully automatically adjusted. If the system is not well understood and will be understood over time, a semi-automatic policy adjustment can be provided. Finally, if the system is not well understood, formal policy review and continuous improvement need to take place. This adaptive policy development consists of integrated and forward-looking analysis, multi-stakeholder involvement, and provision for triggering automatic policy adjustments by monitoring key performance indicators. Even though unpredictable conditions are considered in adaptive policymaking, such as known-known and known-unknown, not all situations can be anticipated (i.e., unknown-unknown situations). However, all these situations are part of adaptive policy development. These adaptive policies allow for enabling self-organisation, decentralising governance, and the social networking capacity of communities, promoting differences in policy responses, and an official review of policies for continuous improvement.

Even though the above discussed policy-related issues and limitations in policy development have been identified in the global context, practically, it is difficult to generalise the policies and legislative requirements that are needed to enhance collaboration in RSUP. Therefore, in addition to this basic literature review, this study analysed the available policies and

legislation relating to RSUP in the Sri Lankan context (See section 4.8, Appendix D: Risk-sensitive urban planning and development related legislations and policies in Sri Lanka; Appendix E: Overview of laws and policies) and proposed policy and legislative requirements in the Sri Lankan context by analysing the current stakeholder collaboration context using primary data.

2.5 Key Elements of the inter-organisational collaboration maturity model

This section presents the systematised literature review that was undertaken to identify the state-of-the-art in maturity models and indicators that will assist in assessing the organisational collaboration maturity in collaboration in RSUP.

2.5.1 Introduction of inter-organisational collaboration maturity models.

Inter-organisational collaboration is a unique process whereby stakeholders come together to provide resolutions or solutions using resources, expertise, and experience from their own organisations (Greer, 2017). The characteristics of this collaborative process can be determined by the various degrees of tension between the self-interests of the individual organisations and the collective interest of the organisations (Thomson et al., 2007; Valiquette & Therrien, 2013). As organisations are competitive in the global market, it is important for organisations to understand how well they are collaborating with their partners to achieve optimum performance and establish pathways to continuously improve their collective performance through efficient inter-organisational collaboration processes. Maturity is defined as a measure to evaluate the capabilities of the organisation regarding a certain discipline (Cuenca et al., 2013). Accordingly, the inter-organisational collaboration maturity model is one of the established tools for understanding the maturity level of collaboration and providing guidance for enhancing collaboration. Hence, the maturity model can be described as a tool that helps assess maturity and provides guidance to progress from one stage of maturity to another stage with the help of its structured collection of elements that describe the characteristics of different stages (Klimko, 2001).

The earliest maturity models can be traced back to work by Crosby in 1979 (Crosby, 1979), which proposed a Quality Management Maturity Grid (QMMG). Since then, there have been many attempts to develop maturity models for a range of organisational contexts, such as the four-stage model for the growth of Electronic Data Processing (Gibson & Nolan, 1973) and the Capability Maturity Model (CMM) for Software Engineering (Paulk et al., 1993). A step-change in these maturity models was initiated by the Capability Maturity Model Integration (CMMI) work (Jansz, 2016) which went beyond just offering support for assessing maturity levels, as in CMM, to providing guidelines for ways of improvement as well as helping to assess maturity levels and allowing organisations to represent their maturity levels in each

process area (Petrachkov, 2012; Software Engineering Institute [SEI], 2009). CMMI supported two ways of improvement using capability levels for an individual process area and maturity levels for a set of related processes (Ho et al., 2016). Due to this pioneering work, the concept of maturity models is now being applied to a range of domains, such as technology, knowledge management and enterprise resource management (Wendler, 2012). However, in the context of collaboration processes, a maturity model was initiated in 1998 by Lebrun et al. which resulted in the development of a Fast Reactive Extended Enterprise-Capability Assessment Framework (FREE-CAF) model. This study focused on managing new products and processes in temporary collaborative projects involving two or more organisations. Since then, there has been much research to develop collaboration maturity models for various contexts.

Although extensive research has been carried out in developing maturity models for inter-organisational collaboration in various contexts, research for understanding the state-of-the-art maturity models' attributes is lacking. This section presents the outcome of an investigation into the state-of-the-art of maturity models, which was conducted to identify and analyse the key components of the maturity models, such as maturity levels, focus areas, and indicators. The findings of this study are useful for guiding the development of an inter-organisational collaboration maturity model by choosing the relevant indicators and maturity levels or assessing the maturity level of the collaborative organisations.

2.5.2 A systematised literature review process and selection criteria

The search and selection process used in the systematised literature review of this study is presented in Figure 2-7. As the first step of the study, the following databases were selected to find the relevant literature: Scopus, Web of Science, Emerald, ScienceDirect, Taylor and Francis, SpringerLink, EBSCO, and Google Scholar. Then, the key terms (("Organisation" OR "Organisation" OR "Enterprise") AND "collaboration" AND "maturity model") were used to capture all the relevant organisational-related collaboration maturity models. Boolean operators with these key terms were used in all the selected databases, excluding Google Scholar where a manual search was conducted with the specified key terms.

The derived literature was filtered using inclusion and exclusion criteria. The exclusion criteria used in this study were: articles that were not in the English language; articles published before the year 2010 in order to obtain the most recent literature on contemporary

maturity models for the analysis; articles that were not included within the following document types: journal articles, conference papers, published theses, book chapters, and books with well researched and peer-reviewed studies; articles which did not have a full text, and articles which did not address inter-organisational collaboration maturity models. Irrelevant papers were removed through an initial scanning based on the above criteria. Moreover, organisational interoperability studies were included since interoperability is interconnected with collaboration (Cestari et al., 2013) and enhances collaboration within organisations (Santos et al., 2016).

327 articles were found from the initial search, and this was reduced to 262 after removing duplications. This was followed by another screening process that involved analysing the title, abstract, and keywords to find the literature sources consisting of inter-organisational collaboration maturity models. Hence, 238 literature sources were eliminated as follows: literature sources that discussed an inter-organisational collaboration or collaboration maturity without containing an inter-organisational collaboration maturity model; literature sources which included maturity models that were not related to collaboration maturity, and literature sources that focused only on intra-organisational collaboration maturity models. This resulted in choosing 24 literature sources relevant to the study which consisted of developing or applying maturity models in various inter-organisational collaboration contexts. A further 5 papers were eliminated after reading the full text as they were part of the same study. The selected literature sources discussing existing inter-organisational collaboration maturity models were then studied, analysed using the thematic analysis method, and synthesised in terms of understanding maturity levels and the indicators used in assessing the collaboration maturity under various dimensions or focus areas.

Figure 2-7: Screening process of selected literature sources

19 literature sources were selected that discussed maturity models for inter-organisational collaboration in the following domains: automotive industry (Boughzala & De Vreede, 2015; Guédria et al., 2011); energy sector (Gilman & Kuhn, 2012); textile industry (Campos et al., 2013; Ho et al., 2016); tile industry (Cuenca et al., 2013); fruit and vegetable sector (Alonso-Manzanedo et al., 2014); animation and video games (González-Rojas et al., 2016); IT-enabled business organisations (Bukhsh et al., 2012); retail sector (small-medium enterprises) (Plomp & Batenburg, 2010); medical sector (Fitterer & Rohner, 2010); disaster management sector (Mäkelä & Virrantaus, 2013; Latif et al., 2016); university-industry collaboration (Awasthy et al., 2018); international corporation of research and innovation (Schimpf & Christo, 2018); e-government (Delgado et al., 2018), and community engagement in city management (Boughzala et al., 2014). Additionally, the model developed by De Soria et al. (2016) has a general viewpoint on inter-organisational collaboration without focusing on a particular domain. Similarly, Haas & Mottok (2017) used the existing maturity model developed by Boughzala & De Vreede (2015) to assess research-oriented learning. Among

these models, only six models (Boughzala et al., 2014; Plomp & Batenburg, 2010; Mäkelä & Virrantaus, 2013; Delgado et al., 2018; Bukhsh et al., 2012; Latif et al., 2016) focus on the information and communication technology (ICT) enabled inter-organisational collaboration, even though we are in a digital technology era. Moreover, these models focus on inter-organisational collaboration in collaborative business processes, supply chain management, manufacturing industry, product innovations, healthcare, disaster management, research, and innovation.

2.5.3 Components of a collaboration maturity model

2.5.3.1 Maturity levels

Determining and defining maturity levels are essential in maturity model development. Each maturity model is developed and applied to serve different purposes in different contexts. Therefore, their maturity level description varies from model to model; however, this study reviewed the description given in existing models and provides a basic general description for each maturity level that can be applied in any inter-organisational collaboration context.

Table 2-11 describes the organisational maturity levels, varying from level 0 (isolated) to Level 5 (matured or optimised) collaboration levels.

Table 2-11:Description of maturity levels

Maturity level	Description of the level	Sources
Level 0	Isolated entities. There are no inter-organisational relationships. Everyone acts based on their own needs. Knowledge and information sharing are discouraged. There is a general unwillingness to collaborate. People do not seem to value collaboration. There is no organisational capability or capacity to collaborate. Collaboration processes do not exist.	(Awasthy et al., 2018; Guédria et al., 2011; Plomp & Batenburg, 2010; Mäkelä & Virrantaus, 2013; Campos et al., 2013)
Level 1	Collaboration is not discouraged. Ad-hoc and chaotic collaboration processes can be seen. Collaboration is unstructured and directed towards the interests of people's own organisations. Collaborate occasionally or short-term basis. There is a general willingness to share information and knowledge; however, knowledge requirements are not identified as well as not managed. People who understand the value of collaboration may collaborate. The management of the collaboration practices is not based on a clear strategy. Lack of information technology to support collaboration, and collaboration tasks are facilitated through paperwork.	(Awasthy et al., 2018; Boughzala & De Vreede, 2015; De Soria et al., 2016; Schimpf & Christo, 2018; Ho et al., 2016; González-Rojas et al., 2016; Cuenca et al., 2013; Campos et al., 2013; Bukhsh et al., 2012; Plomp & Batenburg, 2010; Alonso-Manzanedo et al., 2014)
Level 2	The culture encourages collaboration. The value of collaboration is recognised, and the objectives for collaboration are clear. The key processes for inter-organisational collaboration are defined and documented; some of the information requirements are identified. Information/knowledge is managed in an ad hoc manner (relationships consisting of mere information exchanges begin to appear among members of the network); more efforts are required to ensure interoperability among partners; monitoring tools start to be used for key processes toward collaboration.	(Awasthy et al., 2018; Schimpf & Christo, 2018; Cuenca et al., 2013; Mäkelä & Virrantaus, 2013; Alonso-Manzanedo et al., 2014; Ho et al., 2016; Boughzala & De Vreede, 2015; Fitterer & Rohner, 2010; Plomp & Batenburg, 2010)
Level 3	The management of inter-organisational collaboration is a strategic function. Collaboration activities with defined collaboration processes exist. Partnership contracts exist among the collaborating organisations; Information/knowledge requirements are defined and somewhat managed. Information is shared among the members. A collaboration environment is established. Interoperability is possible, but the risk of encountering interoperability problems is high. Rewards/incentives are available to promote collaboration.	(Awasthy et al., 2018; Schimpf & Christo, 2018; Cuenca et al., 2013; Alonso-Manzanedo et al., 2014; De Soria et al., 2016; Delgado et al., 2018; Bukhsh et al., 2012; Plomp & Batenburg, 2010)

Maturity level	Description of the level	Sources
Level 4	The members of the inter-organisational collaboration expect to collaborate. Organisational leadership shows commitment and provides a strategy for collaboration. Collaboration processes are well-characterised and understood. Collaboration-related activities are considered as part of the workflow. Interoperability is easy even if problems can appear from distant partnerships; Information/knowledge requirements are completely defined and managed. Collaboration capabilities and benefits are assessed and measured. Technology aligned with collaboration requirements; training is available for facilitated collaboration.	(Awasthy et al., 2018; Boughzala et al., 2014; Boughzala & De Vreede, 2015; Ho et al., 2016; Cuenca et al., 2013; Guédria et al., 2011; Alonso-Manzanedo et al., 2014; Ho et al., 2016; Fitterer & Rohner, 2010; Plomp & Batenburg, 2010; Alonso-Manzanedo et al., 2014)
Level 5	There are reciprocal trust and mutual dependency among the members of the network. Collaboration processes and information requirements are continuously reviewed and improved. The management of collaboration is based on a proven and effective strategy. The ability to negotiate with others is high. Collaboration systems/tools are widely accepted, monitored, and updated. Technology is well aligned with collaboration processes and continuously improved.	(Awasthy et al., 2018; Boughzala et al., 2014; Boughzala & De Vreede, 2015; De Soria et al., 2016; Mäkelä & Virrantaus, 2013; Schimpf & Christo, 2018; Cuenca et al., 2013; Fitterer & Rohner, 2010; Alonso-Manzanedo et al., 2014)

Table 2-12 provides the various terminologies used to describe each maturity level in the literature. Those terminologies are classified from level 0 to level 5 by referring to the original descriptions which are given for each level in the selected studies. Based on the context, one could choose a given set of terminologies from this Table when developing a maturity model for a given organisational collaboration context.

Table 2-12:Maturity levels and their terms

Source	Level 0	Level 01	Level 02	Level 03	Level 04	Level 05
Alonso-Manzanedo et al., 2014		Ad hoc	Defined	Linked	Integrated	Extended
Bukhsh et al., 2012		Incomplete	Isolated	Standardised	Quantitative Managed	Optimised
Campos et al., 2013	Isolated	Initial	Executable		Connectable	Interoperable
Cuenca et al., 2013		Initial	Repeatable	Defined	Managed	Optimised
Delgado et al., 2018		Initial	Integrated	Collaborative	Predictable	Optimised
Fitterer & Rohner, 2010		Initial	Managed	Defined	Quantitatively Managed	Optimising
González-Rojas et al., 2016		Incomplete	Repeatable	Accomplished	Managed	Optimised
Ho et al., 2016		Initial	Managed	Defined	Quantitatively Managed	Optimising
Latif et al., 2016		Initialised	Managed	Defined or standardise	Quantified or Measured	Improved Continually or Optimising
Schimpf & Christo, 2018		Initial Collaboration	Managed Collaboration	Defined Collaboration	Measured Collaboration	Optimised Collaboration
Awasthy et al., 2018	Not existent	Initial	Planned and encouraged	Practised	Managed	Continuous improvement
Boughzala et al., 2014		Ad hoc	Exploring		Managing	Optimising
Boughzala & De Vreede, 2015		Ad hoc	Exploring		Managing	Optimising
De Soria et al., 2016		Performed	Managed		Standardised	Innovating Improvements

Source	Level 0	Level 01	Level 02	Level 03	Level 04	Level 05
Gilman & Kuhn, 2012		Stage 1	Stage 2		Stage 3	
Guédria et al., 2011	Unprepared	Defined	Aligned	Organised		Adaptive
Mäkelä & Virrantaus, 2013	Separate	Learnable		Established	Proactive	Optimised
Mäkelä & Virrantaus, 2013		Separate Actions	Starting Cooperation	Coordinating	Adaptable and Capable of Changes	Appropriate Cooperation
Plomp & Batenburg, 2010	No Chain Collaboration	Bilateral Collaboration	Multilateral Collaboration	Extended Chain Collaboration		

2.5.3.2 Inter-organisational collaboration maturity indicators

The literature review shows that each existing maturity model has taken a different point of view using various key focus areas, known as dimensions, components, or elements, to assess inter-organisational collaboration maturity. Each of these focus areas has several indicators to assess the level of collaboration maturity of organisations. In this study, the indicators identified from the literature review were classified and grouped under twelve focus areas based on their nature. The focus areas can be further categorised under the following themes: administrative environment, organisational systems, process, technology, and people. The following sections describe the focus areas and the indicators under each theme.

2.5.3.2.1 Administrative environment

The administrative environment theme comprises two focus areas which are policies and governance. Table 2-13 summarises the key indicators that are referenced in the literature for assessing the maturity of these focused areas.

Table 2-13:Focus areas and indicators under the administrative environment theme

Theme	Focus areas	Indicators
Administrative environment	Policies and laws	Policies regarding collaboration with other bodies (Campos et al., 2013; De Soria et al., 2016)
		Laws regarding collaboration with other bodies (Campos et al., 2013)
		Policies relating to technology and information standards (Campos et al., 2013)
	Governance	Task composition and assignment (Boughzala et al., 2014)
		Degree of formation of governance in terms of strategic governance; IT governance; process management governance (Fitterer & Rohner, 2010; Guédria et al., 2011)

Policies, laws, and governance provide an administrative framework within organisations to facilitate collaboration. The policy and law indicators define the legal criteria of the organisation for collaborating with other organisations (Campos et al., 2013). Moreover, the policies regarding the use of technology and information standards for collaboration are also considered the main factors that help facilitate and control collaboration effectively with data protection standards. The existence of policies and laws for collaboration will take different forms based on the maturity level. For example, at the lowest level of maturity, there will be no government and institutional policies and laws available relating to collaborative activities among organisations. As it matures, organisations will gradually consider policies as an

important factor and begin to plan and implement them. In the final stage of maturity, policies regarding collaboration, technology and information standards for collaboration can be seen (Campos et al., 2013).

Governance refers to the actions employed to effectively manage the collaboration process and steer collaborative members toward the desired solution (Boughzala et al., 2014). The governance indicators capture how an organisation is guided in inter-organisational collaboration and include the following: strategic governance (which addresses activities relating to strategic planning, investment planning, reporting structures on the management level and the establishment of steering committees) (Fitterer & Rohner, 2010); IT governance (which addresses not only technical aspects but also information system related issues such as compliance with standards/taxonomies in policies and procedures), and process management governance (which addresses how the organisation is guided and supported towards a process-centric organisation, formalisation in decision-making and supporting improvement in collaboration processes (Fitterer & Rohner, 2010). The maturity in governance can vary based on its maturity level. For example, at the lowest level of maturity, the governance relating to collaboration does not exist. As it matures, organisations will evolve from having defined governance measures to support collaboration (without implementation efforts and without connectivity between measures and implementation plans) to having a proper plan of governance measures for collaboration with the connectivity of implementation. At the highest maturity levels, continuous feedback, improvement, and suitable governance adaptation for collaboration can be seen (Fitterer & Rohner, 2010). Thus, indicators relating to the administrative environment are vital in assessing the maturity of the administrative framework that exists among partners to support inter-organisational collaboration.

2.5.3.2.2 *Process*

The process theme includes focus areas such as business process, cost management process, collaboration process and its management, knowledge sharing process, and information management process with related indicators, as shown in Table 2-14.

Table 2-14:Focus areas and indicators under the process theme

Theme	Focus areas	Indicators
Process	Business process	Level of business process alignment with collaboration activities (Delgado et al., 2018; Guédria et al., 2011; González-Rojas et al., 2016; Ho et al., 2016)
		Degree of quality of outcome/performance of the collaborative business process (Boughzala et al., 2014; González-Rojas et al., 2016; Ho et al., 2016; Schimpf & Christo, 2018)
	Cost management process	Level of financial support for collaboration (Alonso-Manzanedo et al., 2014; Bukhsh et al., 2012)
		A clear cost-sharing mechanism is in agreement (Bukhsh et al., 2012)
		Clear cost-benefit analysis of collaboration (Bukhsh et al., 2012)
	Collaboration process management	Level of collaborative work planning (González-Rojas et al., 2016; Schimpf & Christo, 2018; Campos et al., 2013)
		Degree of awareness of the collaboration process (Bukhsh et al., 2012; De Soria et al., 2016; Gilman & Kuhn, 2012)
		Level of prior evaluation to select collaborative partners (Campos et al., 2013)
		Attributes of collaboration practices (such as frequency of collaboration (regular/rare/often); How well an organisation is connected in committees and relevant bodies for identifying collaboration opportunities and contribution levels; Aspects of resource sharing for collaboration; Kind of technology used to facilitate collaboration (Boughzala & De Vreede, 2015; Boughzala et al., 2014; De Soria et al., 2016; Gilman & Kuhn, 2012 ; Ho et al., 2016; Awasthy et al., 2018)
		The way collaboration is managed (i.e. are there any well-defined processes for collaboration?); Level of communication among participants and how the communication is supported; Extent of management involvement in collaboration; Level of conflict resolution management and how it is handled (Alonso-Manzanedo et al., 2014; Boughzala & De Vreede, 2015; De Soria et al., 2016; Fitterer & Rohner, 2010; Cuenca et al., 2013; Delgado et al,. 2018; Fitterer & Rohner, 2010; Mäkelä & Virrantaus, 2013; Campos et al., 2013; González-Rojas et al., 2016)
		Level of engagement of partners in collaborative decision-making (Delgado et al., 2018; Gilman & Kuhn, 2012; Ho et al., 2016; Plomp & Batenburg, 2010)
	Knowledge sharing process	Degree of knowledge sharing for collaborative decision-making (Awasthy et al., 2018; Campos et al., 2013; Gilman & Kuhn, 2012; González-Rojas et al., 2016)
		Usage of varying knowledge channels (Campos et al., 2013)
		Existence of knowledge management systems (Campos et al., 2013)

		Level of involvement in joint knowledge creation (Boughzala & De Vreede, 2015; Delgado et al., 2018; Ho et al., 2016)
		The extent of knowledge gets validated and reused among collaborating members (Boughzala & De Vreede, 2015)
	Information management process	Degree of information sharing in terms of requirements and decision-making (Alonso-Manzanedo et al., 2014; Cuenca et al., 2013; Delgado et al., 2018; Ho et al., 2016)
		Level of timely sharing of information (Latif et al., 2016; Mäkelä & Virrantaus, 2013)
		A straightforward procedure for information management among partners based on their function and security clearance (Bukhsh et al., 2012; González-Rojas et al., 2016; Mäkelä & Virrantaus, 2013)
		Availability of information that can be accessed by the collaborative members/partners (Boughzala & De Vreede, 2015)
		Use of information in productive collaboration (Boughzala & De Vreede, 2015)

The first focus area under the process theme is business process which comprises indicators to assess how organisational business processes are aligned with inter-organisational collaboration functions and the impact of collaboration initiatives on the quality of the business process's outcomes. These assessments help to understand the effectiveness of the existing collaborative initiatives. This focus area's maturity is defined in each stage as follows. At the lowest level, the alignment of business processes with collaboration is non-existent, and there are no plans to consider such collaborative alignment in the short- or long-term. In the following stages, the maturity evolves from considering collaborative business processes for inclusion within medium and short-term goals to collaborative business processes that are partially existent and are included in an organisation's strategic goals and plans. In the highest maturity stage, collaborative business processes are implemented with continuous improvement to achieve the desired outcome (Campos et al., 2013).

The second focus area is the cost management process, which is rarely considered in the existing maturity models, although this is an essential factor in inter-organisational collaboration (Bukhsh et al., 2012). The cost management process indicators aim to assess organisational investment in supporting collaboration, cost-sharing, and the cost-benefits of collaboration processes. The maturity of the cost management process varies as follows. At low maturity levels, the cost management process of collaboration does not exist, and the cost of the collaboration process is high. In more advanced stages, the maturity evolves from the existence of cost management agreements and cost management process strategies to a cost-effective collaboration process with high satisfaction. There is continuous improvement in the cost management process, and actions will be taken to prevent cost-based problems in the collaborative process at the highest maturity level with well-established cost-effective collaborative processes (Alonso-Manzanedo et al., 2014; Bukhsh et al., 2012).

The third focus area under the process theme is collaboration process management which includes all the activities and procedures required for implementing efficient collaboration among organisations. It aims to assess the maturity level in a range of areas such as: the identification of collaborative needs in work planning; awareness of collaboration among employees; the attributes of partners as well as their relationships, the attributes of collaboration practices, the way collaboration is managed, and the nature of collaborative decision-making practices. The maturity level of collaboration process management can be assessed as follows. At the lowest level of maturity, collaboration processes and collaboration process management will not exist. In the following stages, the maturity level evolves from

having some form of informal written specifications for supporting collaboration activities to having a well-defined collaboration process with formal and written specifications for the collaborative process and its management. In the final stage, standard models for the collaborative processes exist that continue to be improved and taken into account in the company's short-and long-term plans for continuous improvement (Campos et al., 2013; Boughzala & De Vreede, 2015).

Similarly, the knowledge-sharing process area aims to assess maturity by identifying, extracting, storing, and exploiting the knowledge that facilitates efficient inter-organisational collaboration (Campos et al., 2013). The indicators under this focus area assess organisational collaboration maturity in terms of the following factors: how knowledge is shared among the collaborative members; how suitable methods and technologies are used to exchange knowledge; availability of a proper knowledge management system, including prevention measures for the exploitation of knowledge; the level of involvement of an organisation in terms of joint knowledge creation and knowledge validation and reuse. The maturity level in knowledge-sharing processes can evolve as follows. There is no concern for knowledge management within the organisation at the lowest maturity level. Subsequent maturity levels evolve from actively detecting knowledge management needs, considering tacit knowledge, and incorporating the development of a knowledge management system within the organisational plans to improve explicit knowledge capture and having a knowledge management system. At the highest maturity level, organisations will have a well-established knowledge management system and ongoing plans for continuous improvement (Campos et al., 2013; González-Rojas et al., 2016)

Finally, the information management process area assesses timeliness, accessibility, information collection and sharing procedures, and data security. Information usage among collaborative members is an essential factor in determining quality and long-term collaboration. Therefore, the degree of having standard procedures or rules and regulations for data management that helps to ensure the integrity of data usage and the confidentiality of shared data among collaborative members is considered an important indicator. The maturity levels of the information management process can be defined based on the following criteria. There are no identified information requirements and evidence of information sharing at the lowest maturity level. In the subsequent levels, maturity evolves from a slight appearance of identifying, defining, and sharing some information among some collaborative members to complete information requirements and information-sharing processes being identified,

defined, and accepted among all collaborative members. In the final stage, a high and satisfactory level of information sharing among collaborative members exists and continuously improves, and the intensive use of the information for decision-making can be seen (Alonso-Manzanedo et al., 2014; Cuenca et al., 2013).

2.5.3.2.3 Organisational System

The overall organisational system's maturity level is considered under three focus areas: organisational structure, culture, and strategy. Table 2-15 summarises the key indicators that can be used to assess each of these focus areas' maturity levels.

Table 2-15: Focus areas and indicators under the organisational system theme

Theme	Focus areas	Indicators
Organisa-tional system	Organisational structure	Degree of flexibility in organisational structures (Campos et al., 2013; Guédria et al., 2011)
		Level of defined documented structure with a clear hierarchy of allocated functions (including assigned roles and flexibility of jobs) (Campos et al., 2013)
	Strategy	Level of defined collaboration strategy as a part of the mission and vision statement (Awasthy et al., 2018; Campos et al., 2013; Schimpf & Christo, 2018)
		Degree of alignment of organisational strategy towards collaboration (Campos et al., 2013; Delgado et al., 2018; Ho et al., 2016)
		Level of employee-related strategies towards collaboration (Awasthy et al., 2018; Boughzala & De Vreede, 2015; Delgado et al., 2018; Ho et al., 2016)
		Level of defined collaboration level and type (Campos et al., 2013; De Soria et al., 2016; Alonso-Manzanedo et al., 2014; Cuenca et al., 2013)
	Culture	Level of trust (Alonso-Manzanedo et al., 2014; Boughzala et al., 2014; De Soria et al., 2016; Mäkelä & Virrantaus, 2013)
		Level of commitment and cooperation to collaborate (Alonso-Manzanedo et al., 2014)
		Level of organisational and managerial support for collaboration (Ho et al., 2016)
		Level of willingness to adapt to the organisational and technological changes required for collaboration (Campos et al., 2013)

The organisational system theme covers three focus areas: organisational structure, culture, and strategy. The organisational structure focus area helps to identify whether there is a well-

defined, flexible, and documented structure with a clear hierarchy and allocated functions for collaboration (Campos et al., 2013). Indicators under this theme assess the maturity of the organisational structure in inter-organisational collaboration. The first indicator is the flexibility of the organisational structure in terms of its agile nature to support the inter-organisational collaboration processes (Campos et al., 2013; Guédria et al., 2011). The second indicator is the availability of a defined documented structure with a clear hierarchy of allocated functions (including assigned roles and a definition of how the involvement of internal and external members of the organisation is managed in terms of collaboration) (Campos et al., 2013; Cuenca et al., 2013).

The nature of organisational structure will take different forms based on the maturity level. For example, no dedicated collaborative team or structure will exist at the lowest level of maturity, and responsibilities and authorities will not be defined. As the organisation progresses, the maturity level can evolve from having team members without clear leadership to a flexible organisational structure with well-defined dedicated leadership and team members. This will lead to having an inter-organisational collaborative structure with all members being informed about the task distribution and their power dependencies. At the highest level of maturity, there is a transformation to a clear dynamic and emergent flexible organisational structure with features of a networked organisation that encourages collaboration for working towards a common purpose with rapid learning and decision-making while motivating each other (Guédria et al., 2011).

Organisational strategy is another vital area under the theme of organisational systems. The study of Campos et al. (2013) argued that there is no reason for evaluating organisational collaboration maturity in an organisation where business strategies do not include fundamental collaboration strategies for improving collaboration. This focus area considers strategic organisational decisions taken by top management to enhance inter-organisational collaboration to assess the strategy aspects of establishing interoperability and collaborative culture in the organisation (Campos et al., 2013). Indicators under this theme include: (1) inclusion of a collaboration strategy as a part of the mission and vision statement to create the collaborative culture in the organisation that can be supported by top management (Awasthy et al., 2018; Campos et al., 2013; Schimpf & Christo, 2018); (2) the level of activities in identifying, defining and developing collaboration strategy decisions relating to the organisational business strategy, to technology usage and to resource investment decisions concerning collaboration requirements; (3) employee-related strategic decisions that include

incentive and reward arrangements for collaboration (Awasthy et al., 2018; Boughzala & De Vreede, 2015; Delgado et al., 2018; Ho et al., 2016; Campos et al., 2013); (4) definition of the type of collaboration and the degree of collaboration by using partnership contracts/collaborative agreements among members (Campos et al., 2013; De Soria et al., 2016) and defining the collaborative decision-making strategy (Alonso-Manzanedo et al., 2014; Cuenca et al., 2013).

This strategy maturity can vary based on the maturity level of an organisation. For example, at the lowest level of maturity, no collaboration-related strategic decisions or identification of potential collaborative values exist, and collaboration is not included in the short term or long-term goals. The maturity level of organisational collaboration strategy can initially evolve by establishing a common vision, shared objectives, and collaboration strategy development (without any agreements/contracts among the collaborative members) and then launching and implementing collaborative strategic decisions with well-formed contracts distributed among all the members. In the final maturity stage, the organisation will have continuous improvement in strategic decisions and long-term organisational strategic changes, linking to collaboration actions with short, mid and long-term objectives (Alonso-Manzanedo et al., 2014; Campos et al., 2013)

Organisational culture is another vital factor that influences the collaborative functions of organisations. These culture-related indicators are associated with trust, commitment, cooperation, management support and willingness to adapt. Although such culture-related indicators are essential, they have not been considered in most of the reviewed studies due to the difficulty in measuring such indicators as well as their sensitive nature (Hain & Back, 2011). The organisational maturity of the culture focus area can be measured in different stages as follows. At the lowest level of maturity, collaborative culture will not exist with an unwillingness to collaborate and unsupportive of collaboration. In the following stages, maturity will evolve from the organisational management taking active actions to create a collaborative culture to a culture that embodies collaboration. At the highest level of maturity, reciprocal trust, and willingness to adapt to changes will exist among the collaborative members, and a well-established collaborative culture is continuously looking to improve (Alonso-Manzanedo et al., 2014; Awasthy et al., 2018).

2.5.3.2.4 Technology

The technology theme aims to assess the maturity of information and communication technology (ICT), as shown in Table 2-16.

Table 2-16:Focus areas and indicators under the technology theme

Theme	Focus areas	Indicators
Technology	Information and communication technology	Level of usage of ICT resources for collaboration (Boughzala et al., 2014; Campos et al., 2013)
		Level of organisational interconnection within a common collaborative platform (Campos et al., 2013; Delgado et al., 2018; Fitterer & Rohner, 2010)
		Degree of interconnectivity and interoperability of available technology (Boughzala et al., 2014; González-Rojas et al., 2016)
		Selection and use of appropriate collaborative decision-making supporting tools (Gilman & Kuhn, 2012)
		Level of technology support for knowledge sharing (Boughzala et al., 2014; González-Rojas et al., 2016; Latif et al., 2016)
		Degree of useability of technology for collaboration (user friendly) (Boughzala et al., 2014)

The technology theme represents the focus area named information and communication technology which considers applications, data, and communication components to interconnect organisations seamlessly. This focus area considers aspects relating to data and services from the technological point of view as well as the supporting platforms and architectures (Campos et al., 2013). This theme includes six indicators that aim to assess the maturity of technology in supporting inter-organisational collaboration: the level of usage of ICT resources in the collaboration process for communication and system integration planning for collaboration (Boughzala et al., 2014; Campos et al., 2013; Awasthy et al., 2018; Boughzala & De Vreede, 2015; Campos et al., 2013; De Soria et al., 2016; Gilman & Kuhn, 2012; Guédria et al., 2011; Latif et al., 2016; Plomp & Batenburg, 2010); the use of a common digital platform that allows team members to work in a shared virtual space by overcoming any temporal and spatial limitations (Delgado et al., 2018; Mäkelä & Virrantaus, 2013); the level of organisational interconnection within a common collaborative platform (Campos et al., 2013; Delgado et al., 2018; Fitterer & Rohner, 2010); the degree of interconnectivity and the interoperability of the technology (González-Rojas et al., 2016) that includes the appropriateness and supportive nature of the selected technology for decision-

making and different collaborative needs (e.g. knowledge sharing); the use of social media, and the user-friendliness of the technology.

The information and communication technology maturity measures are defined in several stages. There are no ICT platforms capable of communicating with other organisations at the lowest maturity level, and tasks are carried out based on forms, documents and/or paper. In the following stages, maturity evolves from having systems that could connect with others with only a few ICT capacities and plans for the improvements (due to the unavailability of large investments) to having a mature system that supports the collaboration in a seamless manner. In the final stage, well-established information and communication technology platforms are available for collaboration, with continuous improvement built into planning and implementation (Campos et al., 2013; Delgado et al., 2018; Bukhsh et al., 2012)

2.5.3.2.5 *People*

The theme of people includes the focus area of collaborative staff. Its related indicators as shown in Table 2-17.

Table 2-17:Focus areas and indicators under the theme of people

Theme	Focus areas	Indicators
People	Collaborative characteristics of members (employees/partners)	Knowledge and capability of the collaborative members to fulfil the collaborative need (Awasthy et al., 2018; Boughzala et al., 2014; González-Rojas et al., 2016)
		Understand the value of collaboration and an awareness of collaborative needs (Awasthy et al., 2018); Boughzala et al., 2014)
		Availability of complementary skills and expertise (Boughzala et al., 2014)
		Attributes of the collaborative members (Alonso-Manzanedo et al., 2014; Boughzala & De Vreede, 2015). (Such as motivation, willingness, and the interpersonal skills of those who participate in inter-organisational collaboration processes (Campos et al., 2013; Awasthy et al., 2018; Boughzala et al., 2014); engagement and participation (Boughzala et al., 2014); level of shared understanding and relationship building (Delgado et al., 2018; Boughzala et al., 2014); level of interactivity and interdependence with other collaborative members (Boughzala et al., 2014; Latif et al., 2016)

The people theme aims to assess the maturity of the organisational employees engaged in inter-organisational collaboration. Attributes of the collaborative members are considered

important since their relationships and collective approach to decision-making can highly influence inter-organisational collaboration (Gazley, 2017; Provan & Kenis, 2008). Under the people theme, the following indicators are used: the level of competencies for collaboration; the level of understanding of the collaboration requirements and their value; the role of collaborative members and their background, and education and training levels; interpersonal skills of those who participate in inter-organisational collaboration processes; the attributes of collaborative members towards collaboration.

The maturity of the people's focus area varies as follows: at the initial stage, there is no proper structure or planning for training people and no desire to collaborate, and there is only an implicit or informal arrangement to improve people's desire to collaborate and motivate them. In the following stages, maturity evolves from considering the possibility of training and employees' motivation to having clear arrangements and plans for training and motivating employees to collaborate. In the final stage, plans for continuous training and mutual dependency among the collaborative members exist. Additionally, employees show a willingness to collaborate, and policies and incentives to encourage collaboration skills are available in the organisation (Alonso-Manzanedo et al., 2014; Campos et al., 2013; Awasthy et al., 2018).

In essence, this study analysed the contemporary maturity models that have been developed to assess the maturity of various aspects of inter-organisational collaboration. The study found that the key themes that are considered in maturity models are the extent to which: the policies and governance arrangements support collaboration from the administrative perspective; organisational systems are capable of nurturing collaboration by having a positive organisational culture, organisational structure, and a collaboration strategy; the organisations have consciously aligned their business processes, cost management processes, collaboration process management, knowledge sharing processes and information management to support inter-organisational collaboration; organisations have aligned their information and technology implementation aligned to collaboration needs.; and the employees of organisations who can collaborate effectively.

Furthermore, it is observed that the current maturity models published in the literature have been developed to serve different application domains. As a result, the names used for maturity levels and the definition of maturity level vary from one context to another to reflect their purpose. The study identified 46 indicators for measuring maturity levels in 12 focus

areas. These indicators, synthesised from existing literature, provide a solid foundation for assessing how satisfactory a collaboration is within a given inter-organisational context and how to provide a pathway to improving the collaboration maturity through continuous improvements.

2.6 Theoretical framework of the study

This study conducted three systematic literature reviews and accordingly identified three things as follows:

1. State of art of barriers and enablers of stakeholder collaboration in risk sensitive urban planning
2. The features and inter organisational collaboration structure that can foster collaboration among stakeholders
3. Indicators, maturity levels, and attributes of the indicators that vary against each maturity level

This study identified several gaps in the existing literature. For example, it found that there is no identification of the driving barriers and root causes of the barriers that lead to a lack of stakeholder collaboration. Furthermore, existing studies are lacking in providing a suitable inter-organisational collaboration structure and features as a collaborative governance structure to facilitate stakeholder collaboration in RSUP. Moreover, there is a gap in the availability of a tool that can facilitate stakeholders to understand their stakeholder collaboration context and guide them to enhance their collaboration maturity. Furthermore, the study identified existing studies that are lacking in identify and propose policy requirements in the RSUP.

The finding of study highlights the importance of filling these gaps to enhance the stakeholder collaboration in RSUP. The Figure 2.8 presents a theoretical framework that synthesis and organise the research findings. This theoretical framework has been used as the basis for formulating the research methodology for empirical data collection for answerring ther research questions specified in Chapter 1.

Figure 2-8: Theoretical framework of the study

2.7 Summary

This chapter provides a comprehensive literature review of the study area which is required to achieve the research objectives. In this chapter, twelve barrier themes have been identified under five main categories.. Among them, administrative barriers are identified as the driving barriers which lead to other barriers. Furthermore, through an in-depth investigation of the policy requirements and the limitations of the policy development process, the study found that current policies and laws do not support stakeholder collaboration in RSUP. Because of the ineffective development of policies and legislation that overlooked a system thinking approach and collaborative reviews.-The collaborative policy reviews help to create sectoral policies and laws with coherence to implement collaborative RSUP.

The study further found that hybrid form of hierarchy and network structures are suitable for facilitating stakeholder collaboration with vertical and horizontal integration which leads to coordination among organisations across various administrative scales and sectoral boundaries. Moreover, a decentralised approach is essential for stakeholders to collaborate effectively and make decisions where required. Equally, neutral leadership is also important to provide equality among stakeholders and to avoid the influence of dominant stakeholders.

Finally, this study analysed the interorganisational collaboration maturity models to identify the levels that can represent collaboration maturity and the indicators required to assess the collaboration maturity levels of organisations in terms of interorganisational collaboration. As a result, the study found that existing models consist of a various number of maturity levels that are suitable for their contextual requirements and there are no models available to assess the interorganisational collaboration maturity in the RSUP context. Moreover, the study identified and classified indicators to assess collaboration maturity under five themes as follows: administrative environment; organisational system; process; technology, and people. The following chapter presents the holistic research methodology adopted in this study to achieve the research aim and objectives.

3 Research methodology

3.1 Introduction

The research methods utilised in this study to achieve the aim and objectives are clearly explained in this chapter alongside a justification of their choice. The philosophical stance, the research approach, the methodological choice, the strategies, the time horizon of the research, and the tool and techniques used in this study are presented in subsections. In addition, this chapter outlines the sampling strategies, the data collection aspects, and the validity and reliability of the research design and findings.

3.2 Research methodology

The research methods that were followed for the empirical study of the research were developed on the basis of the 'research onion" model of Saunders et al., (2019), as showed in Figure 3-1. This research onion helps to understand the methodological choice, the strategy, and the research techniques based on the selected philosophical stance.

Figure 3-1: Research Onion

Source: (Saunders et al., 2019)

3.2.1 Type of the research

Exploratory, explanatory and descriptive are the three categories of scientific research (Bhattacherjee, 2012; Saunders et al., 2019). According to Bhattacherjee (2012), exploratory research is frequently carried out in new fields of inquiry with the following objectives: (1) to determine the size or breadth of a specific phenomenon, issue, or behaviour, (2) to produce some preliminary theories (or "hunches") regarding that phenomenon, and (3) to determine whether it would be feasible to carry out a more thorough investigation of that phenomenon. According to Saunders et al. (2019), exploratory research provides an opportunity for the direction to shift in response to new information or understanding. Descriptive research accurately depicts a condition or phenomenon (Robson, 2002). Making thorough observations and thoroughly documenting interesting phenomena is the goal of descriptive research. These observations must follow a scientific method (i.e., they must be repeatable, accurate, etc.) to make them more trustworthy (Bhattacherjee, 2012).

Explanatory research aims to explain observed occurrences, issues, or behaviours. It looks for answers to why and how questions, whereas descriptive research looks at a phenomenon's what, where, and when. Identifying the causes and effects of the target phenomenon aims to "connect the dots" in research (Bhattacherjee, 2012). While analysing the research problem, explanatory studies formulate the relationships between variables. This makes it possible to apply statistical tests, such as correlation, to analyse the relationships more thoroughly. Alternatively, qualitative information might be acquired to explain the relationship between two variables (Saunders et al., 2019). Bhattacherjee (2012) further stated that although some exploratory and/or descriptive research may also be required in the early stages of academic research, explanatory research makes up the majority of academic or doctorate research.

The study presented in this thesis aims to understand the stakeholder collaboration context and establish the connections among barriers to such collaboration using a causal loop diagram, adopting a system thinking approach that provides a glance at the cause and effect of the barriers. Furthermore, the study identifies how these barriers influence each other and, altogether, influence the system. The study also aims to establish suitable enablers alongside the identified barriers and proposes solutions to overcome the barriers. Moreover, the study aims to establish a relationship between the organisational collaboration maturity levels and organisational collaboration maturity indicators and proposes a maturity grid to assess organisational maturity and provide a pathway to enhance stakeholder collaboration. Thus, it

is apparent that the current research observes the occurrences, issues, or behaviours of the phenomena in detail by identifying the causes and effects of the target phenomenon. Therefore, the current research falls under the explanatory research category.

3.2.2 Philosophical stance

Positivism and interpretivism (social constructionism) are considered the two key research philosophies and are positioned at two ends of a continuum (Easterby-Smith et al., 2002). Positivism is based on an ontological assumption of reality and has a predetermined feature. This can also be called "realism" (Jonson & Duberly, 2000) or "objectivism" (Saunders et al., 2016). As opposed to positivism, interpretivism is based on the ontological assumption that reality has no predetermined feature, and everything is created by a human's perceptions, opinions, and beliefs. This can also be called "idealism" (Gummesson, 2000) or "subjectivism" (Saunders et al., 2019). Further interpretivism includes the epistemological assumption which believes that reality can be measured and determined subjectively via the insights of individuals (Collis and Hussey, 2013; Easterby-Smith et al., 2002). Interpretivism considers humans' different perceptions and beliefs which permits the researcher to integrate with the research atmosphere, contrasting with positivism.

In the research onion, the first outer layer helps to select the appropriate philosophical stance of a study. The following subsections discuss the assumptions that help to determine the philosophical stance of a study by identifying the ways in which the research questions will be addressed.

3.2.2.1   Ontological Assumptions

The ontological assumption deals with the nature of reality (Saunders et al., 2016) and discusses how the researcher sees the world (Bhattacherjee, 2012). Realism and idealism are two extremes of the ontological assumption continuum (Pathirage et al.,2008). Realism represents the ontological assumption that reality has a predetermined features and that it is independent of people's will, such as the opinions and experiences of people (Johnson & Duberly, 2000). In contrast, idealism represents the ontological assumption that reality does not have predetermined features and that depends on people's will (such as opinions and experiences) and that they can perceive reality in different ways (Saunders et al., 2016; Gummesson, 2000).

Since the current study involves identifying and validating the ways of enhancing stakeholder collaboration in risk-sensitive urban planning with the involvement of experts who have knowledge and experience in RSUP, this study applies the ontological assumption of idealism where reality can be perceived in different ways based on the will of people.

3.2.2.2 Epistemological Assumption

Epistemology refers to the assumption about knowledge (Saunders et al., 2016). It includes the researcher's beliefs about the best ways to study the world or the way of obtaining recognised knowledge (Bhattacherjee, 2012; Saunders et al., 2016). Positivism and social constructivism are two extremes of the epistemological assumption continuum (Pathirage et al.,2008). Positivism represents the epistemological assumption that the researcher believes that reality must be understood, determined, or measured through objective measures instead of through people's beliefs and perceptions (Easterby-Smith et al., 2002). Positivism incorporates the deductive approach. Social constructivism represents the epistemological assumption that the researcher believes reality is understood, determined, or measured by people's beliefs and perceptions instead of using objective measures (Easterby-Smith et al., 2002). In addition to this, social constructivism adopts people's various perceptions and meanings based on their experiences.

Since this research involves experts in risk-sensitive urban planning and approaches the solution through stakeholders' understanding and narratives, this study applies the epistemological assumption of social constructivism.

3.2.2.3 Axiological Assumption

Axiology refers to the value attached to knowledge by a researcher (Saunders et al., 2016). This axiological choice has two extremes: value-free and value-laden. The value-free assumption believes that the researcher needs to be unquestionably independent about the data as well as any interpretations of the data. Moreover, the researcher does not have any influence on the research findings, utilising objective criteria and without any researcher input. In contrast, the value-laden assumption believes that the researcher influences the data and the interpretation of the data as well as being a part of the discussion or the arguments put forward because of the human beliefs and experiences of the researcher (Saunders et al., 2019; Easterby-Smith et al., 2002).

Since this study, and the researcher, intend to understand stakeholders' narratives regarding enhancing stakeholder collaboration in risk-sensitive urban planning (and the researcher's

input takes place by interpreting the understanding of the research area) and the study includes qualitative data analysis that heavily depends on the researcher's skills and knowledge, then the axiological assumption of this study is value-laden.

According to the above discussion on philosophical stance, this research's philosophical stance is interpretivism with the ontology assumption of idealism, the epistemological assumption of social constructivism, and the axiological assumption of value-laden (Saunders et al., 2016).

3.2.3 Research approach to theory development

The second layer of the research onion provides guidance for the research approach. Induction, deduction, and abduction are the three research approaches relating to theory development. The two-extreme approach for research based on a research question is theory testing and theory building (Saunders et al., 2019). The deductive approach is used to verify or test a theory based on logically derived evidence which means that a hypothesis relating to an existing theory is evaluated using data collection (Saunders et al., 2019). An inductive approach is used for theory generation or for building with logical evidence, which means data collection is used for theory building, including exploring the phenomenon, identifying themes, and creating a framework (Saunders et al., 2019). In addition to these two main approaches, another approach is called abductive, which combines deduction and induction. As an alternative to testing theory (deduction) and developing theory (induction), the abductive approach moves back and forth between the two (Suddaby, 2006; Saunders et al., 2019). Easterby-Smith et al. (2012) suggested that the selection of an appropriate theory development approach will help to develop a suitable research design, strategy, and methodological choice.

This study's requirement covers theory development and modification. Therefore, this study adopts the abductive approach since it enables the researcher to move back and forth between the induction and deduction approaches (Saunders et al., 2019).

3.2.4 Methodological choice

The third layer of the research onion indicates the methodological choice. This layer represents the choice of selecting qualitative, quantitative, or mixed methods' approaches. Quantitative research mostly includes questionnaire surveys as a data collection technique

and uses graphical or statistical data analysis methods which can obtain the required information from numerical data (Saunders et al., 2016). In contrast, qualitative research includes interviews as a main data collection technique and utilises an analysis of the data by categorising the outcomes from the interviews. This method helps to retrieve information from non-numerical data. The mixed methods' approach involves both quantitative and qualitative methods. The complex mixed methods' approach allows for the analysing of qualitative data using quantitative techniques or vice versa (Saunders et al., 2019). This methodological choice includes the choices regarding research strategy and data collection techniques.

This research follows the philosophical stance as interpretivism and the abductive theory development approach using interview as a qualitative data collection method. Therefore, this study relies on the mono-method qualitative method to achieve the study's aim and to gain a better understanding of the research area.

3.2.5 Research strategies

The fourth layer of the research onion indicates the research strategy selection for the study. This layer contains research strategies such as surveys, experiments, case studies, action research, ethnography, grounded theory, archival research, and narrative enquiry. A researcher can adopt more than one research strategy in their research design based on their research question (Saunders et al., 2016). Different authors state that selecting these research strategies is connected with the study's philosophical stance and theory development approach (Creswell, 2009; Saunders et al., 2016; Yin, 2014). In the social science research context, experiments, surveys, ethnographies, case studies, and grounded theory are known to be the most commonly used research strategies (Creswell, 2009).

An experimental study mainly involves experimenting with predictions or assumptions rather than utilising research questions. In an experimental study, the researcher tests whether the developed hypothesis is true or not; additionally, whether there are any relationships or not between the variables (Saunders et al., 2016). However, this study expects to have a broad understanding of stakeholder collaboration in risk-sensitive urban development in an uncontrolled environment. Therefore, the experimental method is not suitable for this study. The ethnography strategy is widely used to understand cultural or social groups over long periods (Creswell, 2009; Saunders et al., 2016). Thus, since ethnography needs a prolonged

time to collect data in order to understand and analyse lived reality, this strategy is unsuitable for this study. Grounded theory is a theory that develops inductively from a data set (Saunders et al., 2016). Since this study uses existing literature alongside the abductive approach, the grounded theory strategy is unsuitable. A case study strategy is used to obtain a comprehensive, deep, and detailed inquiry about a research topic in a real-life context (Saunders et al., 2016). Moreover, a case study approach is widely used to address research questions beginning with "how" and "why" with a focus on current events without any control by the researcher. In a case study, the case will be selected based on the requirement of the study to collect data (Yin, 2014). This study focuses on a deep understanding of the research problem in Sri Lanka as a case including answering "how" type questions.

Survey research is used to understand and collect data, which are mostly unobservable, about people, their preferences, thoughts, and behaviours; it systematically involves questionnaires and interviews as common data collection techniques (Bhattacherjee, 2012). Bhattacherjee (2012) discussed the strengths of the survey approach, namely, firstly, the survey strategy is ideally suited for a very large population such as an entire country; secondly, this method is a more efficient method than other methods in terms of researcher time, cost, and effort. Since this study intends to obtain a deep understanding of the research problem using qualitative data considering Sri Lanka as a case, the survey strategy is not suitable for this study.

3.2.6 Time horizon

The fifth layer of the research onion indicates the time horizon of the study, and it is categorised into two types. The first, cross-sectional, involves capturing or observing the data at a certain or specific time, thus a "snapshot" perspective. The second, longitudinal, involves a long period of study which can observe change over time, like a "diary" perspective. Cross-sectional studies are mostly used in survey strategies as well as in mixed methods' methodology in the case study strategy. Thus, since this study focuses on the current situation and does not use a long observation over time and adopts a case study strategy to capture the data at a specific time, this study adopts the cross-sectional time horizon.

3.2.7 Research techniques

The core and sixth layer of the research onion indicates data collection and data analysis techniques. These techniques depend on the selected research strategy. Since this research adopts a case study strategy, the key data collection technique that is used is interviews. The

data collection techniques and the data analysis methods adopted in this study are discussed in the following subsections in detail.

3.2.7.1 Data Collection Techniques.

The data collection techniques utilised in this study were a systematised literature review, document review, semi-structured interviews to gather data to fulfil the objectives of the study.

3.2.7.1.1 *Systematised literature review*

This study adopted a systematised literature review for the secondary data collection to fulfil the objectives. The systematised literature review is a well-established methodology for reviewing the existing literature in a systematic way. Grant and Booth (2009) stated "Systematised reviews attempt to include one or more elements of the systematic review while stopping short of claiming that the resultant output is a systematic review." Furthermore, this method suits researchers who have limited resources for implementing systematic reviews which involve more than two reviewers. The systematised review consists of several steps to conduct the literature review effectively in a systematic way. These steps are: formulate the research question, develop key search terms, establish the inclusion criteria and exclusion criteria, determine the databases for search, screen publications based on the title and abstract by relevance checking, conduct full-text screening, identify and add new literature from a manual search (if any), synthesise the findings, and document the findings (Grant & Booth, 2009). The systemised literature review steps adopted in this study are shown in section 2.2, section 2.3, and section 2.5.

3.2.7.1.2 *Semi-structured interviews*

A semi-structured interview provides an excellent opportunity to collect all relevant information from interviewees in a flexible manner. Even though the interviewer has predefined questions to elicit the relevant knowledge from the interviewees, a semi-structured interview conversation allows the interviewee to explore and share their knowledge on an area they feel is important (Longhurst, 2003). Semi-structured interviews were conducted in this study to verify the literature findings as well as to gain new knowledge on various aspects such as the barriers and enablers for stakeholder collaboration in RSUP, an adequate inter-organisational collaboration structure, and a policy development approach for collaborative RSUP. Flick (2018) states that the experts synthesise technical and process knowledge with facts concerning the research question. In this context, Littig and Pöchhacker

(2014) stated that the definition of an expert depends on the research design, interaction situation, and the interviewing process. Accordingly, the study selected experts based on their technical and process knowledge in RSUP with at least five years of experience. Data saturation in qualitative studies can be assessed using code saturation and meaning saturation (Hennink, Kaiser, & Marconi, 2017). Accordingly, 20 expert interviews were conducted, where code saturation was reached in eight interviews, and 17 interviews were needed to reach the meaning saturation.

3.2.7.1.3 *Document review*

Document analysis or document review is a data collection method that can be used as a stand-alone method and is generally used with other qualitative data collection methods as a norm for triangulation (Denzin, 1970; Bowen, 2009). Document review was an efficient data collection technique for this study since it is cost-effective, and the documents were readily available and studying them took up relatively little time (Bowen, 2009). Merriam (1988) pointed out that all types of documents can help a researcher to uncover meaning, develop understanding and discover insights relevant to the research problem. Non-technical literature, such as reports and internal correspondence, is also a potential source of empirical data (Mills et al., 2006). Therefore, this study adopted document review as an additional data collection method to understand the stakeholder collaboration context in Sri Lanka by reviewing national policies and legislation, gazetted urban plans, national reports, and publications. Authenticity, trustworthiness, representativeness, and meaning are characteristics that determine the quality of the documents that are chosen for review (Scott.J, 1990). This study satisfied the quality criteria of the document review by reviewing documents that are gazetted and published by the Sri Lankan government and by authorised bodies that are available for public information and review. Therefore, all the documents came from trustworthy sources and contained clear and intelligible data that were representable and meaningful.

3.2.7.2 **Data Analysis**

This study adopted qualitative data analysis techniques to find the desired outcomes. Qualitative data analysis heavily depends on a researcher's knowledge and analytical skills (Bhattacherjee, 2012). In this study, the qualitative data, collected from the semi-structured interviews and document review, were analysed using two data analysis techniques: (1) thematic analysis, and (2) causal loop diagram analysis as a system thinking approach.

3.2.7.2.1 *Thematic analysis*

Thematic analysis is an independent qualitative descriptive approach and is known as a method that helps to identify, analyse and report patterns or themes within data (Braun & Clarke, 2006; Vaismoradi et al., 2013). Thematic analysis can be used in both inductive and deductive methodologies (Mihas, 2023; Hayes 1997). Thus, this study adopted thematic analysis (as a key data analysis method) to analyse the primary data to reach the desired research outcome. The computer-aided coding and analysis were conducted in this study using MAXQDA software. (An example of the codes and the themes' generation process is presented in Appendix H: Example of themes generation).

3.2.7.2.2 *Causal loop diagram analysis as a systems' thinking approach.*

Systems thinking is a concept for understanding how causal relationships and feedback work in a system and help to analyse, sort out, and explain cause and effect and how the changes come temporarily and spatially (Haraldsson, 2004). In such a context, causal loop diagrams (CLDs) are a powerful tool for representing the feedback structure of complex systems that help to elicit and capture the mental models of individuals or teams, making them a valuable tool for facilitating collaborative problem-solving. By visualising the causal relationships between different system elements, CLDs can help identify the root causes of problems and potential interventions to improve system performance (Sterman, 2002). Furthermore, Sterman (2002) emphasised the importance of systems thinking and causal mapping in identifying the underlying feedback structures of complex systems and using this understanding to inform policy decisions. Thus, this study adopted the causal loop diagram as one of the analysis tools to identify the required policy changes to enhance stakeholder collaboration in RSUP.

3.3 Validity of the research

The validity of any research is critical to ensuring its overall quality. The quality of a research design adopted in a study can be assessed by applying criteria to improve the study's validity, authenticity, reliability or trustworthiness (Saunders et al., 2016) (Lincoln & Guba, 1986). Lincoln and Guba (1986) and Yin (2003) suggested four measures to assess the authenticity and trustworthiness of qualitative research, namely credibility, transferability, dependability, and confirmability. These are the alternative terms suggested for the naturalistic paradigm generally used in social science research studies, parallel to the terminologies used in the

conventional paradigm: internal validity, external validity, reliability, and objectivity. The following section explains the quality of the research design that ensures the validity of this study.

3.3.1 Credibility

According to Lincoln and Guba (1986) and Moon et al. (2016), the credibility of any research is represented by to what extent the research study represents the actual value or real meaning of the research participants or to which degree the true value of a participant's input is presented in the research study. To improve the credibility of a research study, various techniques can be applied in the research study including triangulation, persistent observation, prolonged engagement, peer debriefing, negative case analysis, and member checks (Lincoln & Guba, 1986; Moon et al., 2016). Table 3-1:Application of techniques utilised to search for the study's credibility.Table 3-1 shows the adaptation of the techniques utilised to obtain this study's credibility based on Lincoln and Guba (1986).

Qualitative researchers are expected to employ multiple data sources and research techniques (at least two), including interviews, observation, document analysis and physical artefacts, to minimise potential biases by correlating findings across data and by analysing the information gathered using diverse approaches that enhance the validity and reliability of qualitative research (Bowen, 2009; Yin, 1994). Harris and Brown (2010) suggested that using more than one data collection technique can help achieve data triangulation, confirming the research's construct and internal and external validity. Using multiple methods to collect data, researchers can compare and contrast the findings to ensure that they are consistent and accurate and that any biases or errors do not occur.

Table 3-1:Application of techniques utilised to search for the study's credibility.

No	Techniques	Description	Adaptation in the study
01	Prolonged engagement and persistence observation	Concentrated observation and prolonged contact with research participants to assess the possibility of bias and to gather the accurate data given by the respondents	1. Main data collection techniques such as semi-structured interviews were conducted to capture all the relevant information from the respondents with prolonged contact (Around 1.5 – 3 hours per person). 2. The researcher recorded the sessions with the permission of the participants and wrote a clear transcript for the data analysis to

No	Techniques	Description	Adaptation in the study
			avoid mistakes in understanding the given data.
			3. A pilot survey was conducted with the first few interviewees to make sure the questions were clear and to ensure that it was possible to obtain appropriate answers from the respondents, thus avoiding any misunderstandings.
			4. The researcher encouraged the participants to answer in all relevant ways with elaboration and examples and to act to avoid bias in answers (if observed).
			5. Semi-structured interviews were conducted until data saturation was reached. (This study conducted 20 interviews with national and local level experts until data saturation was reached, hence providing a complete picture of the RSUP context in Sri Lanka.)
02	Triangulation	Cross-checking the data by applying different methods and sources at various times and/or using various investigators	1. This study adopted a strong methodology which included multiple data collection techniques: literature review, document review, and semi-structured interviews.
			2. This study adopted different data analysis methods such as thematic analysis and a causal loop diagram to fulfil the research objectives.
			3. This study conducted data collection and data analysis in different phases to achieve the study's objectives.
			4. In addition to the researcher, two supervisors provided guidance to improve the research outcomes of this study.
03	Member checks	Members of the study or the research participants were given the research findings to cross-check whether the data given by them can be understood.	1. Experts in the Sri Lankan context verified all the study outcomes, including the participants who contributed to developing the outcomes.

3.3.2 Transferability

Transferability, a form of the study's external validity, indicates the extent to which the study's findings can be applicable or useful for future research or applied in a similar context elsewhere (Lincoln & Guba, 1986; Moon et al., 2016). This transferability requires a thick description of the research context, and this strong description helps readers to apply the findings in a similar context. Therefore, it is vital to provide complete details of the research context. The following table shows the adaptation of the techniques that indicate the scope of the study's transferability based on Lincoln and Guba (1986). Table 3-2 shows the application of those techniques in this research study.

Table 3-2:Application of techniques to indicate the scope of the study's transferability.

No	Techniques	Description	Adaptation in the study
1.	Thick description	A solid and precise description of the research context must be provided to help readers apply the findings in a similar context.	1. This study provides a clear and comprehensive description of the Sri Lankan context in terms of policies and legislative background, governance arrangements, and country profile in terms of economic and social aspects, urbanisation trends etc. This description can help readers understand and apply the findings to similar contexts or modify the findings according to their contextual needs. 2. The study further provides valuable findings from the literature reviews from the global context (including emerging economies) that the readers can use to apply according to their contextual need. 3. The study provides a strong methodology to enhance stakeholder collaboration in RSUP. This methodology can be applied in any context to enhance stakeholder collaboration in RSUP.
2.	Expert validation	The study outcomes need to be tested for their applicability.	1. The study outcomes were validated by the experts.

3.3.3 Dependability

Dependability indicates the degree to which a study's findings would constantly repeat without any changes when the study is replicated with the same participants and in the same context (Guba, 1981; Moon et al., 2016). According to Lincoln and Guba (1986), conducting an external audit by hiring an external party helps to make a dependability judgement. Moreover, according to Shenton (2004), Polit & Beck (2006) and Streubert-Speziale and Carpenter (2007), as cited in Moon et al. (2016), a researcher needs to correctly record and document all the procedures and research methods followed in the study to provide a clear understanding to enable the readers to assess the dependability of the study. This detailed explanation of the methodology will increase the dependability of the study. Table 3-3 shows the utilisation of the techniques to ensure the study's credibility based on Lincoln and Guba (1986) and Moon et al. (2016).

Table 3-3:Application of techniques to ensure the study's dependability.

No	Techniques	Description	Adaptation in the study
1.	External audit	The external auditor will assess the study and provide judgement on the dependability of the study.	1. This study did not hire an external auditor to provide judgement. However, this study was guided by two supervisors to follow a robust and clear methodology which can increase the dependability of the study.
2.	Record and documentation of methodology	Providing a clear understanding for readers on the methodology will increase the dependency on the study.	2. This study explains all the methods and procedures followed in this study in terms of literature review, data collection, and data analysis within the relevant sections.

3.3.4 Confirmability

Confirmability indicates the level to which the research findings are purely dependent on the participants' contributions without a researcher's influence, bias, or interest (Guba, 1981; Moon et al., 2016). To assist in ensuring the confirmability of a study, Lincoln and Guba (1986) suggested an external audit, as discussed in section 3.3.3, as a technique that provides the opportunity to assess the consistency of the findings while replicating the data analysis. Therefore, external audits help to judge any bias incurred by the researcher in the study. Furthermore, a clear demonstration of the data analysis and findings that were utilised to deliver the conclusions will provide transparency in providing a data analysis without bias

and will help readers judge the study's confirmability (Moon et al., 2016). Table 3-4 shows the application of the techniques used to reach the study's credibility based on Lincoln and Guba (1986) and Moon et al. (2016).

Table 3-4:Application of techniques to ensure the study's confirmability.

No	Techniques	Description	Adaptation in the study
1.	External audit	The external auditor will assess the study and provide a judgement on the confirmability of the study.	1. This study did not hire an external auditor to provide judgement. However, this study was guided by two supervisors to follow transparent data analysis techniques with proper interpretations that were utilised to provide the conclusions which increased the confirmability of the study. 2. The researcher conducted a member check, as described in Table 3-1 to ensure the study's findings interpreted the accurate data received from the participants.
2.	Record and documentation of the findings; analysis towards the conclusion	Providing a clear understanding for the readers on the methodology will increase the confirmability of the study	1. This study explained all the procedures followed in the data collection, and in the analysis utilised to obtain the conclusions. 2. The researcher was vigilant to avoid bias in this study with regard to the interpretation of research findings.

3.4 Research ethics

The study was conducted under the University of Salford's ethics' code requirements and the UK Research Registry Office regulations for studies involving humans and was approved by the Science and Technology Research Ethics Panel of the University of Salford under application ID 3154 and date of approval: 1 October 2021. (See Appendix G: Evidence of ethical approval)

3.5 Summary

This chapter provided details on the research design of the study. Firstly, justification was provided for the selected philosophical stance of the study. Then, the theory development

approach, the methodological choice, the research strategy, the time horizon, and the data collection and analysis techniques were discussed in detail. In addition, this chapter provided an overall view on the quality of the study's research design that representing the trustworthiness and authenticity of the study. The next chapter presents a justification for the context selection, a profile of Sri Lanka, and comprehensive information on the current administration, governance, collaborative RSUP context and culture. Additionally, the following chapter will present the contextual part of the document review findings from existing policies and legislations, from the review of urban plans, and the stakeholder analysis

4 Sri Lanka as a Case study

4.1 Introduction

This chapter represents Sri Lanka as the case study context. Various contextual aspects such as the country profile of Sri Lanka, the definition of urban and urbanisation in Sri Lanka, the importance of stakeholder collaboration in RSUP in Sri Lanka, RSUP-related laws and policies in Sri Lanka, Sri Lankan urban planning administrative system, and stakeholder analysis in Sri Lankan risk-sensitive urban planning are discussed in this chapter in detail.

Figure 4-1: Sri Lanka

Source: (World Atlas, 2022)

Geographical data of Sri Lanka: Sri Lanka is an island located in the Indian Ocean, South Asia. Sri Lanka's total area is 65,610 sq. km, including 64,630 sq. km of land and 980 sq. km of water (lakes etc.). Sri Lanka has biodiversity and a robust ecosystem, including rainforest, freshwater lakes, rivers, grasslands, and coastal and marine habitats (Central Intelligence Agency [CIA], 2022).

The climate conditions of Sri Lanka: The key determinants of the Sri Lankan weather conditions are tropical monsoons, namely northeast monsoons for the four months' period

from December, and southwest monsoons for the five months' period from June. (CIA, 2022).

Natural resources and land use: Available natural resources in Sri Lanka are valuable gems, limestone, mineral sands, graphite, phosphates, clay, hydropower from water sources, and arable land for cultivation. According to a 2018 estimate, Sri Lanka consists of 43.5% of agricultural land, 20.7% of arable land, 15.8% of permanent crops, 7% of permanent pasture, 29.4% forest, and 27.1% of other areas. Moreover, the irrigated land area in Sri Lanka is reported as 5,700 sq. km (2012) (CIA, 2022).

Ethnic groups and official languages: According to a 2012 estimate the ethnic population of Sri Lanka is made up as follows: 74.9% Sinhalese, 11.2% Sri Lankan Tamils, 4.2% Indian Tamils, 9.2% Sri Lankan Moors, and 0.5% of other groups. Tamil and Sinhala languages are considered to be the country's national languages (CIA, 2022).

Environmental issues: Sri Lanka is currently facing several environmental problems, such as freshwater source pollution due to improper industrial waste management, air pollution especially in the capital city of Sri Lanka, deforestation due to urbanisation, soil erosion and coastal area degradation due to pollution and mining (CIA, 2022).

Religions: According to a 2012 estimate (CIA, 2022), the religions in Sri Lanka are Buddhist (70.2%), Hindu (12.6%), Muslim (9.7%), Roman Catholic (6.1%), other Christian faiths (1.3%), and other faiths (0.05%).

Legal system: Sri Lanka received independence on the 4th of February 1948 and followed a combined legal system that is influenced by Roman-Dutch civil law, Jaffna Tamil customary law, English common law, and Muslim personal law. Sri Lanka does not participate in any international law organisations (CIA, 2022).

Economic condition: The Sri Lankan economy mainly depends on agriculture, the export of rubber, tea, coconuts, tobacco, shipping, textiles, information technology services, construction and tourism (CIA, 2022). Sri Lanka's real Gross domestic product (GDP) per capita is $3,474. The actual GDP growth rate in 2022 was reported as -7.8% (Central Bank of Sri Lanka [CBSL], 2022).

Population and its distribution: Sri Lanka has a population of about 23 million based on the estimation in July 2021, and its growth is estimated at 0.63%. The population's median

age is considered to be 33.7 years in total, with 32.3 years for males and 35.1 years for females. The average life expectancy is 77.75 years (CIA, 2022). .

Form of government: Sri Lanka is a democratic republic.

4.2 Definition of "Urban" in Sri Lanka

There are two kinds of approaches available in Sri Lanka to define the urban area. An early urban and rural area classification in Sri Lanka was based on local government authorities according to their administrative purpose as follows: village councils, town councils (TC), urban councils (UC), and municipal councils (MC) (Weeraratne, 2016). According to this classification, until 1987, before the 13th Amendment of the constitution, an urban sector in Sri Lanka covered municipal councils, urban councils, and town councils. However, according to the 13th Amendment, town councils were eliminated as a classification in this listing and included under the Predesiya Sabas (village councils). Moreover, the authority of the local governments was transferred to the provincial councils from the central government. The Grama Niladhari Division (GND) (a sub-unit of a divisional secretariat) was created under the divisional secretariat which is under the district secretariat and connected to the central government. Because of the inclusion of town councils into Predesiya Saba, the urban population dropped from 21.5% in 1981 to 13.1% in 2001. In addition to this approach, according to the Urban Development Authority Law No. 41 of 1978, a relevant minister can declare areas as urban areas according to his/her opinion for development purposes (Weeraratne, 2016). Therefore, some areas which were classified as rural areas were also simultaneously declared as urban areas. In 2022, the Urban Development Authority (UDA) classified 273 local authorities as urban areas out of 341 local authorities, which included 8,140 GND areas (Urban Development Authority [UDA], 2022), as shown in Table 4-1.

Table 4-1: Local authorities declared under the Urban Development Authority (UDA)

Local Authorities	Total local authorities (LA)	Declared local authorities under UDA	GND
Municipal councils	24	24	712
Urban councils	41	41	514
Predesiya Sabas (Village councils)	276	208	6914
Total	341	273	8140

(Source: UDA, 2022)

Therefore, the current administrative urban definition in Sri Lanka has limitations in that it does not capture the dynamism of urbanisation in Sri Lanka. To overcome this limitation, the study by Weeraratne, (2016) suggested policymakers should redefine the definition of an urban area as "If a GND has a minimum population of 750 persons, a population density greater than 500 persons per km^2, firewood dependence of less than 95% households, and well water dependence of less than 95% households, such a GND is defined as an urban area" (Weeraratne, 2016, p. 10). According to this definition, 3,659 GND divisions have been identified as urban areas and 43.8% of the national population are living in urban areas. This clearly shows the issues in the current urban area classification. Furthermore, the Ministry of Housing & Construction (2015) highlighted the housing and sustainable urban development issue in Sri Lanka. The Report for the Third United Nations Conference on Human Settlements-Habitat III stated that the defining of urban and urbanisation has issues in Sri Lanka and is considered a future challenge for the country (Ministry of Housing & Construction, 2015).

4.3 Urbanisations in Sri Lanka

Urbanisation provides massive opportunities for economic development as well as causing unavoidable consequences and, therefore, the subject receives global attention (National Physical Planning Department, 2019). The United Nations has insisted on a national urban agenda for each nation state under its roadmap to achieve sustainable development goals, as half of the global population is in urban areas, and this is expected to reach 70% by 2030 (National Physical Planning Department, 2019;CIA, 2022). In developing countries, people move towards urban areas for several reasons such as: investment in industry and commerce due to the facilities in urban areas; increased life and health standards; increased life expectancy; better education; employment; leisure opportunities, etc. Urban sprawl poses many problems, such as major disaster-related impacts due to increased congestion, inappropriate housing, and unsafe conditions due to the people's movement to unsafe risk-prone areas that increases the vulnerability to natural hazard threats (Ministry of Environment, 2021; Malalgoda et al., 2013).

In the South Asia context, this percentage (of global populations within urban areas) is recorded as 80% due to the developing trend. Even though Sri Lanka is a South Asian country, the urbanisation rate is comparatively low but is showing an increasing trend

(National Physical Planning Department, 2019). Sri Lanka is an island with an area of 65,610 square kilometers and a population of 21.08 million (Ministry of Environment, 2021). Moreover, according to a 2021 estimation, 18.9% of the total population live in an urban area, and the rate of urbanisation is calculated as 1.22 % for the years 2020-2025. These percentages refer to the population living in the areas under the authority of the municipal councils and the urban councils in the country and, therefore, the actual urban population is considered to be higher due to the limitations in the definition of the urban context in Sri Lanka, as discussed in section 4.2. The National Physical Planning Department (2019) has also stated that there is a mismatch in the urban population statistics when comparing the ground realities. In addition, the trend of urbanisation is observed uniquely in Sri Lanka where, in addition to the urban sprawl, some of the areas that are considered to be urban when they obtain facilities that indicate urban characteristics (Department of National Physical Planning, 2019). Sri Lanka is urbanising much faster than indicated in the given statistical data due to the limitations of urban definition issues prevailing in Sri Lanka (Weeraratne, 2016). Sri Lanka needs to manage this urbanisation and urban sprawl appropriately.

Figure 4-2: Urbanisation pattern in Sri Lanka

Source: (National physical planning department, 2019)

4.4 National urban policy and urban governance in Sri Lanka

In Sri Lanka the poor regulatory framework for land use and management has been identified as a key factor that drives improper urban expansion in Sri Lanka (UN-Habitat, 2015). This condition is enhanced by the Sri Lankan ineffective land registration system, where permit processing time is lengthy, and registration and stamp duty fees are high (UN-Habitat, 2015). When it comes to urban development policy in Sri Lanka, there are not many policies. UN-Habitat (2015) has stated that Mahinda Chinthana (urban vision) was the first comprehensive national urban policy. Mahinda Chinthana is an overarching policy that considers sustainable urban development, including disaster risk reduction and climate change. Its primary focus is the economic development of people and considers the green city concept in urban development with the collaboration of the central environmental authority. However, this document is based on a political manifesto.

In 2015, the new government replaced the Mahinda Chinthana (urban vision) with a new policy that included the Megapolis plan for the country's development (UN-Habitat ,2015). The National Physical plan (2011-2030) operates as a supplement to this policy which focuses on integrated planning with economic, social, physical, and environmental aspects. This policy focuses on the country's strategic plan to facilitate land acquisition and enhance connectivity. Another government that replaced the government in charge since 2015 has further revised this policy and published it in 2019 as a National Physical plan and policy 2017-2050 (National Physical Planning Department, 2019).

With respect to Sri Lankan urban governance, it is primarily managed by the local authorities. However, according to the 13th Amendment, the provincial councils act as a mediator between the national and local agencies, resulting in weak coordination between the national and local institutions. Furthermore, the legislative powers and the authority of planning are vested with the national agencies (national physical planning department (NPPD) and urban development authority (UDA), and the local authorities are mainly left with the responsibility of providing services in the urban area with limited infrastructure development activities (UN-Habitat, 2015). UDA is responsible for urban planning for the urban declared areas that cover all municipal, urban councils, and some Predesiya Sabas. The approval power for urban development activities is vested with the planning committees (for declared urban areas), comprising members from the local authority and UDA members.

However, these policies and institutional arrangements (governance) are identified as weak for effective cross-sectoral urban planning and development (UN-Habitat, 2015). This situation needs to be urgently resolved since the urban environments in Sri Lanka are vulnerable to natural disasters (UN-Habitat, 2015).

4.5 Disaster risk in Sri Lanka

Sri Lanka is affected by several types of natural hazards. They include Cyclones, Floods, Landslides, Rock Falls, Land Subsidence, Tsunamis, Earth Tremors, Earthquakes, Drought, Storm Surges, Coastal Flooding, Coastal Erosion, Soil Erosion and Sedimentation, Salinity Intrusion into Drinking Water Sources, Forest Fires, Tornadoes, and others (National Council for Disaster Management, 2010). As well as the riverine floods, Sri Lanka is affected by the flash floods. Moreover, Sri Lanka is vulnerable to climate change-induced risks such as high-intensity rainfall followed by flash floods and landslides since it is a tropical island in the

Indian Ocean (Ministry of Environment, 2021; Ministry of Mahaweli Development & Environment,2012). As a result, Sri Lanka has consistently been ranked among the top ten countries at risk of extreme weather events by the Global Climate Risk Index (Ministry of Environment, 2021). Such disasters have caused a recorded damage of nearly 7 billion United States dollars in the years from 1990 to 2018 (United Nations office for disaster risk reduction [UNDRR], 2019). According to the National Council for Disaster Management (2010), the main reason why this occurrence of natural disasters is rising is due to human intervention such as uncontrolled development, environmental degradation, land filling, deforestation, indiscriminate coral, sand, and gem mining.

According to the report of the IFRC (2022), in May 2021 a maximum rainfall of up to 336 mm was experienced in Sri Lanka, triggered by the southwest monsoon and the tropical storm "Tauktae" in the southeast Arabian Sea. This heavy rain and wind caused floods that affected 43,701 people, including five deaths (11,247 families) in nine districts. While the disaster relief programme was ongoing for this incident, another intensive rainfall in the first week of June caused further floods and landslides in the same districts as well as in three adjacent cities. This event caused 15 deaths, damaged 1,422 houses, affected 266,923 people (44,476 families), and 26,842 people had to be evacuated. This was followed by another disaster event in November 2021, where 15 people were killed, 7,000 people were affected, and 800 houses were damaged due to the floods and landslides (Daily News, 2021). These disasters were mainly triggered by flash floods and landslides. Here, it is important to note that such disaster events are not new to Sri Lanka, and Sri Lanka has been affected by them for a long time. Newspaper articles, given in Appendix C: Newspaper articles that discuss the huge climate induced natural disaster events in Sri Lanka over the past decade. show that Sri Lanka has been affected for more than a decade by similar disaster incidents, and few effective improvement actions have taken place to prevent or control them.

4.6 Climate Change induced threats in Sri Lanka

The Climate Change Secretariat [CCS] (2010 a) has indicated that consecutive dry days are increasing in Sri Lanka, especially in the dry and intermediate zones. The air temperature of the country is increasing at a trend of 0.14 degree Celsius per decade and, according to the current prediction, it is suggested to become 0.2 degree Celsius per decade. Therefore, the number of warm nights and days as well as extremely hot days are increasing. Moreover, the

frequency of dry periods is increasing, and the rainfall patterns are changing. Similarly, the amount of heavy rainfall which can fall in one day is increasing which can lead to heavy floods. Furthermore, the climate change adaptation strategy for Sri Lanka 2011-2016 (CCS, 2010 a) has stated that climate change will lead to frequent floods, drought, and landslides in Sri Lanka. Therefore, CCS (2010 a) emphasises the need to integrate climate change into urban development activities.

4.7 Framing the current challenges

Urban and suburban populations living in Sri Lanka face two main climate change issues. The first one is high temperatures. The increasingly higher temperatures create discomfort for those living in urban and suburban areas. The high level of human activities in urban areas increases the impact of heat waves in the cities. Consequently, high day and night temperatures lead to a high consumption of energy utilised for cooling. In the country's dry zone, high evaporation rates and long dry spells due to the high temperatures cause water shortages (Ministry of Environment, 2021). Moreover, the upper country area, where higher watersheds exist such as Badulla and Nuwara Eliya, also faces drought-related water scarcity. According to the Ministry of Environment (2021), similar challenges could be faced by the growing urban areas in the wet zone due to the increasing demands. The second climate change issue is the climate-induced disaster risk to human settlements due to the increasing frequency of weather-related hazards such as floods, droughts, and landslides. The towns situated in the wetland areas, such as the south-western quarter, are affected by floods, and this situation is heightened due to an increased rainfall in the wet zone (Ministry of Environment, 2021). The hill country is particularly vulnerable to landslides due to inadequate housing schemes. Sri Lanka's coastal zone is densely populated particularly in the western and southern areas (Ministry of Environment, 2021). These coastal areas are highly vulnerable to risks relating to sea-level rise, salinity intrusion and drinking water scarcity (Ministry of Environment, 2021).

In 2010, the National Council for Disaster Management stated that the occurrence of natural disasters has increased due to uncontrolled development, and that the impact of such disasters was high due to the tendency of people to occupy hazard-prone lands (due to population growth and scarcity of land). Moreover, these uncontrolled developments can trigger new hazards and challenge the development process by causing irreparable permanent damage.

Furthermore, disasters have increased in Sri Lanka due to the improper land use for human settlement and cultivation on steep sloping land. These activities cause disaster events such as floods and landslides (Department of Land Use Policy Planning, 2010).

Moreover, the National Council for Disaster Management stated that urban development, the environment (climate change), and disaster management are interconnected and, therefore, sustainable development is the only way to safeguard the environment and help to reduce the triggering of hazards (National Council for Disaster Management, 2010). Since 2010 there have been actions to take adaptive measures to build the resilience of the country to face the adverse impacts of climate change. With adaptive measures as the priority, Sri Lanka is involved in the global efforts to minimise greenhouse gas emissions within the framework of the sustainable development and principles enshrined in the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol (KP) (Ministry of Mahaweli Development and Environment, 2012). Even though the need to mainstream urban development, disaster risk reduction, and climate change into policy planning had been identified earlier, the research conducted by Malalgoda & Amaratunga (2015) pointed out that Sri Lanka still requires links setting up between all the relevant organisations such as government agencies, community-based organisations, Non-government organisations (NGOs), educational organisations and the private sector to reduce disaster risks and build resilient urban environments. However, at present, there is no strong capable strategy available in Sri Lanka to enhance stakeholder collaboration in risk-sensitive urban planning and development.

Climate change adaptation strategy for Sri Lanka 2011-2016 insisted on the need to mainstream climate change adaptation into national planning and development, and climate-resilient and healthy human settlements were identified as important targets for the country (Ministry of environment, 2010). It is evident that organisations in disaster management, climate change, and urban development work in silos in Sri Lanka. In addition, in 2019, the National Physical Planning Department stated that noncompliance with existing plans, unplanned developments and inefficient urban development processes at the local level has already caused several disasters over the last few years and is still causing damage to life and property. Moreover, as discussed in the previous sections 4.5 and section 4.6, Sri Lanka has been facing the same kind of disaster events and climate change impacts over decades without any huge improvement in disaster risk reduction and climate resilience and prevention strategies. Therefore, investing in sustainable urban planning and development

that ensures resilience and safety is essential in Sri Lanka. Even though the National Disaster Management Plan (2013-2017) recommended mainstreaming disaster risk reduction into the development process as one of the key recommendations, the UNDRR Status Report of Disaster Risk Reduction in Sri Lanka (2019) shows that there is still a need to reform the disaster management system and the policy frameworks and regulations need to be aligned with climate change actions and with sustainable development goals according to the global policies such as Sendai Framework, the Paris agreement, the United Nations Framework Convention on Climate Change (UNFCCC) and the UN Kyoto Protocol (KP) (Disaster Management Centre [DMC], 2014; UNDRR, 2019).

The Ministry of Environment (2021) has established nationally determined contributions for risk-sensitive urban development by mainstreaming disaster risk reduction and climate change adaptation into urban development as a target for the year 2025. The Ministry of Environment (2020) has also stated that stakeholder collaboration is challenging in terms of mainstreaming disaster risk reduction and climate change adaptation and mitigation within urban development in Sri Lanka due to a lack of coherence and support from the different entities involved. Moreover, the study conducted by Saja, Sahid and Sutharshanan (2020) has concluded that risk-sensitive development is complex and challenging since it requires the integration of disaster and climate risk reduction in long-term development projects that demand stakeholder collaboration and political will. Therefore, enhancing stakeholder collaboration is crucial in creating risk-sensitive urban planning in Sri Lanka.

4.8 Overview of the legislation and policies in Sri Lanka regarding risk-sensitive urban planning and development.

This study reviewed relevant policies and laws relating to RSUP in the Sri Lankan context, including a detailed review of policies and laws in the following sectors: urban development; disaster management; climate change, and environment. The review study is given in Appendix D: Risk-sensitive urban planning and development related legislations and policies in Sri Lanka and Appendix E: Overview of laws and policies. This review findings shows how all the laws and policies relating to urban development, disaster management, and climate change discuss RSUP and development and collaboration approaches. The study considered the policies and legislation indicated in the urban development related document named "Sector Vulnerability Profile: Urban Development, Human Settlements and Economic

Infrastructure; Supplementary Document to The National Climate Change Adaptation Strategy for Sri Lanka 2011 to 2016" published by the Climate Change Secretariat, Ministry of Environment (CCS, 2010 b). In addition, the study considered a few other laws and policies related to the study.

By analysing the legislation relating to the urban development of the country, the study identified that the National Physical Planning Department (NPPD) is responsible for preparing development plans for the country's land. After the establishment of the UDA, the UDA is responsible for developing urban plans for declared urban areas according to the gazetted National Physical Plan. According to the Urban Development Authority Act of 1978, No. 41, all urban development-related activities should adhere to the urban plan developed by the UDA. Moreover, all other agencies need to get approval from the UDA to conduct any development activities within the purview of the UDA. The Department of National Physical Planning is responsible for preparing national physical plans for the nation and development plans for non-urban areas. In addition to these organisations, the Land Use Policy Planning Department is responsible for planning land use in the country.

However, according to the UDA act, UDA is the leading planning agency for developing urban plans for urban areas, and they should follow the guidance of the National Physical Plan, which the Department of National Physical Planning develops. According to the Housing and Town Improvement (H&TI) Ordinance of 1915, other than the UDA-declared areas, local authorities are responsible for planning under the guidance of the National Physical Planning Department. For the UDA-declared areas, UDA assigns powers to local authorities to plan and implement development activities without conflicting with UDA plans. However, local authorities take part in the decision-making of urban development activities according to the UDA urban development plans through the planning committee which includes a representative from the UDA and the relevant local authority as the implementation decision-making agency of any plan. In addition, the Construction Industry Development Act, no. 33 of 2014, provides authority to construction industry development authority (CIDA) to develop guidelines, regulations, and building codes focusing on disaster risk reduction (DRR) and climate change (CC) and to emphasis the need to implement a national construction policy that focuses on collaborating with stakeholders to develop and establish norms and guidelines.

Regarding disaster management-related acts in Sri Lanka, the Disaster Management Act does not have any direct provision for involving disaster management Centre (DMC) into collaborative RSUP and decision-making. However, Disaster management center can coordinate with other agencies for disaster management activities. Therefore, they have the power to coordinate for RSUP. The Flood Protection Ordinance of 1924 provides authority to the Irrigation Department to control development activities within flood-declared areas.

In the Sri Lankan context, no specific legislation is available concerning climate change. However, the National Environmental Act of 1980 covers environmental protection, including climate change. However, this act only focuses on the Ministry of Environment and Central Environment Authority (CEA) as responsible organisations. CEA has the authority to make decisions regarding development activities under their purview. However, CEA is not dedicated to climate change activities and their focus is on protecting the environment with a focus on environmentally sensitive areas, as mentioned in section D-4-2: National environmental act 1980 (No. 47 of 1980). of Appendix D: Risk-sensitive urban planning and development related legislations and policies in Sri Lanka. However, under the Ministry of Environment, the Climate Change Secretariat has been established as a dedicated organisation dealing with climate change (Ministry of Environment, 2020).

In addition to these agencies, a few environmental-related legislations control the development activities of other agencies in their purview areas, such as the Coast Conservation Department (Coast Conservation Act No 57 of 1981); the Forest Department (The Forest Ordinance no.16 of 1907); the Wildlife Conservation Department (National Heritage Wilderness Area Act no. 3 of 1988 and the Flora Protection Ordinance of 1937); the Central Environmental Authority (National Environmental Act 1980 (No. 47 of 1980) and the National Environmental (Amendment) Act (No. 56 of 1988) (Certified on 12 December 1988 and amended in 1988)), and the Soil Conservation Act no 25 of 1951 and subsequent amendments. Moreover, the Sustainable Development Council established under the Sri Lanka Sustainable Development Act, no. 19 of 2017, focuses on promoting and ensuring sustainable risk sensitive urban planning and development in Sri Lanka. Therefore, this can be seen as enabling legislation for collaborative RSUP.

In declared urban areas, UDA is responsible for preparing urban development plans in alignment with the National Physical plan. All organisations must align with that plan. Moreover, in addition to the UDA, there is a requirement to get approval from different

special agencies for the development activities within their purview, such as the Department of Coast conservation and coastal resource management (CCD); Central environment authority (CEA); the forest department (FD); the department of wildlife (DWL), and the department of agriculture (Soil conservation division).

Therefore, it can be seen that there is a lack of support from legislation for creating risk-sensitive urban planning by collaborative action since there is a lack of direct provisions to assign responsibility to any key stakeholders involved in risk-sensitive urban planning other than the Sri Lanka Sustainable Development Act, no. 19 of 2017 which is expected to ensure the achievement of sustainable development goals in Sri Lanka.

When it comes to policies, in terms of urban development policies, a national physical plan and policy focuses on risk-sensitive urban planning and provides a national physical plan which considers DRR and CC. However, the 'national physical plan and policy has a strategical plan and needs to be considered within local urban planning. Similarly, a land use planning policy considers the disaster risk-informed land use plan. In addition, local government policy emphasises ensuring the implementation of national physical plans and providing collaboration with all relevant agencies if required, including public participation. Moreover, in Sri Lanka, a national construction policy provides support for planning guidelines, codes, and regulations to monitor disaster resilience construction activities. Furthermore, a sustainable development policy for risk inclusive urban planning to empower and build the capacity of local authorities and divisional Secretariats with regard to inclusive planning and disaster management can be seen as being contradictory to the current urban planning process since UDA takes the leadership regarding planning activities for urban areas.

Therefore, it can be concluded that the concept of risk-sensitive urban planning has been initiated in Sri Lanka and that it is considered in development plans up to a certain level. However, these endeavours are not supported by organisational mandates. Moreover, it is essential to note that these policies are discussed separately, including DRR and CC, in development plans. There are no joint initiatives or implementation strategies or coherence among these policies in terms of implementation. Moreover, it is observed that most of the approval agencies, such as CEA and CCD, in the development activities under their purview, do not have any decision-making authority in terms of RSUP. This condition may create conflict and less adaptation of any developed plans.

4.8.1 Collaborative provisions in the legislation

Regarding urban development-related laws, they do not contain any directly stated provisions for integrating DDR and CC into the urban development process. However, the UDA Act provides authority for UDA to call upon any agencies regarding consultations on the development plan preparation, and it is mandatory to publish any draft plans for public comment 60 days before in the Governmental Gazette.

According to the Sri Lanka Land Reclamation and Development Corporation Act, no. 15 of 1968, the Sri Lanka Land Reclamation and Development Corporation was established and was made responsible for developing marshy and low-lying areas and retaining the custody management and control of such vested lands, all the while recognising the need to maintain adequate retention areas for flood waters. This development activity-related law only considered flood disaster risk. However, the implementation of such development work should be with consultation with other government departments, public corporations, or local authorities. All the legislation, listed in Appendix E: Overview of laws and policies, relating to urban planning does not directly dictate collaborative working with other organisations or the inclusion of DRR and CC into the urban planning other than the Construction Industry Development Act, no. 33 of 2014, which supports the national policy on construction that focuses on establishing guidelines and norms.

With regard to the disaster risk reduction sector, DMC is the coordinating agency responsible for disaster management activities in the country. However, DMC does not have any decision-making authority in urban planning. The Irrigation Department is responsible for declaring flood areas and controlling the activities within those areas. Therefore, according to the law, the Irrigation Department is involved in the development activities and decision-making in flood areas. However, the Irrigation Department has no legislative provisions directly dictating collaborative work in risk-inclusive urban planning. Similarly, the National Environmental Act also does not have any provision for collaborative working or for integrating climate change into urban planning.

There is no strong legislative support for collaborative risk-sensitive urban planning and decision-making in Sri Lanka.

4.8.2 Collaborative provisions in the policies

In Sri Lanka, no policies or policy frameworks are available to guide or regulate the urban development process. Therefore, collaborative decision-making in RSUP and any authorised procedures for this are lacking. However, the National Construction Policy indicates the importance of establishing norms and guidelines in consultation with the relevant professional bodies, research organisations and universities to formulate disaster-resilient, energy-efficient, and environmentally sustainable construction practices. These regulations and guidelines can be seen as an important part of RSUP.

When it come to a disaster management (DM) policy, ensuring an inter-ministerial, inter-sectoral and inter-agency coordinating mechanism for all disaster management activities is a main task of the DMC which does not have any decision-making authority in urban planning. Similarly, climate change policy also states about developing and strengthening inter-institutional coordination and collaboration with monitoring mechanism at all levels related to climate change activities. However, the CCS does not have any decision-making authority in RSUP. It clearly shows that although the policies support the concept of collaborative RSUP, there is no legal support and no proper mechanism for its implementation in Sri Lanka.

4.9 Review of the national physical plan and urban development plans in Sri Lanka

This review identifies the state of stakeholders' collaboration in risk-sensitive urban planning and development through a review of the national physical plan and policy and urban development plans which can be considered as the most important development plans for urban areas. It is observed that the national physical plan and policy was developed by inviting all relevant stakeholders nationally for several meetings. However, the bottom-up approach is lacking since district secretariats, divisional secretariats, and local authorities do not participate in the meetings, although research organisations and some NGOs typically take part in the consultation meetings. Current national physical plan and policy considers DRR and CC in the development plans. However, in this risk sensitive development plan considered at the national level as a strategic plan for the country's development. Taking the national policy plan and policy as the basis, the regional physical plans are developed for each province as a framework for developing local action plans by the regional planning

committees, as shown in D-1-2: Town and country planning ordinance No. 13 of 1946 of Appendix D: Risk-sensitive urban planning and development related legislations and policies in Sri Lanka. Then local authorities develop plans for non-urban areas. UDA, as an authorised agency for declared urban areas, develops urban development plans for the declared urban areas in alignment with the national physical plan.

In this research, the current urban planning process and collaborative stakeholder involvement in developing RSUP have been analysed by reviewing the published urban plans in English language (Refer Appendix 5). It is observed that some of the current urban development plans in Sri Lanka have considered DRR and CC, and some have not. In terms of stakeholder collaboration, it is observed that some of the development plan processes did not consist of stakeholders' meetings. Furthermore, the list of invited stakeholders varied from plan to plan and some of the relevant organisations were missing that, ideally, should provide input into the development plans. Moreover, this condition varies from UDA officer to officer. It clearly shows that the urban planning process is not consistently followed, and that the invitation of stakeholders and stakeholder selection for meetings is totally dependent on the planning committee of the UDA. Furthermore, stakeholder meetings happen in an ad-hoc manner with a high probability that key stakeholders might be missing (who are essential for RSUP for several reasons). Appendix F: Review of urban development plans shows a primary analysis of published urban plans in Sri Lanka, and it should be noted that there are still no plans for all the declared urban areas. Stakeholders' participation in RSUP according to each urban plan document is indicated in Appendix J: Stakeholder participation in terms of RSUP in NPP and UDA plans.

4.10 Sri Lankan administrative system

4.10.1 Overview of the Sri Lankan administrative system

Sri Lanka is an independent nation with three tiers of government arrangements: national, provincial, and local. These are governed through two parallel governance mechanisms: central and local governments. The local government covers provincial councils and local authorities. Provincial authorities in the second tier are governed under the Provincial Councils Act 1987. The third-tier local government covers 24 municipal councils, 41 urban councils, and 276 Pradeshiya Sabas (village councils) under the Urban Councils Ordinance 1939, the Municipal Councils Ordinance 1947, and the Pradeshiya Sabhas Act (No. 15 of

1987) with subsequent amendments. The municipal councils cover cities and larger towns; smaller towns and less urbanised areas are covered under the urban councils, and Pradeshiya Sabas cover areas which largely include small townships in rural areas (Commonwealth Local Government Forum, 2023). For administrative purposes, the nine provinces are divided into 25 districts and 331 divisional secretariats (Commonwealth Local Government Forum, 2023). Under the divisional secretariats, there are 14,022 Grama Niladhari divisions available. The above discussion can be easily understood by the viewing Figure 4-3, which shows the complex administrative system in Sri Lanka.

Figure 4-3: Basic structure of government administration in Sri Lankan

Adopted from: (Paffrel, 2022)

4.10.2 Administration of urban planning, DM, and CC in Sri Lanka

According to the UDA Act, and the Town and Country Planning Act, urban development activities are directed through the local government mechanism which deals with the local authorities. In contrast, DM activities are directed through the central government. A disaster management coordination unit is located under each district secretariat (government agent) for each district. Then it is further directed through the divisional secretariat and the Grama Niladhari (DMC, 2014). Similarly, the CEA district offices are mostly located under the district secretariat office in each district to serve the purpose. Furthermore, it is important to note that CCS has no local sub-offices to facilitate CC-related activities. This condition

shows the complexity of the Sri Lankan governance mechanisms and, therefore, the coordination for RSUP is challenging.

4.11 Status of collaborative RSUP in Sri Lanka

Based on an understanding gained from the national physical plan and policy (NPPP) and urban development plans' documents, the RSUP concept has been widely accepted among urban planning agencies, and the NPPP has been incorporated with DRR and CC. Therefore, NPPP was developed through several stakeholder consultation meetings involving the DRR and CC sectors at the national level; however, it failed to consult local-level stakeholders, hindering the integration of the bottom-up approach. Similarly, most urban plans have begun to consider DRR and CC aspects; however, their effectiveness is questionable due to a lack of stakeholder participation and correct representation in the planning stage. Moreover, some urban plans lack incorporating DRR and CC. This condition arises since UDA have no mandate to prepare urban plans, including DRR and CC.

In addition, the Climate Change Adaptation Strategy for Sri Lanka 2011-2016 states that human settlement planning ignores CC for several reasons, including a lack of information about its possible risk and impact. Furthermore, it is stated in this strategy that urban development plans do not cover non-urban areas and inadequacies in land use planning lead to vulnerability in human settlements. Overall, collaborative RSUP is only present in an ad-hoc manner throughout the island, with varying stakeholder participation and, at times, key stakeholders (e.g., DMC, National building research organisation (NBRO), CCS) can be absent.

Furthermore, it is observed from the Performance Report of the department of Land Use Planning (Land Use Policy Planning Department, 2018) that available land use plans are inadequate. Moreover, the UDA plans do not focus on rural areas (beyond its purview) where most of the resettlements take place (Ministry of Environment, 2010).

Regarding development control and approval procedures, the DMC (2014) states that the UDA and local authorities are currently the development controlling agencies for urban areas and some other agencies are responsible for approving the development activities under their purview such as Mahaweli Authority, and the CCD. Some local authorities (LA) are not declared as urban areas by the UDA, and the Town and Country Planning Ordinance governs these LAs. These LAs fall within the purview of the NPPD (DMC, 2014). National Report

for the Third United Nations Conference on Human Settlements Habitat III- states that, even though national physical plans are available, these are not properly followed at other levels within the country in terms of implementing development activities due to the ineffective systems that are practiced.

4.12 Key stakeholder identification and their roles are based on the legislation.

Following the documents' review conducted in this study, this study classifies stakeholders based on their role in risk-sensitive urban planning and decision making. As this study focuses on risk-sensitive urban planning, the stakeholders identified from the key sectors involved in RSUP are involved in urban planning and development, disaster management, and climate change. Firstly, in the process of identifying urban development stakeholders, this study decided to ignore all individual development project plans and other development programmes and plans of government agencies and non-government agencies since all these projects initiatives in urban areas need to obtain approval from UDA according to the gazetted urban plans before any implementation of those projects. Therefore, the stakeholders who are preparing such plans for such development projects and programmes were not considered.

Accordingly, the stakeholders have been identified as the main planning (zonal plans and project plans indicated in the zonal plans) and approval agencies in urban planning and implementation in Sri Lanka. Furthermore, their power and interest are mentioned based only on RSUP and approval of the implementation of the development activities.

The study does not consider the Land Commissioner General's Department since they delegate their power to the district secretariats (Government agents - GAs) at the local level where urban planning is developed. Secondly, in identifying disaster management stakeholders, this study decided to identify relevant technical organisations responsible for the DM activities in SL and which provide technical input in urban planning. Similarly, this study identifies the main CC agencies in SL as key stakeholders.

Furthermore, in this study several research organisations are grouped under research organisations, and universities are grouped and named under academic organisations. Similarly, several non-government organisations are grouped and named under NGOs.

Moreover, several community-related organisations and the public are considered as a 'community'.

Accordingly, Table 4-2 presents the mapping of stakeholders based on their power and interest in risk-sensitive urban planning and development. This study defines "power" as the legislative power of the stakeholders regarding their roles in urban areas. Moreover, their interest in RSUP is defined based on their mandates and policies.

Table 4-2:Key stakeholders in RSUP

No	Organisation	Role	Assessment of their power (in terms of approval of their plans and their implementation in urban areas)	Interest in RSUP	Reference	Reasons
1	Department of National Physical Planning (DNPP)	Planners for the National Physical Plan (NPP)	Low (planning and implementation)	High	Town and Country Planning Ordinance No. 13 of 1946/ Act No.49 of 2000; the Town and Country Planning Ordinance No.13 of 1946 amendment. National Physical Plan and Policy 2030-2050	DNPPs only have high authority for developing NPP and no authority to control its implementation. However, DNPP has a high interest in RSUP based on the National Physical Plan and Policy 2030-2050.
2	National Physical Planning Council (NPPC)	Approval agency of the NPP	Low (planning and implementation)	High	Town and Country Planning Ordinance No. 13 of 1946/ Act No.49 of 2000; the Town and Country Planning Ordinance No.13 of 1946 amendment. National physical plan and Policy 2030-2050	NPPC is the sole entity that has the power to approve the NPP.
2	Urban Development Authority (UDA)	Approval agency of urban plans, planners, and approval agencies	High (planning and implementation)	High	The Urban Development Authority Act of 1978, No. 41 and Urban Development Authority Law (amendment of 2000)	According to the UDA Act, the UDA is a highly powerful body for decision-making and implementation approval within its purview.

No	Organisation	Role	Assessment of their power (in terms of approval of their plans and their implementation in urban areas)	Interest in RSUP	Reference	Reasons
						Moreover, they have a high interest in RSUP since they follow the NPP that focuses on RSUP and have begun to consider DRR and CC aspects in development plans.
3	Local authorities (LA)	Approval agency.	Low (planning). High (implementation)	High	Housing and Town Improvement (H&TI) Ordinance of 1915 Municipal Council Ordinance, Urban Council Ordinance, Predesiya Saba Act	According to the current mandates, Local Authorities are not decision-makers in urban planning but key decision-makers in the implementation approval stage. High interest, according to the local government policy
4	District Secretariat office (DS)	Implementers of development programmes and projects according to the regulations and approval agencies for state land	Low (planning). High (implementation)	Low	Land development ordinance no. 19 of 1935; The Urban Development Authority Act of 1978, No.41 and Urban Development Authority Law (amendment of 2000)	Low interest in the RSUP according to their mandates even though the district secretariat owns state land. According to the UDA act, DS must get approval from UDA to implement any development plans. However, any

No	Organisation	Role	Assessment of their power (in terms of approval of their plans and their implementation in urban areas)	Interest in RSUP	Reference	Reasons
					(Ministry of home affairs, 2020)	implementation activities in the state lands require approval from DS.
5	Divisional Secretariat office (DVS)	Similar roles and responsibilities to the District Secretariat office	Low (planning). High (implementation)	Low	National Report for the Third United Nations Conference on Human Settlements Habitat III-	Similar roles and responsibilities to the District Secretariat office
6	Department of Land Use Policy Planning (DLUPP)	Planners	High (planning) and low (implementation)	High	(Disaster Management Plan 2013-2017) National Land Use Policy 2009	The Land Use Policy Planning Department is responsible for preparing land use plans, and their interest is focused on DRR.
7	Sri Lanka Land Reclamation & Development Corporation (SLLRDC)	Technical agency, approval agency	Low (planning). High (implementation)	High	An act to amend the Sri Lanka Land Reclamation and Development Corporation Act, no. 15 of 1968 Website of SLLRDC accessed on 23.06.2023	SLLRDC have powers to take custody of low marshy lands for development and has interest since they are involved in landfilling on flood areas.
8	Board of Investment (BOI)	Approval agency	Low (planning and implementation)	Low	Greater Colombo economic commission law	BOI has the power to make decisions on development activities in urban areas.

No	Organisation	Role	Assessment of their power (in terms of approval of their plans and their implementation in urban areas)	Interest in RSUP	Reference	Reasons
						Low interest in RSUP. However, their approval in development activities is not required.
9	Construction Industry Development Authority (CIDA)	Technical agency	Low (planning and implementation)	High	(Towards a safer Sri Lanka: A road map for disaster risk management)//National Policy on Construction – D7 Construction Industry Development Act, no. 33 of 2014 National Policy on Construction	Establish a monitoring and evaluation system for construction activities, responsible for codes with the focus on DRR since the national policy on construction focuses on DRR and environmental benefits (indirectly CC) However, CIDA has no power to influence the planning or implementation decision-making.
10	Road Development Authority (RDA)	Approval agency, technical agency	Low in planning and High in implementation	Low	Road Development Authority Act - No. 73 of 1981	RDA has the authority to declare an area as a development area and shall define that area by setting out the metes and bounds of such area; and it shall be the duty of the Authority to implement such programme or development

No	Organisation	Role	Assessment of their power (in terms of approval of their plans and their implementation in urban areas)	Interest in RSUP	Reference	Reasons
						work in consultation with any Government department, public corporation, or local authority. Its Council has members from different ministries as mentioned in 3.1.5
10	Mahaweli Authority (MA)	Approval agency for matters under their purview.	Low (planning) and High (implementation)	Low	Mahaweli Authority of Sri Lanka Act (No. 23 of 1979)	High authority in approving development activity under their purview and less influence in the planning decision making
11	Department of Coast Conservation and Coastal Resource Management (CCD)	Approval agency under their purview.	Low (planning) and High (implementation)	High	Coast Conservation Act No. 57 of 1981 (Disaster Management Plan 2013-2017) Website accessed on 23.06.2023	CCD has the authority to control development activities in their area; however, it is responsible for environment impact assessment and, therefore, is involved in CC and DRR. This it has high interest in RSUP
12	Forest Department (FD)	Approval agency under their purview	Low (planning) and High (implementation)	High	The Forest Ordinance no. 16 of 1907.	The Forest Department has high authority to control development activities in their area and no direct

No	Organisation	Role	Assessment of their power (in terms of approval of their plans and their implementation in urban areas)	Interest in RSUP	Reference	Reasons
						interest in DRR and CC according to their mandate; however, there is an indirect link since they focus on environmental protection. So considered a high interest in CC and climate induced DRR.
13	Department of Agriculture (DoA) (Soil Conservation division)	Approval agency under their purview	Low (planning) and High (implementation)	High	Soil Conservation Act no 25 of 1951 and subsequent amendments	Department of Agriculture has the authority to control development activities in the soil erosion area, and with this focus on soil erosion is considered to have a high interest in RSUP
14	Department of Wildlife (DWL)	Approval agency under their purview	Low (planning) and High (implementation)	High	The Fauna and Flora Protection Ordinance of 1937	The Department of Wildlife has high authority to control development activities in their area and no direct interest in DRR and CC according to their mandate; however, they focus on environmental protection which leads to CC actions. So considered

No	Organisation	Role	Assessment of their power (in terms of approval of their plans and their implementation in urban areas)	Interest in RSUP	Reference	Reasons
						to have a high interest in RSUP.
15	Central Environment Authority (CEA)	Technical agency and approval agency in implementation in their purview	Low (planning) and High (implementation)	High	National Environmental Act 1980 (No. 47 of 1980) and National Environmental (Amendment) Act, No. 56 of 1988 [Certified on 12 December 1988] amended in 1988	CEA needs to provide approval for the development activities under their purview, and they influence the CC activities and DRR activities.
16	Climate change Secretariat (CCS)	Technical agency	Low (planning and implementation)	High	Climate Change Adaptation Strategy for Sri Lanka 2011-2016 National Climate Change Policy	CCS is a dedicated key agency for CC in SL. However, there it has no authority for decision making in planning or implementation. It has a high interest in RSUD.
17	Disaster Management Centre (DMC)	Coordinating agency and advisors	Low (planning and implementation)	High	Disaster Management Act No 13 of 2005	High interest in RSUP. But no power for decision making
18	Department of Irrigation (DI)	Technical agency – Flood	Low (planning) and High (implementation)	High	Flood Protection Ordinance created in 1924	DI has the authority to control development activities in their purview and has a high interest in DRR activities.

No	Organisation	Role	Assessment of their power (in terms of approval of their plans and their implementation in urban areas)	Interest in RSUP	Reference	Reasons
19	Geological Survey and Mines Bureau (GSMB)	Technical agency - Earthquake	Low (planning and implementation)	High	(Disaster Management Plan 2013-2017) Geological Survey and Mines Bureau website accessed 12 July 2022)	High interest in RSUP. But no power for decision making
20	National Building Research Organisation (NBRO)	Technical agency for landslides and other DRR, environment, and CC-related research organisation. Approval agency for development activities under their responsibility. Advisors as a research agency	Low (planning) and High (implementation)	High	(Disaster Management Plan 2013-2017) NBRO website accessed 2022 July 12)	High interest in RSUP. Has powers in implementation decision making
21	Department of Meteorology (DoM)	Technical agency - cyclone, heavy rain, lightning, high wind forecasting and tsunami warning	Low (planning and implementation)	High	Towards a safer Sri Lanka: A road map for disaster risk management Department of Meteorology website accessed 2022 July 12)	High interest in RSUP. But no power for decision making

No	Organisation	Role	Assessment of their power (in terms of approval of their plans and their implementation in urban areas)	Interest in RSUP	Reference	Reasons
22	Academics who have an interest in RSUP	Supporting Agencies	Low (planning and implementation)	High	UDA plans and the NPP	No powers in planning; they conduct research in RSUP and, therefore, have a high interest
23	Research organisations that have an interest in RSUP	Supporting Agencies	Low (planning and implementation)	High	UDA plans and the NPP	No powers in planning; they conduct research in RSUP and, therefore, have a high interest
24	NGOs who have an interest in RSUP	Supporting Agencies	Low (planning and implementation)	High	UDA plans and the NPP	No powers in planning; they conduct research in RSUP and, therefore, have a high interest
25	Community	Beneficiary	Low (planning and implementation)	High	UDA plans and the NPP. Urban Development Act	Even though there are provisions to obtain public comment, there are no powers for the public in decision-making. They have a high interest in RSUD since such planning affects their communities.

4.12.1 Stakeholder classification based on their roles.

Figure 4-4: Stakeholder classification

Figure 4-4: Stakeholder classification clearly shows the role of the stakeholders and their contribution to RSUP and implementation, hence, the gap in RSUP in terms of the decision-making powers of the key stakeholders can be understood. Community members are also considered as advisers since they have tacit knowledge based on their experience. Community and technical agencies (CCS, GSMB, DoM, CIDA) are separated from planning and implementation decision-making, however their contribution is essential in RSUP. In addition, CIDA is the technical agency for developing the building codes and construction guidelines; however, they are not involved in any decision-making.

Furthermore, most implementation approval agencies are not involved in the RSUP decision-making or approval, and this fact clearly shows the current RSUP and implementation issues. Furthermore, technical agencies acting as approval agencies for implementation also do not have the authority to make decisions in urban plans.

4.12.2 Power and interest-based analysis of the Stakeholders

This section provides the stakeholders' power and interest analysis as follows: power and interest matrix in RSUP decision-making, and power and interest matrix in RSUP implementation decision-making. The Table 4-3 shows the power and interest analysis of stakeholder in RSUP.

Table 4-3:Stakeholder analysis based on their decision-making power in RSUP.

Power/Interest	Low	High
High		UDA
Low	DS/DVS MA RDA	DNPP NPPC DLUPP CIDA LA SLLRDC CCS DMC ID BOI GSMB NBRO DoM CCD CEA FD DWL DoA Academics Research organisations NGOs Community

The Table 4-4 shows the power and interest analysis of stakeholder in implementation of RSUP.

Table 4-4:Stakeholder analysis based on their decision-making power in project approval and implementation.

Power/Interest	Low	High
High	RDA MA DS/DVS	UDA LA SLLRDC ID NBRO CCD CEA FD DWL BOI DoA
Low		DNPP NPPC CCS DMC DLUPP CIDA GSMB DoM Academics Research organisations NGOs Community

Table 4-3 and Table 4-4 clearly indicate stakeholder power and interest in RSUP and implementation decision-making. Among the primary stakeholders with high power and high interest in RSUP decision-making, only the UDA has the power in both decision-making in RSUP and in implementation of the plans. The NPPC only has the authority to approve any national plans, but not any urban ones. This condition can be seen as a main weakness in the Sri Lankan governance system in urban planning and decision-making in implementation, where no mechanism exists to ensure the integration of any national plan into the urban plans.

Similarly, Local Authorities, SLLRDC, the Department of Irrigation, NBRO, CCD, CEA, the Forest Department, the Department of Wildlife, and the Department of Agriculture have high interest but do not have powers in RSUP decision-making. However, they have power in implementation. This condition can lead to conflicts in implementing the developed plans since these implementation approval agencies may have different opinions or disagreements

on the plans which will have an impact on successful implementation. Therefore, the successful collaboration and consent of those agencies in the planning process and in the plans is vital.

Furthermore, the stakeholders with high interest but with low power in RSUP and implementation decision-making are identified as follows: NPPD, NPPC, DLUPP, CCS, DMC, the Geological Survey and Mines Bureau, the Department of Meteorology, academics, research organisations, NGOs, and the community. This condition leads to a low incorporation of the ideas or proposals from the technical organisations, research organisations, and the community who are the actual beneficiaries and have tacit knowledge and experience to support the success of RSUP and its implementation. Moreover, as DRR and CC technical organisations, CCS, GSMB and DoM do not have any authority to give implementation approval or undertake planning decision-making.

The following stakeholders have been identified as having low power and low interest in RSUP decision-making, and high power and low interest in the implementation; the Road Development Authority (RDA), the district secretariat and divisional secretariats, and the Mahaweli Authority (MA). This factor creates two kinds of issues as follows: (1) these organisations do not influence RSUP; therefore, the implementation of any plan is questionable since these organisations have high influence power in the implementation decision-making in their purview; (2) since all these organisations have low interest and high power in implementation decision making, their implementation decision making may not align with RSUP.

Finally, CIDA has been identified as having high interest and low power in RSUP decision-making or implementation decisions. Since they are responsible for construction regulations, they should contribute to develop customised guidelines and codes for risk-prone areas and with the consideration of the CC in the planning stage. Due to their low power in both decision-making processes, these components are ignored.

4.13 Summary

This chapter provided a comprehensive understanding of the Sri Lankan context by discussing the current state and culture of collaboration in RSUP. It emphasises the need for effective stakeholder collaboration in RSUP. Furthermore, the stakeholder analysis in Sri Lankan risks sensitive urban planning context is presented that provides basis for the

achieving the research objectives. The following chapter presents the analysis and findings of the primary data collected from the Sri Lankan context to achieve the research objectives.

5 Data analysis and findings

5.1 Introduction

This chapter presents the analysed findings from the data collected from semi-structured interviews and document reviews to explore and understand the stakeholder collaboration context in risk-sensitive urban planning. It covers existing barriers, enablers, suitable governance arrangements, and the required policy changes that can enhance stakeholder collaboration.

Firstly, in Section 5.2and section 5.3, the profile of the participants and details of the reviewed documents are given. Secondly, Section 5.4 presents the list of barriers and enablers as an outcome of the thematic analysis from the semi-structured interviews and document review. Thirdly, in Section 5.5, a causal loop diagram is developed to analyse the stakeholder collaboration context in Sri Lanka (which brings a system thinking approach to understanding the interconnected nature of these barriers) and to propose policy changes that are required to make multi-stakeholder collaboration more effective. Finally, in Section 5.6, the study critically analyses the experts' recommendations for forming collaborative governance arrangements in the Sri Lankan context with the support of the document review findings.

5.2 Profile of the interview participants

Table 5-1 provides the background information on the participants of the interviews, presenting their profiles and expertise.

Table 5-1: Profile of the interview participants

Number	Participant ID	Area of expertise	Profile
National experts			
1	P1NE1	UD and DRR	Professor, University of Colombo
2	P1NE2	UD, DRR, CC	Climate change and Disaster risk management specialist at the Asian Development Bank; Planner
3	P1NE3	DRR	Higher level officer in the National Building Research Organisation (NBRO)
4	P1NE4	UD	Planner, Former high-level officer in the Town Planners of Sri Lanka, The Commonwealth Association of Planners, and UDA.

5	P1NE5	DRR	Senior scientist in the National Building Research Organisation (NBRO) and researcher
6	P1NE6	CC	Climate Change Policy Expert; former National Climate Change Finance Adviser, the Commonwealth; former Consultant – Climate Finance (Mitigation Project Formulation, Appraisal UNDP)
7	P1NE7	DRR, CC, UD	Disaster Risk Reduction Specialist, World Vision Lanka; Former Senior Urban Planner, Strategic Cities Development Programme; Former town planner and Climate Resilient Consultant /Research Unit Coordinator in the National Building Research Organisation.
8	P1NE8	UD, CC, DRR	Senior lecturer at the South Eastern University of Sri Lanka
9	P1NE9	DRR, CC	Project leader of a Climate-smart irrigation project, World Bank-funded project at the Ministry of Agriculture; former higher-level officer in the Disaster Management Centre.
Local experts			
1	P1LE1	UD	Higher level officer in the Provincial Urban Development Authority
2	P1LE2	UD	Engineer, Road Development Authority
3	P1LE3	CC	Senior environmental specialist, Central Environment Authority
4	P1LE4	DRR and UD	Former high-level officer in district disaster management coordination unit, Disaster Management Centre; and lecturer at the University of Jaffna
5	P1LE5	UD	Director planning, District Secretariat Office
6	P1LE6	UD	Assistant director, Department of Land Use Policy Planning
7	P1LE7	UD	Commissioner, Municipal Council
8	P1LE8	UD	Secretary, Predesiya Saba
9	P1LE9	UD and DRR	Engineer, UN Habitat (NGO)
10	P1LE10	UD	Planner, Urban Development Authority
11	P1LE11	UD	Planner, Urban Development Authority

Figure 5-1 provides a graphical representation of the sectoral expertise of the experts selected in this study.

Figure 5-1: Graphical representation of expertise of experts

5.3 Document analysis details

The study reviewed 74 documents, including policies, legislation, urban plans, national documents, and reports relating to risk-sensitive urban planning. Details of the reviewed policies, legislation, and urban plans were given in chapter 4, Appendix D: Risk-sensitive urban planning and development related legislations and policies in Sri Lanka, Appendix E: Overview of laws and policies, and Appendix F: Review of urban development plans.

Table 5-2 represents the number of documents reviewed under each document type and the number of documents which discussed the key areas required for RSUP, such as UD, CC, and DRR. It is important to note that one document may contribute to more than one section.

Table 5-2:Contribution of documents to the RSUP sectors

Document Type	UD	CC	DRR	Number of documents
Policies and legislation	40	16	13	42
Urban plans	27	-	-	27
National documents and reports	02	03	03	05
Total of documents reviewed				74

Figure 5-2 provides a graphical representation of the sectoral relevance of the selected documents.

Figure 5-2: Graphical representation of the sectoral contribution of the documents

Table 5-3:Document used in findings and analysis.Table 5-3 also provides the document ID for the documents that are frequently referred to in this chapter.

Table 5-3:Document used in findings and analysis.

Document ID	Document name	Author/ Authority
D1	Towards a safer Sri Lanka: A road map for disaster risk management	Ministry of Disaster Management 2005
D2	Climate change adaptation strategy for Sri Lanka 2011-2016	Ministry of Environment 2010
D3	Stakeholder Engagement Strategy for Green Climate Fund (GCF)-related Activities in Sri Lanka	Ministry of Environment, 2010
D4	National Report for the Third United Nations Conference on Human Settlements -Habitat III	Ministry of Housing & Construction of the Government of Democratic Socialist Republic of Sri Lanka, 2015
D5	National disaster management plan 2022-2030	Disaster Management Centre, Ministry of Disaster Management 2014
D6	DRAFT National Policy and Strategy on Sustainable Development,	Sustainable Development Council, Sri Lanka, 2020

5.4 Barriers and enablers for stakeholder collaboration in risk-sensitive urban planning

This study classifies the findings from the interviews and from the documents on barriers and enablers, covering strategies and existing opportunities, into five main themes: administrative environment comprising policies and laws, governance, and politics; working environment; organisational capacity; information and knowledge sharing, and the collaboration process.

5.4.1 Administrative environment

This section presents the empirical data findings relating to barriers and enablers for stakeholder collaboration in RSUP under three sub-themes: (A) policies and legislation, (B) governance, and (C) politics.

(A) Laws and policies relating to barriers and enablers.

Table 5-4 and Table 5-5 show the barriers and enablers identified under the laws and policies sub-theme from the empirical data. The key comments and the relevant quotations made by the experts are summarised against each barrier in the Tables below.

Table 5-4: Barriers relating to policies and laws.

Theme	Barriers	Key comments from experts	Experts' Quotations
Policies and legislations	1.Inadequate enforcement of policies and laws	• Current policies that discuss RSUP are weak and do not promote coordination among stakeholders in Sri Lanka for RSUP (P1NE2, P1NE6, and P1NE8) • Ineffective policy enforcement prevails due to a lack of regulatory policy mechanisms such as accountability statements, including the punishment and claim procedures (P1NE6, P1NE7, P1NE8, and P1LE4) • The existing laws are not enforced correctly to support collaboration due to a lack of implementation mechanisms (P1NE1- P1NE 9)	*"I think we have an absence of policies that promote collaboration. We have sectoral policies, and they focus on considering risk-sensitive urban development. But not any collaborative actions are defined" (P1NE6)"* *"You must have a legal framework for enforcement. If you do not have any enforcement power or implement strategy,*

Theme	Barriers	Key comments from experts	Experts' Quotations
			then policies remain merely as a policy" (P1NE4).
	2. Lack of policy implementation tools	• Policies are not adequately translated into strategies and action plans (P1NE 6, P1NE 8, and P1NE 9, D3, D4)	"We have policies, but for what? Policies are just general guidelines and directives, but these policies are not translated into strategies and actions. That's a problem" (P1NE4)
	3. Lack of legislative support for collaboration (P1NE1 - P1NE9)	• The mandates do not indicate the collaborative responsibilities of the stakeholders. (P1NE5, P1NE6, P1LE4, P1NE1; D1-D3) • Laws do not provide shared powers to stakeholders to make urban planning decisions, leading to ignoring of the technical agencies' opinions. (P1NE5, P1LE3) • Laws do not enforce institutional capacity for stakeholder collaboration (P1NE1, P1LE4, P1LE6, P1LE 8, and P1LE 9): no proper training P1LE10; absence of task allocation for staff towards collaboration (P1NE4 and D5)	*"There are many opportunities to collaborate, but that is not mandatory. Because there is no legal support and legislative authority to do that, collaboration is optional; if you want, you can do it. If not, you can omit it. If you omit it, there are no problems. (P1NE6)* *"Task associated or assigned within the organisations do not allow collaboration".* (*P1NE4*)
	4. Lack of integration and coherence among government policies and laws	• There is no integration between government policies to support collaboration (P1NE2) • Current level of coherence among policies is inadequate for collaboration practice implementation (P1NE1-P1NE9) • There is mainstreaming between organisational mandates and, therefore, there is a lack of coordination mechanisms in mandates that lead to collaborative decisions. (P1NE1, P1NE2, P1NE4-P1NE9, P1LE2, and P1LE11).	*"Policy coherence is poor in Sri Lanka compared to the other South Asian countries. We have policies, but unfortunately, these policies are not integrated" (P1NE6). "In the Sri Lankan context, the legislations are separately addressed for the separate sectors" (P1NE9). "Each agency has legal mandates, but we need to focus on how*

Theme	Barriers	Key comments from experts	Experts' Quotations
			they can work with other agencies………. how these organisations work together" (P1NE7).
	5. Lack of funding guidance in policies	• There are no defined financial plans and strategies to obtain finance for collaboration in RSUP (P1NE5)	
	6.Lack of support from policies and law for informal collaboration	• Non-government agencies are not recognised by the government organisations in RSUP since informal collaborations are not suitable for gathering the necessary support for the long term since this can be impacted upon due to changes in personnel (P1NE4 and P1NE7) • Informal collaboration decisions cannot be considered since the mandates require a formal process (P1NE2) • Informal collaboration is not suitable for obtaining funds due to the strict mandates in the Sri Lankan system (P1NE5)	*"In Sri Lanka, our governance system is guided by policies, laws, regulations, and codes. Any public organisation staff should follow these instructions. Therefore, there is very little room or window for informal arrangements. Non-state agencies can establish informal arrangements. But within the informal arrangements, you may be unable to implement certain actions that have been identified to perform risk-sensitive urban planning (P1NE2)".*
	7. Lack of policy evaluation and update	• Sri Lankan policies relating to RSUP are not being updated satisfactorily, and revising them according to the current situation is essential (P1NE1, P1NE2, P1NE4- P1NE7, P1NE9) • Current policies are not aligned with international standards. (P1NE1, P1NE2, P1NE4-P1NE7, P1NE9)	*"Now we have many challenges in front of us, climate change, sea level rise, DRR, and global policies; therefore, of course, we must revisit, evaluate, monitor, and update according to the global agenda and current challenges. (P1NE4)"*
	8. Frequent changes in the	• National physical plans and policies are revised whenever	

Theme	Barriers	Key comments from experts	Experts' Quotations
	national development policy for the country	there is a change in the government based on their party manifestos which leads to changes in urban plans. Therefore, there is a lack of trust in the proposed plans and the urban planning process (P1NE4, P1NE 7, P1NE 8, P1NE 9, P1LE2, and P1LE5)	

As indicated by the experts and observed from the document review Sri Lankan policies in urban planning, disaster risk reduction, and climate change that focus on RSUD incorporate DRR and CC into development activities. However, the existing sectoral policies are not integrated for effective implementation. Furthermore, it neither translated into strategies and actions nor was legally supported for enforcement. Therefore, policies and legislative barriers must be overcome to create a suitable administrative environment for RSUP. The enablers identified from the interviews, to overcome those barriers, are summarised below. These enablers are presented under strategies and opportunities.

Table 5-5: Enablers for the policies and legislation-related barriers

Theme	Enablers	Key comments from experts	Experts' Quotations
Strategies			
Policies and legislations	1. Strengthening the policies and laws towards effective enforcement.	• Strengthening existing policies with clear-cut responsibilities regarding collaborative RSUP with adaptiveness, integration, and coherence is vital (P1NE2, P1NE3, P1NE4, P1NE6, P1NE7, and P1NE9) • Policies must be supported by the legal background and driven by mandatory powers for effective implementation that leads to the creation of a mandated collaboration process (P1NE 1, (P1NE2, P1NE4, P1NE6, P1NE 7, P1NE 8, P1NE9; D1, D4, D5).	"*All organisational acts and policies should have mandatory requirements for collaboration. Otherwise, they will not participate*" *(P1NE1).* "*NGO coordination should be formalised to prevent duplication of activities in the same area and ensure equitable distribution of their services*" *P1NE2.*

Theme	Enablers	Key comments from experts	Experts' Quotations
		• It is important to have effective policies, legislation, and policy implementation tools that enforce accountability by indicating the responsibilities of the stakeholders and monitoring the collaboration process, alongside penalties (P1LE4 and P1NE7). • Policies and laws should allow for required formal and informal collaboration with non-government organisations in RSUP (P1NE2, P1NE4, P1NE5; D5) • Policies need to change the current hierarchical governance system, and all organisational mandates should be changed to support the required decentralised features for collaboration (P1LE10)	
	2. Develop policy implementation tools	• Policies must be translated into strategies and action plans with mandated regulations and guidelines. (P1NE4) • Having proper policy implementation tools such as regulations, procedures, and guidelines is essential to implement collaboration practices (P1NE6, P1NE7, P1NE8; D5)	

Theme	Enablers	Key comments from experts	Experts' Quotations
	3. Collective review of the policies	• It is important to collaboratively revisit and update the existing policies according to the current requirements with a monitoring mechanism for policy evaluation and revision (P1NE1, P1NE3, and P1NE4) • Policy evaluation and development must be undertaken with the policy specialists and expert opinion without any influence from politicians (P1NE9)	*All stakeholders must come together to review the policies, update, and translate the policies into strategies and actions" (P1NE4).*
	4. Stand against changes in long-term national plans	• Bureaucrats should stand against political interference and pressure to revise long-term development plans according to political manifestos (P1NE7)	
Opportunities			
	5. International collaboration and commitments	• As Sri Lanka has signed international collaboration agreements for climate change and disaster risk reduction, developing and revising policies according to international standards that require collaborative actions among the various sectors is necessary (P1NE6).	
	6. Existing policies and laws	• From the document review (UDA Act, D6, National Disaster Management Policy 2022-2030, Coast Conservation Act No 57 of 1981, and National Climate Change Policy 2012) of the study found that existing policies and laws support RSUP initiatives, but not in an effective manner. However, these policies	

Theme	Enablers	Key comments from experts	Experts' Quotations
		and acts are considered an opportunity to build an effective collaboration process with necessary changes. • Sri Lanka's Sustainable Development Act, no. 19 of 2017, allows for developing and implementing policies and strategies towards sustainable development, including RSUP.	
	7. Existing Council	• The Sustainable Development Council has the legal power to develop and implement national policies and strategies for sustainable development. This Council provides an excellent opportunity to begin the necessary initiation towards required policy changes (Sri Lanka's Sustainable Development Act, no. 19 of 2017)	

(B) <u>Governance related barriers and enablers.</u>

Table 5-6 and Table 5-7 show the barriers and enablers identified under the governance sub-theme from the empirical data.

Table 5-6: Barriers related to governance.

Theme	Barriers	Key comments from experts	Experts' Quotations
Governance	1.Lack of power sharing and equality (P1NE1, P1NE 5, P1NE 6, P1LE 3, P1LE5, P1LE 8, and P1LE 10)	• Stakeholders with greater power have an influence on urban planning decisions, and others have less influence on the planning process. (P1NE1) • Only organisation A (anonymised) is a decision maker; therefore, they can review and decide whether others' opinions should be	*"Sometimes stakeholders are invited for discussion, but high powers go to organisation A (anonymised), and they can do whatever they want" (*P1NE5).

Theme	Barriers	Key comments from experts	Experts' Quotations
		adopted or ignored. At the same time, other organisations do not have the mandate to enforce their decision on urban plans (P1NE5, P1NE6, and P1LE3)	
	2. Lack of accountability and responsibility	• The current process does not provide accountability to stakeholders, which creates a lack of interest and involvement in the collaboration process (P1NE8). • National physical plans are not always followed at other levels due to the inadequate governance system which lacks monitoring mechanisms (P1NE6, D1) • There is a lack of clarity in the shared responsibilities of the stakeholders due to a lack of a collaborative policy review. As a result, there is no accountability and therefore stakeholders can deny any responsibility. (P1NE6, P1NE1, P1NE2, P1NE4, P1NE6, P1NE7, P1LE8, P1NE9, P1LE2, P1LE8, and P1LE10) • The involvement of too many organisations in the collaboration process can make the collaboration process ineffective (P1NE6).	*"Regarding individual ministerial functions, there are well-defined, clear-cut responsibilities. But when it comes to coordinating among different ministries and when it comes to actual implementation, responsibilities are not clearly interpreted, and sometimes people define their responsibilities as per their own understanding. This is an issue" (P1NE2).*
	3. Complex and unsuitable governance arrangements	• Each institution has separate legal framing that does not provide collaboration mechanisms (P1NE5), and there is no integration among the organisational governance arrangements towards collaborative initiatives (P1NE7) • Sri Lanka does not have a collaborative institutional framework that facilitates	*"Not all the stakeholders are operating at the same level of authority and influence; some tend to have much greater influence and leadership than others……. therefore, the universities can play a leadership role". P1NE1*

Theme	Barriers	Key comments from experts	Experts' Quotations
		horizontal links for RSUP (P1NE4, P1NE5). • No alignment between the administrative boundaries between local government and district secretariats and divisional secretariats (P1NE4, P1NE8) • There is a lack of neutral collaborative leadership (P1NE1-P1NE7, P1NE9) • Hierarchical structure with centralised powers leads to difficulty in communicating with other organisations due to long hierarchical pathways to reach the other organisations and consume more time (P1NE4 and P1LE10). • Organisational staff's existing roles and responsibilities do not allow or support collaboration activities (P1NE4, P1NE8, P1LE6, P1LE 8, P1LE 9). Therefore, there is a lack of expertise assigned by stakeholders to provide technical guidance at the local level. (P1LE1 and P1LE10) • There is an absence of representatives for participating in the collaboration process (P1NE5 and P1LE1) • Weak intra-organisational leadership (P1NE1, P1NE2, P1NE3, P1NE4, P1NE6, P1NE7, P1NE8, and P1NE9) and organisation leaders lack interest and support for collaborative initiatives (P1NE8) • Current organisational structures are not aligned with collaboration needs, and organisational leaders are also	*"Hierarchy is very heavy and does not allow for a smooth process, such as not supporting collaboration and not allowing subordinates to collaborate"* P1NE4. *"Tasks associated or assigned within the organisation do not allow for collaboration"* P1NE4. *"Island-wide, they have one department. For example, we invite organisation Y (anonymised) .... but they are in Colombo and are not participating. Therefore, we cannot plan with their input"* P1LE1. *"Once the government changes, the minister changes the organisational head. There should be a proper scheme for recruitment. In the case of organisation Z (anonymised), the organisational head is changed whenever the government changes"* P1NE7.

Theme	Barriers	Key comments from experts	Experts' Quotations
		not interested in changing the organisational structures to facilitate collaboration needs (P1NE1). • Informal relationships are important in the collaboration process since personal relationships, judgements, and priorities still determine the contribution in RSUP (P1NE3).	

The governance-related barriers are discussed in Table 5-6. A lack of power-sharing and accountability leads to ineffective participation and contribution in the collaborative RSUP process. It further leads the weak intra-organisational structural arrangement with no allocated collaborative representatives with expertise at the local level. Furthermore, organisational leadership plays a key role in changing organisational structure and culture towards collaborative needs. However, in the current context, organisational leadership is identified as weak. Furthermore, the effectiveness of the collaboration process is determined by the organisational leaders' personal wishes and judgement. The enablers identified to overcome these barriers are presented in Table 5-7.

Table 5-7: Enablers for the governance-related barriers

Theme	Enablers	Key comments from experts	Experts' Quotations
Strategies			
Governance	1. Strengthen legislation and mandated regulations	• Legislation must support the creation of institutional coordination at all administrative levels and sectors (P1NE5. P1NE2, P1NE9). • The legal framework needs to be amended with the required changes to support collaborative RSUP (D4)	*"All organisational acts and policies should have mandatory requirements for collaboration. Otherwise, they will not participate"* *(P1NE1).*
	2. Establish a collaborative governance structure.	• Suitable collaborative governance arrangements among organisations with proper leadership need to be included in	

Theme	Enablers	Key comments from experts	Experts' Quotations
		the constitutions or legislations (P1NE9).	
	3. Provide shared powers to stakeholders	• Power sharing with accountability is essential for effective collaborative RSUP (P1NE5, P1NE6, P1NE8, P1LE3, P1LE5, P1LE 8, and P1LE 10)	
	4. Identify and map stakeholders with roles and responsibilities.	• Revisit and map each stakeholder's role and responsibility and define with whom the stakeholders need to work and in what capacity. This will help organisations revise their structure according to collaborative needs (P1NE6 and P1NE9)	
	5. Rearrange intra-organisational structure with collaborative task allocation.	• The intra-organisational structures of the stakeholders need to be revised in terms of suitable leadership and required representative allocation with the job descriptions of the staff supporting the collaboration process (P1NE1 - P1NE9).	
	6. Appoint suitable organisational leadership.	• Suitable organisational leaders are essential to change the current organisational structure and culture towards collaboration (P1NE1 - P1NE4, P1NE6 - P1NE9 and P1LE2).	
Opportunities			
	7.National physical plan council and inter-ministerial coordination committee	• As discussed in D-1-2: Town and country planning ordinance No. 13 of 1946 of Appendix D: Risk-sensitive urban planning and development related legislations and policies in Sri Lanka, the inter-ministerial coordination committee is available for RSUP at the national level with a sectoral coordination arrangement. However, this is only limited to the national level; therefore,	

Theme	Enablers	Key comments from experts	Experts' Quotations
		extending the powers of this council and committee will help increase the coordination among the stakeholders across various administrative levels.	

Mapping stakeholders based on their roles and establishing a suitable collaborative governance arrangement with power sharing and equality is a key strategy to overcome governance-related barriers. In addition, the study indicates that the national physical planning council and inter-ministerial coordination committee have a great stakeholder network at the national level for the development and approval of the national physical plan and policy. Therefore, extending their powers and connecting them to the local level will help to create vertical and horizontal integration among stakeholders. Furthermore, it is important to note that, according to P1LE1, P1NE3, P1LE10, and P1LE11, the current UDA main planning committee consists of various institutions' members for approving plans. However, disaster management-related organisations and climate change-related organisations are only invited if necessary. This requirement will be determined by the main planning committee based on the climate induced disaster risk impact on the selected urban area. Therefore, UDA's main planning committee only facilitates limited coordination since the decision to collaborate solely depends on the UDA's decision.

(C) Politics related barriers and enablers.

Table 5-8 and Table 5-9 show the barriers and enablers identified under the politics sub-theme from the empirical data.

Table 5-8: Barriers relating to political aspects.

Theme	Barriers	Key comments from experts	Experts' Quotations
Politics	1.Lack of political guidance (P1NE1, P1NE 5, P1NE 6, P1NE 7, and P1NE 9)	• Political leadership adversely affects collaborative planning and implementation in Sri Lanka (P1NE1).	*"We have political support, but its accuracy and whether it is right or wrong is questionable" (P1NE1).*
	2.Political interference in collaborative RSUP	• Due to little knowledge of the subject, politicians negatively influence the administrative	*"The main issues are political influences and*

Theme	Barriers	Key comments from experts	Experts' Quotations
	(P1NE1, P1NE2, P1NE4- P1NE9,P1LE2 ,and P1LE11)	system, which affects collaborative planning and implementation (P1NE9) • Most of the time, local authorities favour the politicians who want to satisfy people's demands for their own political benefits. Therefore, there is limited space for effective collaborative RSUP (P1NE8).	*irrational projects. Politicians initiate projects and planners are forced to incorporate these into the development plans. Even, the planner has to accommodate them due to the influence" P1LE11.*
	3. Lack of vision in the political agenda	• There is a lack of vision among politicians about collaborative RSUP and, therefore, there is a lack of collaborative initiatives in their political agendas (P1NE 2, P1NE 4- P1NE 7, P1NE 9, and P1LE2). • Politicians have an ulterior motive rather than a positive vision for the country. They are using their manifestos as the country's vision when they have the power to rule (P1NE4 and P1NE2). • Policies, including the national physical plan and policy, are changed according to the different political manifestos and this leads to a continuous revision of urban plans. Therefore, stakeholders have lost trust in the planning process and are unwilling to participate in collaborative discussions (P1NE6 and P1NE7)	*"After getting into power, if you use the same manifestos as a policy, how will you run a country? That is the main mistake of most of our successive governments. They misunderstand the manifest and the government policy, which has a vision, strategy, players, actors, and everybody. Manifestos are mainly developed for one's own party members and to satisfy them. You cannot take them as a government policy." P1NE4*

Politics-related barriers, identified in the Sri Lankan context, interrupt the effective collaboration process in several ways. As stated by P1NE1, this condition prevails due to the patron-client political culture in Sri Lanka and, as a result, the politicians' dominant influence can be seen in the RSUP decision-making process. P1NE1, P1NE4, and P1NE7 stated that one of the reasons for this negative political influence culture is that professionals do not stand against politicians' negative influence and do not create awareness among them.

P1NE1 explained that this condition is further supported by the top management of the organisations appointed by the politicians who are under the control of the politicians. Moreover, P1NE2 stated that politics cannot be avoided and, therefore, an apolitical approach is difficult and, as a result, gaining political support is essential. P1NE4 mentioned that there are some good politicians, and their support needs to be gained through creating awareness by the bureaucrats. Accordingly, this study concludes that political interference is visible within the Sri Lankan RSUP context and hinders collaborative decision-making in risk-sensitive urban planning. Enablers to overcome these barriers are listed in Table 5-9.

Table 5-9: Enablers for the political-related barriers

Theme	Enablers	Key comments from experts	Experts' Quotations
		Strategies	
Politics	1.Establish a criterion for political appointments	• Ministers should have subject knowledge about their field; therefore, there should be criteria for the appointment of ministers to avoid negative impacts on RSUP due to their lack of knowledge (P1NE9 and P1NE8).	
	2. Bureaucrats should stand against negative influences and create awareness amongst politicians	• Bureaucrats should encourage politicians to create awareness of a proper collaborative decision-making process (P1NE4, P1NE7, and P1NE9).	*"It is the responsibility of the relevant professionals to give current information and guidance to the politicians. We cannot do anything if the relevant professional plays a "yes sir" role. The issue is with professionals and relevant officers and their inability to manage and convince politicians" P1NE7.*
	3. Create a standard development policy for the long term.	• It is important to have a common national policy and plan for development activities which should not be affected by politicians' negative influences based on their manifestos and political gains (P1NE4 and P1NE8)	

Theme	Enablers	Key comments from experts	Experts' Quotations
		• Bureaucrats should oppose politicians who are trying to gain personal benefits and explain the need for a common policy for the country's development (P1NE7)	

It is important to consider the criteria established for political candidates' appointments to overcome political barriers. However, the experts recommended that bureaucrats oppose political interference by creating awareness among politicians regarding the importance of long-term development policy and plans, collaborative RSUP, and its implementation.

5.4.2 Working environment-related barriers and enablers

Table 5-10 and Table 5-11show the barriers and enablers identified under the politics subtheme from the empirical data.

Table 5-10: Barriers relating to working environments.

Theme	Barriers	Key comments from experts	Experts' Quotations
Working environment	1. Lack of understanding among the stakeholders	• Lack of understanding among stakeholders regarding their roles within RSUP creates conflicts among stakeholders (P1LE4)	*"Among the agencies, they do not have enough understanding. They are doing their tasks. Some organisations are wasting time arguing about who has the authority in a given area while development is taking place" P1LE4.*
	2. Silo-based working patterns and old practices.	• People are looking only into their part of the work rather than focusing on the whole collaboration picture (P1NE8) • Organisational leadership still supports silo-based culture (P1LE2) • Some organisations still have old capabilities and practices without any improvements. For example,	*"They have their own compartment; beyond that, they are not thinking and working. They are working in silos. They are thinking of a minimal scope according to their mandatory power" P1NE5.*

Theme	Barriers	Key comments from experts	Experts' Quotations
		it is difficult to share data in the required format since paper-based data storage is maintained (P1NE1 and P1LE10).	
	3. Lack of motivation	• Lack of motivation from top management hinders collaboration (P1NE1 and P1NE5). • No motivational factors, such as incentives, can be seen in collaborative RSUP (P1NE1, P1NE5, and P1NE6).	
	4. Personal judgement influences collaboration practices	• The collaboration decision-making process is influenced by personal judgements based on benefit expectations (P1NE 3, P1NE 5, and P1NE 7). • Personal interest and judgement mainly occur in data sharing due to a lack of mandates and policies (P1NE3 and P1NE5) • Support from organisational leaders is essential for accomplishing work within an organisation that depends on the personal judgement of the leaders and the personal relationships (P1NE3).	
	5. Unsupportive personal attributes of the collaborative members.	• General attitudinal problems can be seen in collaborative development initiatives (D4). • Ego and competing interests create conflicts and a lack of cooperation. Therefore, other opinions are not prioritised in the RSUP decision-making. Therefore, members are reluctant to collaborate and share knowledge (P1NE3, P1LE2, P1LE4, and P1LE10)	*"Ideally, every organisation needs to be involved in urban planning and work as co-designers. ... Organisation X (anonymised) think this is their subject; therefore, sometimes they do not follow others' guidance. Actually, planning is a multi-stakeholder activity. It should incorporate the ideas of different stakeholders.*

Theme	Barriers	Key comments from experts	Experts' Quotations
		• Interprofessional competition and competition between organisations prevail (P1NE1 and P1NE5) • People are not ready to be transparent and share data, and some stakeholders do not share purposely to hide their mistakes and corruption (P1NE3 and P1NE5). • People's Mentality: ✓ Do not prioritise collaborative meetings and always give importance to other tasks, ✓ Do not attend meetings due to unawareness of the roles, the importance of RSUP, a lack of subject knowledge (P1NE3, P1NE4, P1NE5, P1NE8, and P1LE10), and absence of collaborative job descriptions that include collaborative responsibilities. ✓ Lack of organisational capacity, including human resources, is one reason for their reluctance to work on collaborative needs which is considered as an extra burden on their workload (P1NE3, P1NE5, and P1LE10) ✓ The current educational culture develops a competitive mentality (P1NE3) ✓ People are reluctant to contribute to round table discussions and raise their voices since they believe they represent themselves,	*In some places, organisation X is developing plans in their own way."* *P1NE5.*

Theme	Barriers	Key comments from experts	Experts' Quotations
		and they do not understand that they are representing their organisation, not themselves (P1NE6). • Unsupportive behaviour: ✓ The behaviour of the collaborative members is a significant factor in the success of stakeholder collaboration (P1NE5 and P1LE2) ✓ Behavioural issues come from family and social backgrounds, determined by educational level, personal development and knowledge of the staff (P1NE5). • Lack of enthusiasm and commitment ✓ Staff do not have the interest and enthusiasm to collaborate and to provide their input into planning, and attend meetings only to register their attendance (P1LE 2, P1LE8, and P1LE10) ✓ Staff losing trust and becoming frustrated in collaborative planning due to revisions made based on political manifestos in a long-term plan (P1NE7) • Negative attitude to their organisation: Some staff do not contribute to their organisations effectively and are dormant in important collaboration activities due to their needs and wishes not being	

Theme	Barriers	Key comments from experts	Experts' Quotations
		fulfilled (such as not being recognised for promotions) (P1NE4).	

The working environment barriers presented above illustrate the unsupportive environment that can be created due to the personal attributes of staff, and the lack of motivational factors that can occur from the organisational side. Table 5-11presents the enablers that can overcome the related barriers within the working environment.

Table 5-11: Enablers for the working environment-related barriers

Theme	Enablers	Key comments from experts	Experts' Quotations
Strategies			
Working environment	1. Policies and laws that state collaborative responsibilities.	• Once the policies and legislation are in place, staff will effectively participate and contribute despite their interests and negative attributes (P1NE6). • Policies and laws should provide shared powers among key stakeholders to avoid conflicts and ignorance (P1NE5).	
	2. Introduce research and development activities to change the silo-based culture.	• Having an R&D division and activities helps to create a collaborative mentality among staff (P1NE5).	
	3. Proper recruitment methods	• There should be a proper recruitment process that assesses the collaboration attributes of candidates (P1NE2).	
	4. Capacity building of the collaborative staff	• Creating awareness through enhancing stakeholders' knowledge through training activities will help to change their attitudes towards collaboration (P1NE1, P1NE 6, P1NE 8, and P1NE 9) • Staff need to be involved in an excellent environment to get good exposure to change their mindset, such as foreign visits (P1LE4)	

Theme	Enablers	Key comments from experts	Experts' Quotations
	5. Monitor and evaluate the performance	• Establishing indicators for measuring collaborative performance could be a solution to overcoming working culture-related issues (P1NE1, P1NE 2, P1NE 6, and P1NE 9)	
	7. Motivation	• Provide financial incentives (P1NE1, P1NE 2, P1NE 5, P1NE 6, and P1NE9) • Provide non- monetary incentives such as promotions and recognition (P1NE6) • Top managers should provide proper guidance and a suitable environment for collaborative working by considering their staff's existing workloads. This support is essential to motivate and change staff attitudes towards collaboration. (P1NE5)	*"I do not think that current collaboration is rewarded. I think the commitment to the collaboration has to be incentivised. If not, it does not really motivate people to go out and collaborate. Therefore, people remain very much confined to their organisation" P1NE1.*
	8. Top management can influence and give directives in changing culture	• Top management in an organisation could transform silo-based culture by including collaboration responsibilities in official job descriptions and creating monitoring and evaluation processes (P1NE1, P1NE4, P1NE5, and P1NE6) • Motivate staff by giving required directives that help to change their attitudes towards collaboration (P1NE4)	
	9. Teach collaborative attributes at the school level.	• It is important to provide proper directives at a young age in schools and in universities to change the attitudes of the young generation to foster good qualities and awareness about RSUP (P1NE4).	
	Opportunities		

Theme	Enablers	Key comments from experts	Experts' Quotations
	10. Disaster Management Plan 2022-2030 (D5)	• D5 focuses on involving universities and research organisations in training officials, and on capacity development including teaching disaster management in universities as well as overall knowledge development activities. This plan is an opportunity to overcome the working culture barriers created by the lack of knowledge and unawareness.	

5.4.3 Information and knowledge sharing

Table 5-12 and Table 5-13 show the barriers and enablers for information and knowledge sharing identified from the empirical data.

Table 5-12: Barriers relating to information and knowledge sharing.

Theme	Barriers	Key comments from experts	Experts' Quotations
Information and knowledge sharing	1. Lack of information and knowledge sharing	• Lack of communication and coordination among the stakeholders, and access to information from various organisations is limited in Sri Lanka (P1NE1, P1NE2, P1NE4-P1NE5, P1NE8, and P1NE9) • D4 indicated that there are still severe lapses in communication, inter-departmental and inter-ministerial cooperation, and coordination.	
	2. Reluctance to share data.	• Stakeholders are reluctant to share data for planning, sometimes due to inaccurate data and sometimes due to corruption (P1LE10 and P1NE3).	*"When I worked with the divisional secretariat to get resource data, that person did not allow me to print a copy. They ask me to read and go. These data are not updated and are inaccurate. I could not use them since they are unreliable. P1LE10*
	3. Not providing the data according	• Stakeholders do not provide the data according to the requested format or the requirements. For example, organisation X	

Theme	Barriers	Key comments from experts	Experts' Quotations
	to the required format.	(anonymised) needs GIS map information in 1:10000 and another organisation has data in 1:50000 (P1LE10) • Organisations lack staff and need funding to create the data in the required format (P1LE10).	
	4. Lack of data	• Lack of information available within organisations is one of the reasons for not sharing information among stakeholders (P1NE3, D4). • Organisations do not give the requested data as they do not have the data at the local office. The information request needs to go to the head office, and that is a long process due to the hierarchical governance (P1LE4 and P1LE10)	
	5. Information is not available within the responsible organisations	• Data is not available within the responsible organisation (P1LE10)	*"If we request data from organisation A, they advised to get the data from organisation B. Planners face difficulties in getting data due to the long hierarchy" P1LE10*
	6. Unreliability of the data	• The reliability of the data is questionable for valid usage (P1LE10 and P1LE11)	
	7. Selling data for money	• Some of the key data needs to be purchased in Sri Lanka, and this situation is sometimes managed due to the informal connections between organisational staff (P1LE10) • Most organisations ask for money to give their data. This depends on the head of the organisation since there are no systems or mandates for data sharing (P1NE6 and P1NE7)	*In Sri Lanka, most institutions think a database is a golden treasure. They think that if you share something with another organisation free of charge, that is a loss for the organisation, and if they sell the information, that is a good option to get profit for the organisation. P1LE10*
	8. No mandates and procedures for information	• No proper system for communication, information, and knowledge sharing among the stakeholders due to a lack of	*There is no system for data sharing among the stakeholders. The current system does not allow for*

Theme	Barriers	Key comments from experts	Experts' Quotations
	and knowledge sharing	mandates and agreements (P1NE1, P1NE2, P1NE4, P1NE5, P1NE8, P1NE9, P1LE2) • The personal interest of organisational leaders takes a place in information sharing since no mandates are available to support data sharing (P1NE3 and P1NE5) • Lack of knowledge sharing among the stakeholders prevails in the current RSUP context, leading to ineffective collaborative decision-making (P1NE1 and P1NE2).	*sharing of the information, and information is scattered, and it is in different types of compartments. P1NE4* *Dissemination of knowledge among stakeholders does not happen automatically. That has to be promoted. P1NE1.*
	9. Lack of modern digital technology usage in information and knowledge sharing	• There is no collaborative digital platform to share data from different organisations to help collaborative decision-making (P1NE4 and P1NE5) • Most Sri Lankan organisations do not use modern technology to communicate with other organisations, and they still rely on paperwork which hinders effective communication and information and knowledge sharing (P1NE8, P1NE9, and P1LE10).	
	10. Language barriers	• Stakeholders in Sri Lanka face language issues in communication and coordination across boundaries (P1NE1, P1NE2, P1NE4-P1NE6, and P1NE9) • Language is a massive barrier to expressing their opinions and to understanding the jargon, which leads to a lack of enthusiasm and commitment (P1LE2, P1NE4, and P1LE5)	

Enablers to overcome those barriers are presented in Table 5-13.

Table 5-13: Enablers for the information and knowledge sharing related barriers.

Theme	Enablers	Key comments from experts	Experts' Quotations
		Strategies	
Information and knowledge sharing	1.Strengthening the policies and laws towards effective information and knowledge sharing	• The legal system should be strengthened with regards to data sharing for RSUP; it should lead to the establishment of procedures for information and knowledge sharing (P1NE5) • Creating agreements can be a solution for increasing information and knowledge sharing (P1NE1, P1NE6, and P1NE9).	
	2. Establish system for information and knowledge sharing	• A proper system is essential for inputting and dealing with information requests from organisations (P1NE4).	*"You need a system. For example, you ask the data from an organisation, and they are not ready to give it. If you have an online system, you just put in a request application; whether you have a personal connection or not, you can get it. That is a system. In the long run, you need a system. P1NE4*
	3. Adopt modern digital technology for information sharing.	• Creating an online platform is essential for requesting and getting information (P1NE4) • Organisations need to move cloud-based communication systems and away from paperwork for effective communication and information sharing (P1NE9)	
	4. Change to decentralised governance	• Having a decentralised governance arrangement in organisations with required powers is essential for accessible communication and data gathering without following the long	

Theme	Enablers	Key comments from experts	Experts' Quotations
		hierarchy that consumes time and poses several difficulties (P1LE10).	
	5. Usage of common language	• Use English as a linking language in development planning meetings rather than using Sinhala, since the Tamil-speaking representatives cannot comprehensively understand Sinhala (P1NE9 and P1LE5)	
		Opportunities	
	6. Knowledge Platform	• A knowledge platform established by the Sustainable Development Council is available which can be used and further enhanced towards building the capacity of stakeholders (D7).	

The information and knowledge-sharing barriers and enablers are presented in the above tables. However, P1NE3 and P1NE4 looked at this issue from another angle and argued that organisations could use the "Right to Information Act" to get the data. However, P1NE6 stated that the right-to-information law focuses on citizens and is impractical for the collaborative RSUP; hence, the right-to-information act cannot be considered as an enabler. Furthermore, P1NE3 and P1NE5 stated that some organisations published their data on websites which other relevant organisations can use. However, it is essential to note that, according to P1LE10, data available on organisational websites are unsuitable for planning requirements since they are not in the required format to incorporate into the planning. Therefore, they need to request the data from relevant organisations separately, and it is challenging to get the data in the required format due to the lack of staff to fulfil these requests.

5.4.4 Collaboration process-related barriers and enablers.

Table 5-14 and Table 5-15 show the barriers and enablers for the collaboration process identified from the empirical data.

Table 5-14: Barriers relating to the collaboration process.

Theme	Barriers	Key comments from experts	Experts' Quotations
Collaboration process	1. Improper collaboration process	• The collaboration process is not based on the mandated criteria and, therefore, it is conducted in an ad hoc manner (P1NE1, P1NE5, P1NE6, and P1NE8) • The collaboration mechanism between planning agencies and all relevant agencies is not clearly stated, and the legal provisions for this mechanism are also not adequately indicated (P1EN1, D1) • The current consultation process is unsuitable for collecting the required information for RSUP, and the consultation meetings do not provide helpful information since people just attend without engaging in a meaningful discussion (P1LE5 and P1LE8) • One of the reasons for the improper collaboration process is institutional limitations, such as a lack of staff to participate and a lack of funding to conduct several collaborative meetings with stakeholders and community groups throughout the plan development phases (P1LE10).	*"The planner has a major role to play. There is no guideline as to who should be consulted and who shouldn't; planners are the people deciding everything based on their knowledge" P1LE11.*
	2. Lack of monitoring and evaluation of the collaboration process	• There are no comprehensive monitoring and evaluation systems in the current collaboration process in RSUP, which is one of the reasons for the ineffective collaboration process (P1NE4).	
	3. Lack of incentives	• No incentive mechanism (monetary and non-monetary) in the current collaboration process that will motivate the participants towards successful collaboration (D2, P1NE1,	

Theme	Barriers	Key comments from experts	Experts' Quotations
		P1NE 2, P1NE 5, P1NE 6, and P1NE9)	
	4.No proper identification of stakeholders	• Due to a lack of knowledge and systematic thinking, organisation X (anonymised) misses out inviting some important stakeholders for collaborative meetings and, therefore, how suitable representatives are invited for the collaboration process is questionable. This argument is further observed through the list of stakeholders consulted, given in the urban plans documents. • There are no proper guidelines or legal criteria for selecting stakeholders for collaboration, and the selection depends on the planning agency (P1NE1, P1LE1, P1LE 2, P1LE 5, P1NE8, P1LE 9, and P1LE10). • Due to the absence of defined criteria for stakeholder selection, stakeholder selection is sometimes influenced by the political agenda. Some stakeholders are purposefully ignored to make decisions without any objections. (P1NE9, P1LE5 and P1LE8).	*"No clear identification of stakeholders and mapping of their roles and responsibilities. Planning agencies never try to understand what they are doing in this case. When inviting people, the planning agency does not properly define and clarify the role. Without clarification, you blankly invite people, and they do not know what to talk about and what not to talk about. That's why the collaboration process needs to be clear-cut, and you need to mention what you need from the particular collaborative member/institution". P1NE8* *"Correct representatives are not invited. People who suit us are invited to finish the project or plan as required". P1LE5*

Theme	Barriers	Key comments from experts	Experts' Quotations
	5. No mandated procedure for collaboration	• Participants are not accountable in the collaboration process due to the absence of mandates defining the collaboration process and stakeholder responsibility (P1LE4 and P1NE5).	
	6. Low participation in collaboration process	• The participation of stakeholders in collaboration meetings is lacking as there are no subunits to represent the organisations in local areas (P1NE5; P1LE1) • Since no legal mandate is available for all the stakeholders to participate in the RSUP, participation becomes optional (P1LE2). • It can be seen from the document review that mandatory technical organisations' participation is also lacking in some of the urban plan developments. (See Appendix J: Stakeholder participation in terms of RSUP in NPP and UDA plans).	*"Some agencies send a letter through their director general saying that these parts need to be incorporated into the plan. But we need those people at the table……………… ……… Organisation C (anonymised) never came for a meeting. We always wanted to go to their office, but they seemed very busy. I do not know why this happens". P1LE10*
	7. No proper representation from the stakeholders	• There are no suitable representatives in the collaboration meetings, and thus they do not provide insights as required (P1LE10 and P1LE11) • Local-level staff duties are assigned, and they are trained for their sectoral requirements in Organisation C (anonymised) (D5); therefore, they are not present at meetings and putting forward their requirements/ideas. (P1LE11).	*"When planning agencies try to get ideas in the stakeholder meetings, representatives are unprepared. They do not have proper documents. They only come for a verbal discussion with no scientific background. At that stage, we cannot adopt the statements that they give. Even Organisation C*

Theme	Barriers	Key comments from experts	Experts' Quotations
			just came to sit and discuss verbally without proper preparation……… ………. People like discuss their experience. However, planners only need scientifically based decision-making factors. They talk only about their experience" P1LE11.
	8. Poor feedback mechanism	• Collaboration process is ineffective since the meeting minutes, and feedback, are not shared among participants (P1NE5, D3). • There are no proper feedback mechanisms to inform all participants regarding their decisions, with justifications (P1NE5 and P1NE7). • There is no system to adopt the lessons from previous experiences and from success stories to improve the collaboration process due to the lack of a feedback mechanism (P1NE1, P1NE4, P1NE6 and P1NE9)	*"We sign only for attendance. So, they can write a minute according to their need and finalise the meeting. Nobody is notified about the minutes or feedback. We are not signed in the meeting minutes"* P1NE5.
	9. A large number of organisations	• The large number of organisational involvements in RSUP is an issue in terms of selecting and involving stakeholders in the collaboration process. This condition is created due to overlapping tasks among agencies, and many organisations are functioning in relation to the same task (P1NE1, P1NE2, P1NE4, P1NE6-P1NE9, P1LE10)	*"In Sri Lanka, there are so many organisations for one thing. If you take the environment, there are so many organisations. ... Bringing all organisations to one table in a day without missing one or more is*

Theme	Barriers	Key comments from experts	Experts' Quotations
			impossible." P1LE10.
	10.Different representatives attend during various stages of the collaboration process	• Representatives from organisations are not always the same. Therefore, discussions and monitoring or checking the outcome based on earlier comments becomes difficult. Therefore, meetings become ineffective (P1LE3 and P1LE8)	*The same people are not always attending the meetings. ………… The main problem is that there is no proper legal mechanism for monitoring them. People are not attending all the meetings due to their personal or other needs. P1LE8.*

The above table shows the barriers relating to the collaboration process in RSUP. A lack of the proper identification of stakeholders is mentioned as one of the barriers. D4 stated that the National Physical Plan is not always followed in local level urban plans due to the inadequate governance system. It can be concluded that, with the observation of the UDA plans and legislation, NPPD participation and its approval are not mandatory for urban planning at the local level, and this condition leads to a lack of integration among national plans and local plans. Furthermore, regarding community representation, P1LE10 stated that a local authority could not represent community needs even though a local authority consists of the elected members of a community. To support this point, P1LE7 stated that the local authority representative in collaborative meetings generally does not represent public opinion or the opinions of the elected representatives. Therefore, there is a need to conduct a separate meeting with all the representatives in the local authority. The following enablers are suggested to overcome the collaboration process barriers. Table 5-15 shows the proposed enablers to overcome those collaboration process related barriers.

Table 5-15: Enablers to collaboration process-related barriers

Theme	Enablers	Key comments from experts	Experts' Quotations
Strategies			
Collaboration process	1. Select appropriate agencies according to roles and responsibilities.	• Identifying all relevant stakeholders and mapping their roles and responsibilities in collaboration is vital since many agencies are involved in the same work in Sri Lanka (P1NE2, P1NE4, P1NE6, P1NE8, and P1NE9). • Reducing the number of organisations by eliminating the duplicating responsibilities among organisations and increasing the responsibility of key organisations will help to overcome the need to invite a large number of stakeholders to participate (P1NE8).	*"We need to revisit the role and responsibility of each organisation, and we need to map the responsibilities of the other organisations. Where do you have linkages? and with what stakeholders do you need to work in what capacity? Then when you understand the interlinkages, the roles are getting clearer. Based on that, you need to revise your organisation structure. e.g., establishing different collaborative teams with collaboration knowledge".* P1NE6
	2. Establish legal mandates and agreements for an effective collaboration process.	• Legal mandates and policies should be put in place to formalise the collaboration process. It also helps to overcome the negative influence of individuals' preferences in the collaboration process (P1NE6). • Formal agreement among stakeholders should be	

Theme	Enablers	Key comments from experts	Experts' Quotations
		established to overcome any issues in the collaboration process (P1NE9) • Regular stakeholder meetings should be organised to encourage effective contribution and decision-making. Stakeholder feedback should be taken seriously throughout the process (P1LE5). • It is important to have a monitoring and evaluation and feedback mechanism in the collaboration process to make it effective (P1NE1, P1NE 2, P1NE5, P1NE 6, and D1).	
	3. Allocate dedicated collaborative staff or teams within organisations.	• Stakeholders should allocate separate teams or representatives with collaborative tasks (via the official job descriptions) to avoid absence and ineffective participation due to workload and other commitments (P1NE6 and P1NE9).	
	4. Create trust	• Creating trust among stakeholders helps overcome some of the collaboration issues due to personal attributes and, hence, leads to effective participation and contribution in the collaboration process (P1NE1 and P1NE 9) • Formal collaboration processes and regulations are essential to work under and support trust since government organisations cannot work only based on trust (P1NE2 and P1NE6). • Trust in RSUP and its implementation needs to be enhanced among stakeholders by avoiding frequent changes in the national plans based on political manifestos (P1NE7).	

5.4.5 Organisational capacity-related barriers and enablers

Table 5-16 and Table 5-17 shows the barriers and enablers related to organisational capacity identified from the empirical data.

Table 5-16: Barriers relating to organisational capacity.

Theme	Barriers	Key comments from experts	Experts' Quotations
Organisational capacity	1. Inadequate financial resources	• Lack of financial resources is one of the reasons for ineffective stakeholder collaboration (P1NE 1, P1NE 2, P1NE 4, P1NE 5, and P1NE 6) • Organisations lack the financial resources to acquire competent human resources for collaboration (P1NE2) • Strategies to obtain finance for collaborative RSUP are lacking, and there are no defined financial plans for collaboration (P1NE5).	*"We wanted to do more meetings and focus groups as much as we could, even with the community. But due to the institutional framework and to financial issues, we could not conduct more than one meeting. We were trying to get all the stakeholders as much as we could for that meeting"* P1LE10.
	2. Inadequate technical capacity	• A lack of technical facilities and capacities hinders effective collaboration (P1NE 1, P1NE 2, P1NE 4, and P1NE 5) • Digital collaborative platforms are lacking in Sri Lanka to share data among stakeholders in order to work together (P1NE1 and P1NE5)	
	3. Inadequate and inefficient use of existing human resources' capacity	• Existing organisational structures do not support collaboration work since they do not have enough staff to allocate to collaboration needs due to the lack of human resources (P1NE9) • Inefficiency of existing human resources creates ineffective collaboration outcomes (P1LE10 and P1NE8) • Some organisational leaders, appointed through political influence, do not have the	

Theme	Barriers	Key comments from experts	Experts' Quotations
		proper knowledge to contribute during collaboration meetings, and this can result in ineffective collaborative decision-making (P1NE6). • Due to inadequate human resources and a lack of awareness, the appropriate responsible person who should attend meetings does not always participate and, instead, sends subordinates who do not have the responsibility and capacity to attend and participate effectively (P1LE 2) • Some Sri Lankan organisations may have enough human resources; however, they are not properly utilised (P1LE2).	
	4. Lack of knowledge of existing human resources /collaborative staff	• Lack of knowledge by the collaborative members affects the collaboration process and makes plans ineffective due to a lack of understanding about the collaborative needs (P1NE1-P1NE9) • People misunderstand their collaborative roles and needs due to their lack of knowledge (P1NE2) • Sectoral organisations lack the knowledge to provide adequate input into RSUP (P1NE6 and P1NE8; D5) • Lack of staff capacity and knowledge to handle digital technologies is one of the reasons that some organisations are not adopting the use of modern technologies (P1NE2, P1NE4, and P1NE5). • Some stakeholders are still using paper-based communication modes and are not replying to emails which hinders effective communication and	*"Sri Lanka lacks climate change expertise. We need to think more about the scientific and technological background"* P1NE6. *"For example, when we develop a plan, we need the terrain conditions and the slope conditions. What is the mean sea level? What are high and low areas? What are the issues that people are facing? Are there solutions we can offer them to mitigate their issues? How to save the people in inundation time? In order to prepare the development plan, we need such*

Theme	Barriers	Key comments from experts	Experts' Quotations
		information sharing due to their incapability to handle modern technologies (P1LE10).	*information. They have to give such input, and that knowledge is absent." P1LE1*

All the national experts stated that the lack of organisational capacity in financial resources, in human resources, and technology is one of the reasons for ineffective stakeholder collaboration. P1NE7 stated that the lack of knowledge of the stakeholders is the worst factor in RSUP, and it prevails due to the poor recruitment system. P1NE4 and P1NE6 stated that unsuitable people are selected and appointed in organisations, including to the top management positions, due to political influence and without following proper selection criteria. This factor leads to inefficiency in their collaboration performance due to their lack of knowledge and a lack of professional background. The enablers proposed to overcome those barriers are given in Table 5-17.

Table 5-17: Organisational capacity-related enablers

Theme	Enablers	Key comments from experts	Experts' Quotations
Strategies			
Organisational Capacity	1. Strengthening policies and laws providing guiding towards funding facilities	• Policies and plans should provide pathways to obtain funding for collaboration needs (P1NE5)	
	2. Capacity building of staff	• Each sectoral collaborative staff member should have sound field knowledge to provide adequate input into collaborative decision-making (P1NE6 and P1NE8) • Collaborative staff should increase their technical knowledge in order to handle modern digital technologies, such as common collaborative platforms for communicating, for digital-based data storage, and for data sharing (P1NE1)	

Theme	Enablers	Key comments from experts	Experts' Quotations
		• Capacity building of stakeholders needs to be undertaken by conducting awareness programmes, training, research, and development activities within organisations. (P1NE1, P1NE2, P1NE4, P1NE5, P1NE6, P1NE9, D5, D4, and D2)	
	3. Recruit skilled staff	• Recruiting skilled staff and organisational leaders is one of the ways of having capable staff in an organisation who can be allocated for the collaborative requirements (P1NE1, P1NE2, P1NE6, P1NE7 and P1NE9) • Skilled staff for collaborating with communities is essential (P1LE10)	
	4. Appointment of suitable organisational leadership	• Organisational leaders should have theoretical and practical knowledge to handle policy-related decision making and ground-level problem-solving (P1NE9). • An organisational leader is vital in directing employees towards collaboration and determining the organisational culture and thinking regarding collaboration. This situation leads to assigning capable representatives for the collaboration process (P1LE2 and P1NE6).	
	5. Adopt modern digital technology for information sharing	• Organisations must move to cloud-based communication systems, from paperwork, for more effective communication and information sharing (P1NE4 and P1NE9)	
Opportunities			

Theme	Enablers	Key comments from experts	Experts' Quotations
	6. Climate change adaptation strategy for Sri Lanka 2011-2016	• D2 proposed to work towards capacity building of organisational staff in regard to climate change. This knowledge development can contribute to collaborative RSUP in response to climate change.	
	7. Technical Committee on Training, Education and Public Awareness	• The Technical Committee on Training, Education, and Public Awareness functions under the Disaster Management Technical Advisory Committee and can be utilised for planning training programmes for the capacity development of government bodies and the public, including educating school children and university students (D5).	
	8.NGOs	• Utilising NGOs to engage with communities in DRR activities (D5). • Required funds can be obtained from NGOs (D2). • NGOs undertake training programmes relating to their development projects. This can be utilised for the knowledge development of the stakeholders (P1NE8)	
	9. Funds from international commitments /Green Climate Fund	• Sri Lanka can get support from international relations and agreements such as with the Green Climate Fund (D2)	
	10. Knowledge Platform	• The Sustainable Development Knowledge Platform available in Sri Lanka can be used and further enhanced towards the capacity building of stakeholders (D6).	

5.5 Adaptation of systems thinking approaches to identify the policy requirements that can enhance stakeholder collaboration in RSUP.

This section presents the connections between barriers to stakeholder collaboration in RSUP. The narratives gathered from the expert interviews were used to develop a causal loop diagram that provides the connections among the barriers. This diagram was further analysed to identify the root causes of the barriers, the conditions created by those barriers that lead to a lack of stakeholder collaboration in RSUP, and the feedback loops that represent the comprehensive stakeholder collaboration system. This causal loop diagram was validated with five RSUP and systems thinking experts. The experts' profiles are given in Table 5-18. The final causal loop diagram is presented in Figure 5-3. The validation process is explained in Appendix M: The validation process of the causal loop diagram..

Table 5-18:Expert profile of those who validated the causal loop diagram.

Expert ID	Expertise area	Profile
ECLV 1	RSUP	Senior scientist in NBRO
ECLV 2	RSUP	Planner, Former high-level officer in the Town Planners of Sri Lanka, The Commonwealth Association of Planners, and UDA.
ECLV 3	RSUP	Professor, University of Colombo
ECLV 4	RSUP and systems thinking	Researcher, University of Salford
ECLV 5	RSUP and systems thinking	Senior lecturer, Bahauddin Zakariya University

Figure 5-3: Causal loop diagram for stakeholder collaboration in RSUP

The causal loop diagram explains the cause and effects that lead to stakeholder collaboration alongside the feedback loops that represent the comprehensive stakeholder collaboration system. These systems thinking approach allows one to analyse the system and identify the key feedback loops that influence the system. As a result, key policies are proposed to enhance stakeholder collaboration in RSUP.

This causal loop diagram connects the barriers and helps to identify cause and effect. It illustrates how barriers lead to undesirable conditions, such as a lack of participation and contribution , an ineffective collaboration process, an unsupportive working environment, and a lack of information and knowledge sharing. These undesirable conditions finally lead to a lack of stakeholder collaboration, as shown in Figure 5-3. The analysis of the causal loop diagram shows that weak policies and laws, political interference, and negative personal attributes are the root causes of the lack of stakeholder collaboration in RSUP. However, according to the diagram, strong policies and legislation can influence the issues arising from the stakeholders' negative attributes. Therefore, the diagram indicates that politics, policies and legislations are key driving barriers. Furthermore, the importance of governance that is driven by policies and legislation is also shown in the diagram. Therefore, this study's findings align with the result of the ISM application that says politics, policies and legislations, and governance are the critical driving barriers that lead to a lack of stakeholder collaboration in RSUP. These findings contributes to fulfill the research gap which is already indicated in the Figure 2-8: Theoretical framework of the study.

The following subsections discuss the system's key loops to understand the leverage points.

5.5.1 Importance of Mandated Procedure for collaboration and provide accountability.

Loop 1 (mandated procedure for collaboration loop) shows that a positive improvement in adaptive integrated collaborative policies and laws creates a mandated procedure for stakeholder collaboration. Hence, the relevant organisations should be required to change their mandates towards collaboration in order to provide accountability by their collaborative representatives. This accountability increases participation and contribution (See Figure 5-4).

Figure 5-4: Mandated collaboration process

However, it is essential to note that, as one of the impacts of adaptive integrated policies and laws, power-sharing mandates are vital to providing decision-making powers with signing authority to relevant stakeholders that leads to accountability in urban planning. Hence, participation and contribution in the collaboration process will be increased (loop 2 – the power sharing loop), as shown in Figure 5-5. As another aspect, once powers are shared among stakeholders, the level of respect and recognition of other stakeholders' opinions will be increased. As a result, interest in participation and contribution and information and knowledge sharing will increase despite issues caused by personal attributes such as superior mentality and competition.

Figure 5-5: Power sharing loop

In this study, it was identified that the collaboration process for RSUP occurs in an ad hoc manner without any established criteria, including a lack of a defined number of meetings and feedback procedures. Furthermore, stakeholders stated that the current process involves many organisations as there is no established stakeholder mapping their roles and responsibilities. All these issues can be addressed by establishing a mandated procedure for collaboration with stakeholder roles and responsibilities as a contribution of loop 1 (mandated collaboration procedure loop) and loop 2 (power sharing mandates) in the system (See Figure 5-3). Establishing a mandated procedure reduces the political pressure on the planning process, for example by reducing the number of collaborative meetings and reducing the time of the planning process to get the final plan completed as early as possible.

Furthermore, the changes in organisational mandates to support collaboration, as part of loop1 (mandated collaboration procedure loop), contribute in several ways to creating a supportive working environment. Once the organisational mandate supports collaboration, strict mandates towards sectoral tasks will be loosened. Hence, a silo-based working approach and the prioritising of sectoral tasks will be reduced. Moreover, staff will be begun to think 'outside the box' with regard to collaboration. Furthermore, the change in organisational mandate regarding staff development activities, such as introducing research and development activities and training to enhance subject and technical knowledge, can bring about changes in staff mentality and produce thinking beyond their sectoral needs. This change will involve them more in innovative collaboration activities and, therefore, lead to a supporting working environment (See Figure 5-3).

5.5.2 Importance of information and knowledge sharing

The experts explained that adequate information and knowledge sharing is not taking place as there are no utilised procedures for information and knowledge sharing. This condition leads to a data selling culture in the Sri Lankan context. However, to solve the issue, the mandated procedure for collaboration (loop1) (see Figure 5-3) leads to the establishment of mandated procedures for information and knowledge sharing that will increase information and knowledge sharing effectively (loop 8- procedure for information and knowledge sharing loop).

Furthermore, establishing information and knowledge-sharing procedures is important also to the mandated collaboration procedure, which indicates the responsibility and communication

paths regarding information and knowledge sharing. This responsibility indication towards information and knowledge sharing also increases the accountability of the stakeholders, hence leading to the allocation of capable representatives in the collaboration process as shown in Figure 5-6

Figure 5-6: Procedures for information and knowledge sharing and allocation of capable representative loops.

Accountability further increases the reliability and accuracy of information and knowledge sharing by overcoming reluctance in data sharing (See Figure 5-3). Similarly, accountability creates the need for an effective recruitment process without political interference in organisational staff and leadership appointments. This effective recruitment process leads to allocating capable representatives in collaboration, thus increasing dedicated, continuous participation in, and contribution to, the collaboration process (loop 4- allocation of capable representative loop) (see Figure 5-6).

Furthermore, experts stated that an allocated capable representative could understand satisfactorily their roles and responsibilities to provide effective participation and contribution rather than the random participation of somebody from an organisation with a lack of awareness and knowledge regarding collaboration needs.

5.5.3 Importance of adequate funding and utilising NGOs

It is important to note that recruitment and allocating collaborative representatives depends on the funding availability of organisations. Moreover, experts stated that the number of collaborative meetings is generally reduced due to inadequate funding since the cost of the meetings cannot be met by the current coordinating lead agency. Loop 6 (funding loop) (see Figure 5-7) represents the increment of financial strategies in policies and laws that will increase the chance of obtaining necessary funds for collaboration needs. Available funding will facilitate the recruitment and staff allocation for collaborative RSUP.

Furthermore, such funds can be utilised for staff development activities, investment and adopting new technologies to support information and knowledge sharing, to provide incentives to motivate collaboration activities, and to conduct an adequate number of collaborative meetings as required.

Figure 5-7: Funding loop

Furthermore, experts stated that the involvement of NGOs in the collaboration process is beneficial as follows: (1) it attracts funds for collaboration activities, and (2) it supports staff development activities to enhance their subjective and technical knowledge which leads to adopting new technologies and the allocation of capable representatives. Therefore, it is suggested that policies should include provisions for integrating external organisations such

as NGOs in the collaboration process formally or informally according to the requirements. However, current Sri Lankan strict mandates provide little room for integrated decision-making from informal collaborations and, therefore, it is difficult to obtain funding through informal collaborations. Therefore, policies and laws should make provision for incorporating informal collaborative insights in decision-making and for formalising the necessary external organisations' involvement in the collaboration process to gain the maximum benefit from them. These changes can be put in place by creating collaborative institutional frameworks that facilitate NGOs' formal or informal involvement in the collaboration process (loop 7 – involvement of NGOs loop) (See Figure 5-8).

Figure 5-8: NGOs' involvement loop

Therefore, Loop 6 (funding loop) and Loop 7 (involvement of NGOs loop) are also identified as the key loops in the system that contribute to all four conditions: participation and contribution, working environment, information and knowledge sharing, and collaboration process (See Figure 5-3).

5.5.4 Importance of a collaborative institutional framework

In the Sri Lankan context, no collaborative institutional framework creates coordination among various organisations, and the dominancy of leading organisations in the collaboration process prevails since no powers are distributed among stakeholders in decision-making. As a

solution, establishing a mandated procedure (loop 1) and power-sharing mandates (loop 2) leads to determining an organisations' collaborative framework with neutral leadership to avoid dominant stakeholder leadership in the collaborative planning process (See Figure 5-9).

Figure 5-9: Collaborative institutional framework loop

This collaborative institutional framework further reduces stakeholders' centralised intra-organisational structure; thereby, powers are devolved to the local level, where collaborative RSUP occurs. Once the decentralised structure with dedicated powers is in place, the long hierarchical communication path for information requests and sharing will be eliminated. Therefore, the effectiveness of information and knowledge sharing will be increased. Additionally, this decentralisation reduces the centralised organisational structure, resulting in supportive working environments. This collaborative institutional framework further influences the stakeholders to appoint representatives for the collaboration process by eliminating current barriers, such as the unavailability of subunits or representatives at the local level to participate in the collaboration process.

5.5.5 Importance of staff development activities

Figure 5-10: Staff development activity loop

Staff development activities increase human resource competencies in organisations which help employees adopt new digital technologies that can support adequate information and knowledge sharing (loop10- staff development activities loop). This competent human resource further contributes to the allocation of capable representatives with required subject knowledge, despite rely on recruiting new staff. Hence participation and effective representation in collaboration meetings will be increased (See Figure 5-10). Therefore, policies should promote staff development activities to enhance collaboration by overcoming issues due to unawareness, and lack of technical and subject knowledge, as discussed above.

5.5.6 Identifying critical loops

Figure 5-11: Critical loops

As well as the features of adaptive integrated policies and legislations that create mandated collaboration procedures (loop 1) as discussed above, loop 5 (changes in common national policies and plan loop) represents the reinforcing effect on stakeholders' trust in the planning process through political pressure (See Figure 5-11). Experts stated that there is a negative effect on trust in the planning process because of political influence in changing the country's common national development plan and policy according to the ruling parties' political manifestos. Therefore, stakeholders avoid participating and contributing to the collaboration process. As a result, stakeholder collaboration is lacking, thereby reducing the collective stand against political pressures. Hence, the political pressure on collaborative policies and plans tend to further exacerbate.

Even though other participation and contribution-related issues such as personal interest, the working environment, the allocation of dedicative collaborative members, and understanding the roles, can be overcome by the formation of mandated collaboration procedures (loop 1) as discussed above (See Figure 5-3), changes in the national policy and plan loop (loop 5) can be considered as a competing loop that affects effective participation and contribution. Accordingly, the dominancy of loop 1 and loop 5 will determine the collaboration effectiveness. Therefore, there should be criteria to revise the national common planning policy and plans without them being influenced by governmental changes and political manifestoes.

5.5.7 Importance of collaborative policy review and update

The experts stated that once the stakeholders have mandates and accountability in regard of collaboration needs, they are required to collaborate effectively despite their interests and negative personal attributes such as ego, competitive mentality, and lack of enthusiasm and commitment (See Figure 5-3). However, it is essential to note that loop 1(mandated procedure for collaboration) shows the balancing effect of climate-induced disaster risks on adaptive integrated collaborative policies and laws.

The balancing effect is explained as follows (See Figure 5-12): the increment of the adaptive integrated collaborative policies and laws results in participation and contribution by increasing accountability in the collaboration process. Thus, successful collaborative RSUP and its implementation are taking place. This successful risk-sensitive urban planning and implementation reduces the climate-induced disaster risk and its impact. Therefore, the need for a collaborative review of policies and laws will be reduced. Hence, adaptive integrated laws and policies will be outdated in the long term.

Figure 5-12: Mandated procedure loop and feedback loop

In the meantime, feedback on the collaboration process also influences the adaptive integrated collaborative policies and laws (loop 3- feedback loop). However, since this feedback loop shows the reinforcing effect, the decremental effect of adaptive policies and

laws results in outdated mandates; thereby, feedback based on outdated mandates and systems may be ineffective in revising the policies and laws to serve the current need. Moreover, stakeholders may not be ready to collaboratively review the policies and laws until they experience the effect of climate-induced disaster risk. Hence, the integration among sectoral policies and adaptiveness towards collaborative requirements may get outdated over time; hence, collaboration needs cannot be achieved.

As discussed before, loop 1 (mandated collaboration procedure loop) is considered an overriding loop in the system (See Figure 5-3). Therefore, this lack of review and update of policies and laws will affect stakeholder collaboration in RSUP. Therefore, there is a need for a policy to define the collaborative policy evaluation and update procedures at regular intervals. Therefore, it is suggested that stakeholders should collaboratively review policies and legislation at regular intervals for effective stakeholder collaboration in risk-sensitive urban planning.

5.5.8 Policy requirements

As an outcome of this analysis, the following policy changes are proposed to change the system effectively by reducing negative impacts.

1. Stakeholders should collaboratively review policies and legislation at regular intervals for effective stakeholder collaboration in risk-sensitive urban planning.
2. Policies and legislation should define mandated collaboration procedures and indicate stakeholders' roles and responsibilities.
3. Policies and legislation should determine a collaborative institutional framework for risk-sensitive urban planning with required decentralised and neutral leadership features.
4. Policies and legislation should dedicate shared powers to all stakeholders with signing authority in RSUP.
5. Policies and legislation should guide funding for these collaboration processes.
6. Policies and legislation should provide criteria to revise the national standard planning policy and plans without getting influenced by governmental changes and political manifestoes.

7. Policies should allow informal collaboration in risk-sensitive urban planning and permit formalising collaboration with external organisations such as NGOs as required.

8. Policies and legislation should establish the procedure for information and knowledge sharing.

9. Policies and legislation should encourage staff development activities such as research and training sessions to enhance subject and technical knowledge.

5.6 Suitable collaborative governance arrangements for enhancing stakeholder collaboration in risk-sensitive urban planning.

This section provides a detailed analysis of the primary data findings from the experts' interviews and document reviews that provide the basis for establishing a suitable collaborative governance structure for Sri Lankan RSUP. The following sections provide recommended collaborative governance arrangements and features for effective stakeholder collaboration in RSUP.

5.6.1 Current governance arrangements in the RSUP

In Sri Lanka, according to the Urban Development Authority Act of 1978, No 41, UDA is the leading organisation responsible for urban planning for declared urban areas. The regional office planning committee of the UDA coordinates with other agencies such as local authorities, district secretariats, divisional secretariats, and other technical agencies relating to disasters, the environment, and community representatives. It is important to note that collaboration with other stakeholders at the local level for urban planning is not mandated according to the UDA Act. According to section 8. c of the Act no 41 of 1978, UDA has the power to call upon any government agencies to undertake consultation for any development activities, however it is not indicated as a mandated collaboration requirement. Hence, the document review of urban planning documents shows that some urban plans were developed without stakeholders' consultation meetings. Furthermore, P1NE5 further mentioned that the UDA head office develops some of the urban plans at the national level due to the incapacity of some regional UDA offices, and, therefore, opportunities for collaboration with local stakeholders are absent. Thus, collaborative network arrangements at the local level while preparing urban plans is not mandated and, therefore, is implemented in an ad hoc manner.

It is important to note that, according to the document reviews of urban plans, the Climate Change Secretariat, the dedicated organisation for climate change, did not participate in any collaborative meetings for urban planning. In addition, it was identified from the published urban plans that stakeholders' collaboration meetings were conducted in an ad hoc manner. The stakeholders were invited without any correct mapping/identifying of their roles and responsibilities. Sometimes, urban plans were developed without any stakeholder

collaboration process. Moreover, the stakeholders are invited for the collaborative meetings depending entirely on the UDA's discretion.

Furthermore, any developed plans will be approved by the UDA head office's main planning committee which does not have mandatory participation from national-level DRR and CC sector stakeholders. P1NE3, P1LE1, P1LE10, and P1LE11 stated that the UDA's main planning committee at the head office approves the local urban plans developed by the UDA local offices and invites relevant stakeholders (such as disaster management agencies and environmental agencies) based on the necessity. However, there is no mandated requirement to invite those stakeholders.

Moreover, all provincial-level plans and local-level plans, such as urban and non-urban area plans, need to be aligned with the National Physical Plan developed by the Department of the National Physical Plan, and any deviations need to be reviewed by an inter-ministerial coordination committee and approved by the National Physical Plan Council according to the National Physical Plan and Policy 2017-2050. However, the National Physical Planning Council and the Department of the National Physical Plan do not have any legislative powers to influence the urban plans according to the Town and Country Plan Ordinance and the UDA Act, as stated by P1NE6 and P1LE11. It is obvious from the document reviews that, most of the time, a National Physical Planning Department member is not invited to stakeholder meetings at the local level of urban planning. It is important to note that there is little integration among national and local plans in the current governance system. Moreover, urban and non-urban area plans are developed by agencies such as UDA and local authorities without common leadership to oversee urban and non-urban area plans. This condition leads to a lack of integration among the development plans among adjacent administrative boundaries and ineffective RSUP.

Finally, regarding inter-organisational arrangements, P1LE10 stated that current sectoral agencies follow long hierarchical structural arrangements without any decentralisation features at local level. Therefore, communication and information sharing must go through a long hierarchical path that consumes time and poses several difficulties.

5.6.2 Proposed structural arrangements.

Table 5-19 shows the list of governance structural arrangements proposed by the empirical data for collaborative RSUP.

Table 5-19: Structural arrangements proposed by the empirical data for collaborative RSUP.

Proposed structural arrangements	Experts' Views	Quotations
1. Local authorities as a planners	1. The National Policy on Local Government Action Plan 2012-2014 suggests that local authorities can involve the District Secretariat in the planning and coordinating of major development work. 2. According to the document review, it is essential to note that, despite several planning legislations and planning agencies that came later, the Housing and Town Improvement Ordinance in 1915 provided powers to the local authorities as a primary planning agency for development activities. Since the coordination between the National Physical Planning Department and the local authorities is suggested in this arrangement, this option facilitates the balance between bottom-up and top-down approaches, which is identified as one of the features of successful collaborative governance arrangements (See section D-1-2: Town and country planning ordinance No. 13 of 1946 of Appendix D: Risk-sensitive urban planning and development related legislations and policies in Sri Lanka). 3.D4, D5, D6, and National Policy on Local Government Action Plan 2012-2014 encourage the leadership of the local authority in the planning of development activities, including urban areas, since this approach is already there for non-urban areas where the UDA is not available for planning as mentioned in D5. 3. However, it is essential to note, as mentioned by P1LE5, that local authorities lack the capabilities to take on RSUP leadership. To support this, D4 suggested that local authorities be empowered to formulate zoning and urban development schemes in collaboration with the National Physical Planning Department and the Urban Development Authority. Therefore, it can be concluded that even though local authorities are proposed as leading agencies in the collaboration process, they are incapable of executing such an undertaking.	

Proposed structural arrangements	Experts' Views	Quotations
2. The steering committee or core team with key stakeholders	P1NE5 suggested that the collaboration structure should facilitate horizontal connections and power-sharing with a top-down approach. Therefore, accountability should be transferred to all collaborative members to increase collaboration. Accordingly, P1NE5 proposed that creating a core team or a steering committee with key stakeholders, and having advisory committees of research organisations and universities, is suitable for enhancing collaboration in RSUP.	*I propose some key agencies for steering and advisory committees. First, the aspects need to be identified; key agencies can come according to these aspects. Research organisations and universities are not on the steering committee. They can be on the advisory committee to give some advice. (PINE5)*
3. Mobilise the existing leadership	1. P1NE4 insisted on mobilising existing leadership by stating that bringing a third party as new leadership is not essential. Moreover, P1NE4 stated that the UDA can take the leadership role as with current practice, and all other organisations should cooperate with a mutual understanding. 2. In contrast, P1LE4, P1NE6, and P1NE8 stated that the UDA is a technical planning agency which is not suitable for decision-making in RSUP. 3. PLE11 stated that the urban plans which are developed by the local planning offices of the UDA are approved by the main planning committee of the UDA head office. This main planning committee does not consist of other DRR and CC sectoral representatives as members, and they can be invited if required. Therefore, the UDA is the sole decision maker at the national level, with limited sectoral stakeholder collaboration.	

Proposed structural arrangements	Experts' Views	Quotations
	4. P1NE8 stated that the issue with the current UDA is that their powers are limited to developing urban plans and that they lack powers for implementation which is mainly influenced by political interference.	
4. The leadership of the National Physical Planning Department	1. P1LE11, an expert from the planning agency (UDA), stated that the National Physical Planning Department needs to be extended to involve RSUP. 2. P1LE11 further stated that regional plans are developed according to the National Physical Plan under the National Physical Planning Department, and the National Physical Planning Department is responsible for non-urban area plans by coordinating with local authorities. It is important to note that regional plans runoff cover all the runoff plans, the regional level drainage plans, and the water system and provide integrated views for urban planning. Therefore, the involvement of the National Physical Planning Department is essential for a holistic and integrated approach to urban plans with non-urban plans and other urban plans. 3. P1NE6 indicated that the National Physical Planning Department, which prepares the National Development Plan for the country, is not given any authority to influence the local urban plans' decision-making, even though the National Physical Plan and Policy 2017-2050 indicated that all local plans should be aligned with the National Physical Plan. Accordingly, supervision by the National Physical Plan Department is essential in the local plans to ensure the integration of all local plans among all administrative boundaries and to create integration among national and local plans as balanced top-down and bottom-up approaches in development plans. 4. From the document review, the study has identified that the National Physical Planning Council, and the inter-ministerial coordination committee consists of all the relevant subject ministries' representatives. This council and committee were formed under Act 49 of 2000, the amendment of the town and country planning ordinance. This sectoral ministries' feature was highlighted as a required feature	*I can suggest NPPD should be extended to focus on RSUP. They are now not strong enough to influence planning and implementation. They are preparing the National Physical Plan. There is a council called NPPC with all ministers. And a technical committee is also there. But they have no power to influence these kinds of physical development on the ground level. My idea is that NPP would strengthen and connect to LA and DS for the non-urban areas. Anyway, UDA follows the NPP and prepares a plan for urban areas. The whole country plan in a holistic view can be done (P1LE11).*

Proposed structural arrangements	Experts' Views	Quotations
	for effective collaboration by P1NE4. This council and committee are dedicated to developing and approving the National Physical Plan and Policy, and they are not connected to the local level to control the country's urban planning and development activities, hence hindering the bottom-up approach. 5. It is further observed from the document reviews that the National Physical Planning Council and the inter-ministerial coordination committee, and the National Physical Planning Department are involved in the development and approval of the National Plan at the national level, in regional plans, and in local plans for non-urban areas; however, according to the P1LE1 and P1LE11, in practice, generally, local authorities jointly work with the UDA for planning development activities in their local purview. 6. The National Physical Plan Council, committee and the National Physical Planning Department do not have the authority to be involved in RSUP decision-making at the local level despite the fact that all urban plans should align with the National Physical Plan. Therefore, as P1NE6 stated, the integration of national physical and local plans is still questionable, although the UDA says that national physical plans are considered in urban planning. 7.The above analysis shows that a top-down approach is lacking since the involvement of NPPD is lacking in current RSUP decision-making. Therefore, in order to create a balanced top-down and bottom-up approach, this study suggests that, in compliance with the opinions of above-mentioned experts, the National Physical Planning Council, the inter-ministerial committee, and the National Physical Planning Department (See D-1-2: Town and country planning ordinance No. 13 of 1946 of Appendix D: Risk-sensitive urban planning and development related legislations and policies in Sri Lanka) need to be empowered to approve urban plans by checking whether they are aligned with the National Physical Plans.	

Proposed structural arrangements	Experts' Views	Quotations
	Furthermore, this arrangement can help to incorporate bottom-up ideas at the national level if necessary. This transformation will help to overcome the limitations associated with the current practice whereby the UDA main planning committee at the national level decides on the urban plans developed at the local level without having all relevant stakeholders as mandatory participants.	
5. Shared leadership of divisional secretariat and local authorities	1.P1NE 8 suggested that the divisional secretariat and local authorities, which consist of political leaders who are public representatives, should take a shared lead in urban planning, and UDA should only provide technical support and cannot take a leading role. 2.P1NE8 has emphasised the importance of incorporating a bottom-up approach. All plans from the divisional secretariat level are to be taken to the district secretariat level and to the national level (P1NE8). DMC and CCS must be integrated with these local agencies to provide technical support. Furthermore, these local plan details must be integrated with the national physical plan. 3.D4 and D6 also suggested a decentralised approach by providing a leading role to the local authorities and/or divisional secretariats. In contrast, P1LE11 stated that district secretariats are coordinators and mainly responsible for the welfare and supply chain of the country, and therefore, they cannot be considered for the planning leadership. 4.P1NE5 and D4 stated that local authorities are not capable enough to take leadership of planning activities at the current stage and need to be empowered. 5.Furthermore, to validate the above statement, DRAFT National Policy and Strategy on Sustainable Development, sustainable development council, 2020 focuses on the empowerment and capacity building of local authorities and Divisional Secretariats towards inclusive planning and disaster management.	

5.6.3 Features required for collaborative risk-sensitive urban planning in Sri Lanka.

Table 5-20 shows the required features in the collaborative governance arrangements that can foster collaboration among stakeholders in RSUP.

Table 5-20: Required features for collaborative governance in RSUP.

Features	Key points discussed	Quotations
1. Power sharing and equality	1.Power sharing and equity among stakeholders are essential for successful collaboration (P1NE1, P1NE 4, P1NE 5 and P1NE 6). Since UDA is the sole decision maker, and all powers are vested with them regarding RSUP, therefore, other stakeholders' opinions are sometimes not recognised or are ignored (P1E1, P1LE3, P1NE5, and P1NE6). This argument is further validated from the documents' review as follows: According to section 8. c of the Urban Development Act no 41 of 1978, the UDA has the power to call upon any government agencies to undertake consultation with the authority for any development activities. Other sectoral laws and mandates do not have any powers related to RSUP. Therefore, the UDA takes leadership and decision-making powers in RSUP. This condition leads to other stakeholders having no powers and influence in decision-making. 2.All relevant key stakeholders to be involved in the RSUP process as co-designers and to take responsibility and accountability for the design by signing and approving the plan; this can help to avoid the supremacy held by the dominant stakeholder (P1LE3, P1LE 5, P1LE8, P1NE7, and P1NE5) 3.Each institution should lead each other towards collaboration with proper guidance and, therefore, a shared network governance where each organisation has the leading role is suitable for RSUP (P1NE3).	
2. Neutral leadership	1. Neutral collaborative leadership is absent in the current governance arrangements and, therefore, it is important to have an external neutral collaborative leader to coordinate the collaboration activities from a university or a research organisation to create equality among all stakeholders (P1NE1 and P1NE5).	*"Particularly in urban development, the universities can play a leadership role. Everybody should benefit rather than only*

Features	Key points discussed	Quotations
		certain stakeholders having the upper hand and having a greater kind of influence at the expense of others" (P1NE1)
3. Necessary decentralisation approach	1. A rigid top-down hierarchical system prevails in Sri Lanka which does not allow for bottom-up approaches (P1NE1-P1NE6, P1NE9). This condition leads everyone to work according to their mandates and to not think about working 'out of the box'. (P1NE7). 2. Conversely, P1NE4 stated that hierarchical features are essential for governance to manage things. However, power devolution is essential to handle the issues at the grassroots level. 3. Current urban planning is conducted locally with a decentralised approach; however, other organisations are not decentralised with dissolved powers to incorporate their decisions in the urban plans. For example, some organisations do not have subunits or representatives to collaborate at the local level. Some representatives available for collaboration are not capable enough and are not trained well enough to adequately contribute to RSUP (P1NE2, P1NE3, P1LE1, P1LE10, and P1LE11) 4.A decentralised system in an organisation is essential for accessible communication and data gathering without following the long hierarchy paths that pose challenges and consumes time (P1NE 8 and P1LE10)	*"I cannot contact them directly. I have to ask first my deputy director, the provincial director, the strategic planning division director, the deputy director of general planning, then the additional director general, then the director general and then the letter has to go through the director general to their department, and then the letter has to go to that division. Think how it is possible. My head office wants me to finish the plan as soon as possible. So, I have to think of a way that is possible. And managed*

Features	Key points discussed	Quotations
		by me as soon as possible". P1LE10
4. Balanced top-down and bottom-up approach.	1. The Sri Lankan governance mechanism is hierarchical, with little bottom-up approaches and little collaboration with subordinates. This condition hinders communication and coordination among other organisations at the local level (P1LE2 and P1LE10). 2.P1NE5 insisted on the importance of the top-down approach in the urban planning context and stated that a pure bottom-up approach is unsuitable for risk-sensitive urban planning since this will focus on current short-term issues. Therefore, a balanced top-down and bottom-up approach is suggested which leads to the necessary integration between national and local plans. 3. P1LE11 insisted on integrating the National Physical Plan and Policy with local urban plans for the country's holistic development with integration among various administrative boundaries.	*"The bottom-up approach only focuses on the current issues. Planning is not a current focus. We should focus on the current issues, but the main focus is on future developments. We need to identify the existing problems through a bottom-up approach and incorporate those things for a short-term period. But our focus should be on the long-term planning that comes from the top-down approach." P1NE5*
5.. Vertical and horizontal integration	1.P1NE4 and P1NE5 suggested that a collaboration structure with horizontal connections and power sharing is essential and, therefore, accountability should be transferred to all collaborative members to increase collaboration. 2. As discussed under the balanced top-down and bottom-up approach, vertical integration across various administrative scales is essential to maintain a balanced top-down and bottom-up approach.	

Features	Key points discussed	Quotations
6. Room for necessary formal and informal collaboration	1.P1NE4 insisted on the importance of having informal collaboration as it helps us to utilise knowledge in private and informal organisations. Therefore, it is suggested that a collaborative governance structure should allow for formal and informal collaboration where public and private organisations can contribute to RSUP. 2. Informal connections depending on personal contacts are not suitable for the long term and depend on the people who are involved and thus are limited to their working period. Therefore, it is important to have formalised connections where necessary for long-term collaboration (P1NE4 and P1NE5).	
7. Effective community participation.	1. Community participation in RSUP is vital since citizens are exposed to disasters, and they are the beneficiaries of the RSUP (P1NE1). 2.D4 recommended that the inclusion of citizens can be undertaken by introducing a citizen charter within the local authorities for development activities.	

These collaborative governance structural findings are discussed in chapter 6**Error! R eference source not found.** to derive the outcomes.

5.7 Summary

This chapter provided the analysis of, and findings from, the primary data collection that will help to achieve the research objectives. The study has identified the barriers and enablers for stakeholder collaboration in the Sri Lankan context. The causal loop diagram was developed which shows the connections among the barriers. From this detailed analysis of the barriers and enablers, the study found that politics, policies and legislations, and personal attributes are the root causes which create undesirable conditions which lead to a lack of stakeholder collaboration in RSUP. Furthermore, from the causal loop diagram as a system thinking approach, the study proposed nine key policy changes that are required to transform the current weak stakeholder collaboration context in RSUP.

In addition, the study found suitable structural requirements to foster collaboration in RSUP. Accordingly, neutral leadership, a decentralised approach, and a balanced top-down and bottom-up approach with the provision of informal connections and community engagement were identified as key requirements for successful collaborative governance arrangements in RSUP. The next chapter discusses and synthesises these research findings and triangulates the data with the literature findings.

6 Discussion and outcomes

6.1 Introduction

This chapter presents the synthesis of the research findings from the primary data gathered from semi-structured interviews with national experts, local experts, and document review, and from the secondary data collected from the literature review through triangulation. All the information is discussed under six main sections in line with the following research objectives outlined in Chapter 01: (1) barriers to, and enablers for, stakeholder collaboration (Section 6.2); (2) policy proposals and changes required to enhance stakeholder collaboration in risk-sensitive urban planning (Section 6.3); (3) a suitable inter-organisational collaboration (Section 6.4) (4) maturity grid development (Section 6.5); and (5) development and validation of a framework for enhancing stakeholder collaboration in RSUP (Section6.6).

6.2 Barriers to, and enablers for, stakeholder collaboration in risk sensitive urban planning

This study found barriers to, and enablers for, stakeholder collaboration in RSUP which can be categorised under the following five themes: Administrative environment; Working environment; Organisational capacity; Information and knowledge sharing, and the Collaboration process as indicated in the Figure 2-8: Theoretical framework of the study. This section compares the findings from the global context including emerging economies with the Sri Lankan context to consolidate the new knowledge created. Moreover, it also discusses the applicability of the barriers in Sri Lanka within a broader global context focusing on emerging economics.

6.2.1 Administrative environment

As presented in Chapter 5, the following three key barriers were found under the administrative environment theme: (A) law and policies; (B) governance arrangements, and (C) politics that influence the administration of stakeholder collaboration in RSUP. These three key barriers are discussed below.

A. **Law and policies**

An absence of collaborative laws and policies (Wamsler et al., 2020; Trapp et al.,2017; Shrestha & Dhakal 2019; Broto et al., 2015; Yumagulova & Vertinsky, 2019; Malalgoda & Amaratunga, 2015; Chu, Brown et al., 2019) and a lack of coherence among sectoral laws and policies (Webb, Petheram et al., 2014; Bissonnette et al., 2018) are identified as key barriers from the literature review. This includes the studies conducted in emerging economies (Shrestha & Dhakal 2019; Broto et al., 2015) which does not allow for the forming of a collaborative governance arrangement in risk-sensitive urban planning.

However, in the Sri Lankan context, the empirical data reveals that there are sectoral laws and policies (e.g. the *UDA Act; Disaster Management Act No 13 of 2005; the National disaster management policy,2010; the National Environmental Policy 2003; the National Climate change policy 2012)* which refer to stakeholder collaboration in risk-sensitive urban planning. However, these policies are not strong enough to form collaborative governance since they do not specifically mention the mandated collaboration process with the proper identification of the role and responsibilities of collaboration members; this is similar to the findings in the studies within the global context including emerging economies (Malalgoda et al.,2013; Nguyen et al., 2018; Wamsler et al.,2014; Forino et al., 2018). This condition shows that even though Sri Lanka has policies and legislation that support collaborative RSUP, they are not adequate to foster effective collaboration and, therefore, result in ad hoc consultation meetings and little accountability due to the lack of mandated clear-cut responsibilities; this situation is similar to the global context including emerging economies (Malalgoda et al., 2013; Nguyen et al., 2018; Chu, Brown et al., 2019; Webb, Petheram et al., 2014; Forino et al.,, 2018; Rendon et al., 2016; Malalgoda et al., 2014; Leck et al. 2018; Therrien et al., 2018; Mwenje, 2019). It indicates that there should be an enforceable mandatory legislative requirement to establish successful collaboration in the Sri Lankan context.

Furthermore, the primary data indicates that current legislations do not support collaboration among stakeholders in RSUP due to the following reasons: collaborative responsibilities of the stakeholders are not indicated in the mandates. This issue was identified in the studies that were conducted in the emerging economies (Malalgoda et al.,2013; Nguyen et al., 2018; Wamsler et al.,2014; Forino et al., 2018)), laws do not provide decision making authority to stakeholders, and laws do not lead institutional development that requires stakeholder collaboration. All these barriers which have been identified in Sri Lankan context also prevail

in the emerging economies according to studies which include emerging economies (Nguyen et al., Malalgoda et al.,2013; Shrestha & Dhakal 2019; Broto et al., 2015).

It can be observed from the primary data that the national planning policy, the DM policy, th CC policy, and local government policy consider inclusive urban development separately. Therefore, there is no integration and coherence between each policy's approach. Additionally, no explanation or clear strategies can be seen towards RSUP as identified by the study (Webb, Petheram et al., 2014; Bissonnette et al., 2018). A lack of funding guidance for the collaboration process is identified as another barrier associated with the policies in the Sri Lankan context, similar to the global context (Rendon et al., 2016). Furthermore, primary data and the literature findings from a study (Yumagulova & Vertinsky 2019) has indicated that informal collaboration is essential to support an effective collaboration process with formal arrangements; however, current strict mandates in the Sri Lankan context are not allowed to incorporate the outcomes from the informal collaboration.

In addition, the empirical study reveals that inadequate enforcement of laws and policies is another vigorous barrier to forming collaborative governance. The reasons identified for the inadequate enforcement of the laws and policies are: (1) these policies are not supported by the legislation to enable enforcement by law; (2) no regulatory policy mechanisms exist such as an indication of accountability for implementation; (2) sectoral laws and policies are not integrated or are lacking in coherence and, therefore, implementation is difficult among various sectors since their organisational mandates are not aligned with the same collaborative process; (3) there is an absence of policy implementation tools or implementation mechanisms such as regulatory guidelines and strategies to implement the collaboration process with proper stakeholder identification and roles in the planning process, and (4) political influence hinders the enforcement of laws and policies towards collaborative actions.

The primary data further reveals that a lack of evaluation and updates of the legislation and policies based on current conditions and international standards is a key reason for the existence of absent or weak policies for supportive collaboration. Moreover, in Sri Lanka, the frequent changes in the common national policy are another barrier which is created because of national policies being changed by politicians based on their manifestos whenever the government changes.

The primary data further explains that the lack of vision among politicians regarding collaborative risk-sensitive urban planning and implementation leads to a lack of

collaborative initiatives in their political agendas; this can be viewed in studies (Uittenbroek, et al., 2014). Therefore, politicians influence policies and plans based on their political manifestos whenever the government changes. This condition creates distrust in collaborative initiatives and frustrates stakeholders. Hence, this instability in the national policies hinders stakeholder collaboration in RSUP in Sri Lanka. Similar to Sri Lankan context, this lack of political vision and guidance can be seen in emerging economies and hinders effective stakeholder collaboration (Nguyen et al., 2018; Malalgoda et al.,2014; Taylor, 2016).

Therefore, the enablers discussed below would be suitable for overcoming inadequate policies and legislation prevailing in the emerging economies.

In terms of the enablers that can help to overcome policy and law related barriers, the empirical study indicated the importance of strengthening existing policies and laws to promote stakeholder collaboration in RSUP with features similar to those put forward in the literature findings, as follows: including provisions to mainstream collaboration among stakeholders from various sectors (Farrell, 2010; Uittenbroek, 2016) which will make changes in the formation of a collaborative governance structure; a mandatory collaboration process for RSUP; organisational mandates to support collaboration and lead to changes in intra-organisational structures and task allocation with a proper job description that leads to accountability among collaborative representatives (this change, in turn, will create integration and coherence among sectoral policies) (Walsh et.al, 2013; Wamsler et al., 2020; Trapp et al.,2017; Shrestha & Dhakal, 2019; Bissonnette et al., 2018; Mwenje, 2019; Torabi et al.,2018; Uittenbroek, et al., 2014; Uittenbroek, 2016; Amaratunga et al., 2018; Taylor, 2017; Parthasarathy, 2016; Papa et al., 2015); ensure provision for financial guidance (Rendon et al., 2016); and, accommodation of required formal and informal collaborations with private organisations (Yumagulova & Vertinsky, 2019; Smedby & Neij, 2013). In addition, the empirical study indicated the importance of policy implementation tools such as guidelines, mandated regulations, and strategies towards implementation which are essential to successfully implement collaboration policies and legislations that lead to effective collaboration. It could further be found from the primary data that these collaborative policies and implementation tools need to be supported by legislation that can lead to a legally mandated collaboration process that defines the roles and responsibilities of stakeholders, monitoring, and evaluation mechanisms.

The literature and primary data suggested that relevant stakeholder involvement in policy development should take place to ensure, and create, integration and coherence among the sectoral policies and organisational mandates that are required for successful involvement in the collaboration process as identified in the studies conducted in the global context including in emerging economies (Uittenbroek, 2016; Chu, Schenk et al.,2018; Walsh et.al, 2013; Wamsler et al., 2020; Trapp et al., 2017; Shrestha & Dhakal, 2019; Bissonnette et al., 2018; Mwenje, 2019; Torabi et al., 2018; Uittenbroek, et al., 2014; Hegger et al., 2014; Amaratunga et al., 2018; Taylor, 2017; Parthasarathy, 2016; Papa et al., 2015).

The primary data further implied that laws, policies, and policy implementation tools must be regularly reviewed and updated coherently and with adaptiveness to establish collaborative governance in risk-sensitive urban planning. These features help to achieve adaptive policies for collaborative RSUP as suggested in the primary data and the study of Swanson & Bhadwal (2009). Although providing guidance and support that assists policymakers' awareness is not directly suggested by Sri Lankan experts; yet stakeholder involvement in policymaking can provide guidance to the policymakers as viewed in the study by Webb, Petheram et al. (2014).

In addition, empirical study, based on the primary data found that bureaucrats should stand against political interference by explaining the potential negative consequences of the political interference actions in order to minimise political interference and pressure in the collaboration process and maintain common national policies without changes created by political manifestos. Among these proposals, some of the solutions are creating coherence among the sectoral policies, and organisational mandates requiring successful involvement in the collaboration process as identified in the emerging economies (Farrell, 2010; Walsh et.al, 2013; Shrestha & Dhakal, 2019; Taylor, 2017; Parthasarathy, 2016). Furthermore, in the Sri Lankan context, the empirical study looked at international collaboration as a good opportunity to enhance the country's policy on international standards with regard to collaboration. Moreover, current policies can be seen as opportunities that enhance collaboration since they   provide a basis for incorporating proposed strategies for collaborative RSUP without posing critical challenges regarding collaborative RSUP as a new concept.

B. <u>Governance</u>

The empirical study indicated that, in the current governance arrangements for RSUP in Sri Lanka, the decision-making powers are vested in one planning organisation that has the authority to consult other organisations (including organisations from the disaster management and the climate change sectors) in regard to urban planning according to their mandate (the Urban Development Authority Act). In addition to this factor, since other organisational mandates do not allow for decision-making on the planning process due to the absence of collaboration policies and coherence among sectoral laws and policies, proper consideration of the opinions of other stakeholders in the consultation meetings is questionable, and the influence of the powerful stakeholders can be noticed in Sri Lankan context. Hence, the absence of powersharing and equity has become a significant barrier for stakeholders, creating ego issues and hence less interest in participating in, and contributing to, the collaborative RSUP process. Since organisational mandates do not support collaboration, collaboration tasks are not included in the official job descriptions of staff who are expected to collaborate. Therefore, the appropriate allocation of existing roles and responsibilities in the governance arrangements is lacking, thus not allowing for, or supporting, collaboration activities (Uittenbroek, 2016). Therefore, people are not accountable and interested in supporting collaborative planning and decision-making. This finding is supported by the studies that were conducted in the global context including in emerging economies (Malalgoda et al.,2013; Nguyen et al., 2018; Chu, Brown et al., 2019; Webb, Petheram et al., 2014; Forino et al., 2018; Rendon et al., 2016; Malalgoda at al.,2014; Leck et al., 2015; Therrien et al., 2018; Mwenje, 2019). These studies indicate a lack of clear-cut responsibilities and overlapping responsibilities among stakeholders making the collaborative system ineffective and less accountable. Furthermore, this situation creates a lack of clarity in the roles and responsibilities of collaboration initiatives.

This condition further leads to the absence of dedicated collaboration representatives from organisations. Moreover, some organisations do not have any local office or branch to participate in urban planning activities, and collaborative organisations at the local level are not given collaborative tasks. This is an indication of an unsuitable intra-organizational structure that hinders the collaboration process, as identified in the global context including in emerging economies (Taylor, 2016; Uittenbroek, et al., 2014). As fuel for this condition, the primary data has indicated that hierarchical structural arrangements with centralized powers still prevail in the Sri Lankan context which hinders the devolving of required decentralized

powers for organisations that are required to collaborate at the local level. This setup creates difficulties in communicating with other organisations by following a long hierarchical pathway that consumes time and poses difficulties in coordination across the scales.

The primary data and literature findings (Munene et al., 2018; Webb, Bai et al., 2018) further indicated that strict mandates lead to a rigid hierarchical governance structural arrangement with top-down coordination which means that the current Sri Lankan rigid governance system allows little room for informal collaboration, especially with non-governmental organisations in Sri Lanka due to these current strict mandates. Moreover, the primary data revealed that any informal relationship needs to be formalised if such a relationship needs to continue for a long time and have decision-making powers. However, formal and informal collaboration are intertwined, and structural governance arrangements should permit informal collaboration where necessary to create successful collaborations by adopting network structural features rather than having a rigid hierarchical structure.

The existing literature, including studies from the emerging economies, argues that the lack of coordination mechanisms in governance arrangements is one of the barriers to stakeholder collaboration in RSUP (Nguyen et al., 2018; Shrestha & Dhakal, 2019; Leck et al., 2018; Taylor,2016). Similarly, the current governance structural arrangements in Sri Lanka are identified as complex and unsuitable for facilitating adequate coordination mechanisms for collaborative RSUP, and there is no institutional framework to facilitate horizontal integration among the organisations to promote collaborative RSUP. Sri Lanka's current administrative governance system consists of two parallel administrative systems: central government and local government. Urban planning activities are mainly channelled through local government arrangements, and DRR and CC actions are conducted through the central government. Furthermore, the administrative boundaries of the local authorities (local government) and district/divisional secretariats (central government) are not aligned. These conditions create coordination issues among the three major sectors required to collaborate for RSUP. As those in power within the government change, organisational arrangements under the ministries are changed from time to time. Most of the time, organisations are classified under ministries which are not related to the subject area; they are only allocated according to political interest. Therefore, coordination among organisations related to a similar subject area may lose the opportunity to utilise easy communication paths, and collaboration may be ineffective. Moreover, no national committees or councils comprising various actors relevant to RSUP are connected to the ground level to coordinate national and local level actors.

The literature review findings revealed that a lack of leadership in the collaborative governance arrangement for RSUP (Malalgoda, Amaratunga, 2015; Chu, Brown et al.,2019; Malalgoda et al., 2014; Coaffee et al., 2016; Uittenbroek et al.,2014) and disagreements in leaderships' selection (Trapp et al., 2017) are barriers to stakeholder collaboration in RSUP. However, in the Sri Lankan context, the planning agency takes leadership in RSUP at the local level and conducts consultant meetings with other organisations according to the UDA Act, and, therefore, there are no leadership selections taking place and, hence, no disagreements on leadership selection. However, this condition causes a lack of neutral inter-organisational leadership for collaborative risk-sensitive urban planning and thus becomes a barrier since the influence of the powerful leading planning organisation (UDA) in Sri Lanka determines the collaboration process and makes decisions on RSUP

Furthermore, it has been identified that weak organisational leadership is another reason for the absence of collaborative task allocation to staff. It is evident that political influences in organisational leadership appointments and in the recruitment processes of organisational leadership are hindering the appointment of suitable leaders with the relevant skills to support collaboration. Particularly in the emerging economies, a lack of coordination in governance mechanisms and a lack of leadership in leading stakeholder collaboration in the RSUP are identified as key barriers related to goverance and this aligns with the Sri Lankan context (Nguyen et al., 2018; Leck et al., 2015; Shrestha & Dhakal, 2019; Leck et al., 2018; Taylor,2016; Malalgoda, Amaratunga, 2015; Malalgoda et al., 2014).

Therefore, the following enablers which are discussed below have been identified as overcoming the governance-related barriers and can be utilised in emerging economies as well.

Empirical studies have revealed that there is a need to modify the existing policies and legislation that create changes in institutional coordination or in government arrangements and the formation of collaborative governance that can facilitate collaboration in RSUP.

As a first step, the empirical study suggests that identifying and mapping stakeholder roles and responsibilities is key to distributing required powers among the stakeholders which ensures equality in RSUP decision-making. In turn, organisational mandates should be changed towards supporting a collaboration process that leads to including collaborative tasks within official job descriptions. This process will help to rearrange the intra-organisational structure towards supporting collaboration actions (Uittenbroek, 2016) and create an accountable

governance mechanism in RSUP, as suggested by the studies (Chu, Brown et al., 2019; Coaffee et al., 2016).

The empirical findings and the literature findings insist on the establishment of collaborative governance in risk-sensitive urban planning with the feature of having network governance at the local level with the required decentralised powers allocated to local stakeholders under a neutral collaborative leader to monitor and facilitate the collaboration process. The literature findings support this neutral leadership concept by proposing a neutral partner or a dedicative coordinating organisation as a collaborative leader; this is especially suggested for an emerging economies such as Sri Lanka (Trapp et al., 2017; Shrestha & Dhakal 2019; Webb, Petheram et al., 2014; Forino et al.,2018; Webb, Bai et al. 2018; Valencia et.al, 2019; Hegger et al., 2014; Nugraha & Lassa, 2018; Munene et al., 2018). This governance arrangement leads to self-organised network governance (Taylor, 2016; Nugraha & Lassa, 2018) with a decentralised governance structure along with a centralised system (Trapp et al.,2017).

Experts have further suggested that a collaborative governance arrangement should consist private sectors, such as NGOs, and focus on formalising NGOs' activities in urban planning to obtain their knowledge, support, and opinions regarding successful urban planning. This is further validated by the literature findings that indicate the importance of incorporating formal and informal ways of inter-organisational arrangement in collaborative governance (Yumagulova & Vertinsky; 2019; Wamsler et al., 2014; Forino et al., 2018; Smedby& Neij, 2013; Uittenbroek, et al., 2013). However, experts have suggested that it is difficult to bring the insights from informal collaboration into the formal planning process in the Sri Lankan context. Therefore, experts have advised on formalising the required informal collaboration to consider the outcome of informal collaboration. In addition, experts have suggested appointing suitable organisational leaders who can support the collaboration process by changing organisational culture and structure and managing staff to support the collaboration process.

Moreover, the empirical study has identified that existing councils and coordination committees facilitate stakeholder collaboration with limitations since they are not specially formed for RSUP purposes. Therefore, there is still a need to form a suitable collaborative governance structure for collaborative RSUP. These enablers can be used for emerging economies as most of the governance related barriers are similar to those in the emerging economies and some of the enablers are already suggested for emerging economies. Therefore, other enablers also can be utlised for the emerging economies. It is further

understood that changing organisational mandates to support collaboration requirements helps to rearrange stakeholders' intra-organisational structures to support collaboration actions. This change can lead to an accountable governance mechanism in RSUP. Moreover, the empirical study identified that existing councils and coordination committees facilitate limited stakeholder collaboration since they are not specifically formed for RSUP requirements at the local level. Therefore, they can be considered as an opportunity to form a suitable collaborative governance structure for collaborative RSUP.

C. **Politics**

Politics is an unavoidable factor in determining stakeholder collaboration in RSUP. There is no priority for enabling collaborative initiatives in the political agenda due to a lack of vision among Sri Lanka politicians relating to RSUP; this is also the case in emerging economies (Nguyen et al., 2018; Trapp et al.,2017; Malalgoda et al.,2014; Therrien et al., 2018; Taylor, 2016; Coaffee et al., 2016; Torabi et al., 2018; Uittenbroek, et al., 2014). This factor and political interference (Malalgoda et al., 2013; Trapp et al.,2017; Forino et al., 2018; Mwenje, 2019) in the collaboration process have been identified as key barriers from the existing studies and from the primary data. The primary data further reveals that political interference adversly affects collaborative risk-sensitive urban planning due to the following reasons: a lack of support for collaborative risk-sensitive urban planning (since politicians are happy if there is any development in their area and they are not concerned with the risk-sensitive approach that requires stakeholder collaboration); local authorities that consist politicians elected by people, favouring the politicians who want to satisfy people's demand for political benefits; politicians and their subordinates also have influence on the administrative system in Sri Lanka in terms of staff appointments and make changes in the collaboration process that lead to corruption and inefficiency in stakeholder collaboration process in RSUP, and making changes in national policies according to political manifestos and needs. Furthermore, competing interests among, and visions by, politicians (Mwenje, 2019) and thematically structured political committees (Valencia et.al, 2019) which are discussed in the global literature are not evident in the Sri Lankan context. A lack of political vision and will towards stakeholder collaboration and a lack of political interference are identified as key political related barriers in emerging economies (Valencia et.al, 2019; Nguyen et al., 2018; Taylor, 2016) such as Sri Lanka.

To overcome political barriers, even though the literature suggests encouraging an apolitical approach (Yumagulova & Vertinsky; 2019; Ahn & Schmidt, 2019), experts have argued that political support is inevitable and, therefore, an apolitical approach is not suitable. However,

experts have suggested that in Sri Lanka, there should be a criterion for a politician's appointment that leads to capable politicians who can provide support in a positive manner. Furthermore, the experts stated that, in the current scenario, bureaucrats should advise politicians towards a proper collaborative decision-making process by creating awareness that will help to get support from politicians and avoid unnecessary political interference in the collaborative urban planning process, especially in creating a common national policy that is not influenced by governmental changes. These practices are aligned with the strategy identified in the global context including in the emerging economies, such as securing political will and commitment (Shrestha & Dhakal, 2019; Mwenje, 2019; Valencia et.al, 2019) and seeking support from dedicative politicians (Wamsler et al., 2014), even though primary data do not indicate them explicitly. Furthermore, the experts stated that bridging different political interests and values (Chu, Schenk et al., 2018) is not identified in the Sri Lankan context since ministries in the Sri Lankan government work under the manifestos and values of the ruling party and do not have their own various interests and values. These enablers can be utilised to overcome the political related barriers in the emerging economies.

6.2.2 Working Environment

In this section, this study discusses how the working environment-related barriers and enablers influence stakeholder collaboration in risk-sensitive urban planning in Sri Lanka. An empirical study found that, in Sri Lankan culture, professionals or bureaucrats do not typically oppose politicians' negative influences by creating awareness among them because the majority of the organizational leadership appointments are mostly influenced by politicians. The collaboration process is hindered in Sri Lankans due to their silo-based working patterns and traditional thinking that lead to following old routines and practices; this is similar attitudes in the global context including in the emerging economies (Trapp et al., 2017; Webb, Petheram et al., 2014; Farrell, 2010; Uittenbroek 2016). In addition, empirical studies have further explained the reasons for this condition: (1) since the current organisational mandate does not support the collaboration process, collaborative members are limited in their thinking according to their given mandatory power; (2) most organisations do not promote research and development activities that create an open mindset for gaining new knowledge and awareness regarding collaborative requirements and innovative decision making; this is supported by the study by Uittenbroek (2016) which argued that stakeholder reluctancy in exploratory learning is a barrier for the stakeholder collaboration. Furthermore,

organisational leadership plays a significant role in motivating staff and in influencing organisational culture towards supporting collaboration, which is typically lacking in the Sri Lankan context. In addition, the current collaboration process does not include any monetary or non-monetary incentives to motivate stakeholders towards effective contributions.

Experts have stated that involvement in the collaboration process depends on the organisational leaders' or collaborative staff's personal judgment in involvement in collaboration processes, especially in the area of knowledge and information sharing. This condition leads to a data-selling culture that hinders effective information and knowledge sharing among stakeholders.

An empirical study found that collaborative members typically prioritise their sectoral activities due to various sectoral needs and issues as also identified in the studies in the global context (including in emerging economies) by Hardoy et al. (2019), Bissonnette et al. (2018), Farrell (2010); and Walsh et.al (2013).For example, primary data evident that such collaborative members avoid consultation meetings by attending other meetings due to a lack of awareness, knowledge and understanding about their roles and responsibilities and also mainly because of the absence of collaborative mandates and job descriptions that provide accountability.

The personal attributes of collaborative representatives are a key determiner of the collaborative working environment in several ways as follows: (1) Egotistical issues, for example, powerful organisations think that risk-sensitive urban planning is their subject and, therefore, sometimes ignore or do not respect other stakeholders' opinions. This condition creates less interest in the collaboration process. (2) A lack of trust in the planning process due to changes in government policies whenever the government changes. (3) Stakeholders tend to easily avoid collaborative works due to their existing workload and due to the absence of job descriptions and mandates instigating collaboration. These conditions show a lack of enthusiasm and commitment by stakeholders in collaborative risk-sensitive urban planning, as explained in the studies by Trapp et al. (2017), Shrestha & Dhakal, (2019), Rendon et al. (2016) and Uittenbroek, (2016). (4) Collaborative stakeholders are not ready to be transparent in information sharing and typically do this purposely to hide their mistakes or corruptions. (5) Collaborative representatives personalise matters and, therefore, are reluctant to contribute to the collaboration process and raise their voice in the collaboration discussions since they think they are representing themselves rather than organisations. They do not

understand their role and their representation of their organisation. (6) Collaborative members do not represent their organisations satisfactorily due to their negative attitude towards the organisation for their own personal benefit, and (7) Competing interests among stakeholders who wish to show their superior mentality and, therefore, are not ready to listen to others; they are competitive. This latter factor is repeated in the global context including in emerging economies (Trapp et al., 2017; Farrell, 2010; Shrestha & Dhakal, 2019; Forino et al., 2018; Rendon et al., 2016; Therrien et al., 2019; Uittenbroek, 2016; Giordano et al, 2020). The experts stated that the personal attributes of the collaborative members are influenced by social and economic factors as well as family backgrounds and the attitudes learnt at school.

It is important to note that, in the Sri Lankan context, organisational staff do not have a fear of, or a negative mentality against collaborative governance arrangements' formation due to the loss or degradation of their powers in existing arrangements as identified in the study by Trapp et al. (2017) . It is further understood that since Sri Lankan staff have a permanent appointments with secured jobs and power put in place by legislation and they do not think about governance reformation. Similarly, since the Sri Lankan sectoral policies have begun to mention risk-sensitive urban planning and the current leading planning agency (UDA) conduct ad-hoc consultation meetings with stakeholders, the unawareness of stakeholders towards risk-sensitive urban planning (Trapp et al., 2017). is not evident in the Sri Lankan context. However, in Sri Lanka, no integrated policies and laws bring all the stakeholders' interests together for a mandated collaboration process; therefore, the working environment is not supported in risk-sensitive urban planning.

To overcome working environment related barriers, the experts have suggested that policies and legislation need to be strengthened in an integrated manner (Walsh et.al, 2013; Wamsler et al., 2020; Trapp et al.,2017; Shrestha & Dhakal, 2019; Bissonnette et al., 2018; Mwenje, 2019; Torabi et al., 2018; Uittenbroek, et al., 2014; Uittenbroek, 2016; Hegger et al., 2014; Amaratunga et al., 2018; Taylor, 2017; Parthasarathy, 2016). This strengthening is essential for the establishment of synergies by creating a joint vision among organisations (Walsh et.al, 2013; Uittenbroek, 2016) and to establish collaboration practice as a routine (Uittenbroek,2016) including allocating collaboration tasks into the official job descriptions of staff (Wamsler et al., 2014). As suggested in the study by Nugraha & Lassa) (2018) and the primary data, having mandates that provide power sharing, equality, and accountability among stakeholders will help to reduce competition due to ego.

The experts have further suggested that staff development activities should be introduced such as research and training programmes to enable capacity building of the stakeholders and that exploratory learning should be facilitated which can create awareness of collaboration requirements and process and an open mindset for collaboration (as suggested by the study conducted in an emerging economies (Broto et al., 2015)). Adopting an effective recruitment process is essential because this leads to capable staff with collaborative attributes and strong organisational leadership appointments that can influence changing the organisational culture (Uittenbroek, 2016) to bring about a supportive working environment within the organisation to provide the required contributions in the collaboration process. Furthermore, the empirical study validates the suggestions from the literature which were obtained from the global context including from the emerging economies, such as: introducing performance monitoring and evaluation that can catalyse the engaging of people in collaboration with dedication (Walsh et.al, 2013; Valencia et.al, 2019) and monetary and non-monitory incentives (Trapp et al., 2017; Torabi et al., 2018; Farrell, 2010; Hegger et al., 2014**;** Pieterse et al., 2018).

Furthermore, it is interesting to note that addressing the personal interests and concerns of the collaboration members (Nemakonde & Van Niekerk, 2017) in the collaboration process is not identified in the Sri Lankan context, and the primary data has indicated that the collaboration in Sri Lanka process cannot be determined by the personal interests of the collaborative members; they must obey the mandate given.

Additionally, the empirical study found that creating trust among stakeholders by adopting formal and transparent collaboration processes and ensuring consistent national development policies without being influenced by political needs is similar to the findings of other studies (Walsh et.al, 2013; Yumagulova & Vertinsky; 2019; Sitas et al., 2016). The experts have further emphasised the importance of the collective stand against the political interference of bureaucracy. Furthermore, the experts mentioned that teaching the positive qualities relating to collaboration at the school level and focusing on improving the country's social and economic levels can facilitate the production of good citizens and reduce negative mentality and behaviours that hinder collaboration. Furthermore, bureaucrats' capacity-building helps them stand against political interference. Moreover, this study suggests utilising the existing national plans and strategies (Climate Change Adaptation Strategy for Sri Lanka 2011-2016 and the Disaster Management Plan 2022-2030) to build the capacity of stakeholders. The study suggests that the involvement of NGOs can be useful in providing training and

development for collaborative staff since it is common for NGOs to run training programmes on a small scale for their projects. Most of these working environment related barriers and enablers that are identified in the Sri Lankan context align with barriers identified in the emerging economies (Walsh et.al, 2013; Sitas et al., 2016; Nemakonde & Van Niekerk, 2017; Pieterse et al., 2018 ; Farrell, 2010; Valencia et.al, 2019; Broto et al., 2015; Nugraha & Lassa, 2018; Parthasarathy, 2016; Hardoy et al., 2019; Shrestha & Dhakal, 2019) . Therefore, these findings can be generalised to overcome the working environment related barriers in the emerging economies.

6.2.3 Information and knowledge sharing

This section discusses the barriers and enablers to information and knowledge-sharing in RSUP.

Information and knowledge sharing are key to effective stakeholder collaboration in risk-sensitive urban planning, facilitated by appropriate coordination and communication mechanisms. A lack of information and knowledge sharing is a barrier to collaborative RSUP, as identified by studies including within the emerging economies (Hardoy et al., 2019; Giordano et al, 2020; Mwenje, 2019; Sitas et al., 2016). Additionally, the empirical study reveals several other issues that hinder information sharing in Sri Lanka, such as stakeholders' reluctance to share data due to inaccuracy of the data, not being ready to be transparent due to corruption, a lack of information availability; appropriate information is not available in either the responsible organisations. Furthermore, the experts have indicated that the shared data is unreliable for RSUP due to its inaccuracy and outdated nature.

There are no mechanisms for information and knowledge sharing in the Sri Lankan context due to the lack of mandated procedures or systems for information and knowledge sharing. This condition further leads to a data selling culture in the collaboration process. Furthermore, the primary study reveals that current governance arrangements focus on silo-based functions and do not support coordination among stakeholders across scales and sectors as identified in the studies conducted in emerging economies (Leck et al., 2018; Sitas et al., 2016).

For example, an expert from a leading planning agency mentioned that, due to the centralised top down organisitional structure, the information request process from other organisations does follow a long hierarchical path through their organisational heads if the local office does not have the relevant data in a required format. This process makes delays and difficulties in

the information-sharing process; therefore, most of the time, the requested information is not received at the time of planning. Furthermore, the experts stated that, in Sri Lanka, some organisations use the paper mode of communication without using updated communication modes such as emails and data sharing software. Similarly, there is no common digital platform in Sri Lanka to share data and knowledge among stakeholders. Some organisations still lack a digital data storage system, leading to data sharing difficulties.

Furthermore, the language barrier has also been identified as a barrier to effective collaboration in Sri Lanka within national-level agencies since Sri Lanka has two main languages, Tamil and Sinhala. Even though English is a linking language, it is not much used in most national-level stakeholder meetings. A similar condition is discussed in the literature as communication breakdowns happen among stakeholders due to scepticism, jargon, and the use of different official languages (Forino et al., 2018; Walsh et.al, 2013).

Among all the information and knowledge sharing barriers, a lack of information and knowledge sharing and a lack of mechanisms to create coordination and facilitate information and knowledge sharing are identified as key barriers in emerging economies (Leck et al., 2018; Sitas et al., 2016; Hardoy et al., 2019) such as Sri Lanka. Therefore, the following enablers to overcome information and knowledge sharing barriers can be utilised by emerging economies.

To overcome information and knowledge sharing barriers, the empirical study suggests that mandated procedures and systems for information and knowledge sharing should be established, including creating agreement among stakeholders for effective information and knowledge sharing without reluctance and overcoming a data selling culture as suggested bya study conducted in an emerging economies (Walsh et.al, 2013). Moreover, this change can lead to some of the suggestions identified in the global context to improve information and knowledge sharing, such as: improving the understanding of the information needs and requirements among organisations (Giordano et al, 2020), encouraging knowledge sharing (Stepanova et al., 2020), establishing regular and transparent information flows and communication among organisations (Valencia et.al, 2019), and facilitating knowledge co-production through formal and informal social relationships (Dias et al., 2019; Shrestha & Dhakal, 2019; Yumagulova & Vertinsky; 2019; Chu, Brown et al., 2019; Sitas et al., 2016; and van de Ven et al., 2016). The experts have further indicated that current Sri Lankan laws

and policies should be strengthened to support forming mandated information and knowledge-sharing procedures.

Additionally, the experts have stated that digital platforms, such as common data-sharing platforms, are essential for requesting information and obtaining information. Similarly, it is suggested that organizations need to move to cloud-based communication systems and away from paperwork for more effective communication and information and knowledge sharing. Furthermore, the primary data suggests that establishing a decentralized governance arrangement allows local offices to share and request information for local-level risk-sensitive urban planning. This is essential for communication and data gathering without following the long hierarchical path that consumes time.

Furthermore, although the experts do not explicitly mention the following suggestions found in the literature, these suggestions are indirectly covered under the strategies identified by the primary data. Collaborative knowledge brokering with the help of an expert (Webb, Petheram et al., 2014; Sitas et al., 2016) is covered under the training and development programmes such as workshops; Such brokering can be undertaken once the collaborative information and knowledge sharing is facilitated by procedures. Implementing measures to address the knowledge gap, build trust, clarify uncertainties, and bridge values (Yumagulova & Vertinsky; 2019; Chu, Schenk et al., 2018) can be done by the monitoring and evaluation of the collaboration process. These evaluation process results help to overcome these issues by addressing the knowledge gap, issues, and bridging values. These enablers are listed and discussed under the organizational capacity theme since they are highly related to stakeholders' capacity development.

It is important to note that, in Sri Lanka, even though English is considered the official language, the effective usage of English as a common language is still questionable and depends on the actions of the people conducting and participating in a meeting. However, primary data highlighted the importance of using a common language for the effective collaboration and contribution of stakeholders. Moreover, the empirical study found that the existing knowledge platform of the sustainable development council is an opportunity that can be used to share knowledge relevant to RSUP.

6.2.4 Collaboration process

The barriers and enablers associated with the current collaboration process are discussed in this section. An effective collaboration process is key for stakeholder collaboration in risk-sensitive urban planning. However, in Sri Lanka, the collaboration process is conducted in an ad hoc manner without defined mandated criteria. Therefore, only the leading planning agency determines the collaboration process, which allows political pressures to change the collaboration process according to political needs. This condition results in a lack of consistency in the collaboration process, the number of meetings is not defined, a lack of monitoring and evaluation of the collaboration process, a lack of incentives for motivating the collaborative staff based on performance does not occur, a lack of feedback mechanisms that helps learning lessons from mistakes and thus enhancing the collaboration process further, and the collaborative meeting results are not communicated and discussed with stakeholders to reach collective decisions in risk-sensitive urban planning.

In addition, since there are no mandated collaboration procedures (with identification of stakeholders' roles and responsibilities), stakeholders do not have accountability in the collaboration process. As a result, participation and contribution are optional and depend on the personal decision of stakeholders based on their sectoral needs. The empirical study further found that, since there is no accountability, no dedicative continuous participation of the same collaborative members can be seen in the collaboration process.   Therefore, there is no effective risk-sensitive urban planning taking place; there is an absence of connectivity in all the meetings due to different members' participating.

Furthermore, since there is no proper identification of which stakeholders should attend collaborative meetings, the participation of a large number of organisations in the collaboration meetings is identified as a common issue in emerging economies, as mentioned in the studies by Malalgoda & Amaratunga (2015) and Malalgoda et al. (2014).Meanwhile, in the Sri Lankan context, many organisations have overlapping responsibilities, thereby, confusion is created in inviting such organisations to collaborative meetings which leads to ineffective collaborative meetings with many organisations. Furthermore, political influence limits the stakeholder selections and the determination of the number of collaboration meetings to finalise the urban plans based on political needs. Therefore, the relevant key stakeholders can be excluded from the process, and correct representation in the collaboration process is also ignored.

Furthermore, in the Sri Lankan context, since the ad hoc collaboration process takes place without any mandates, the long-term and inelastic collaboration process (Trapp et al.,2017) is not identified as a barrier. Since the collaboration process with a proper reporting mechanism is considered as a barrier in the emerging economies (Nugraha & Lassa, 2018), this study proposes the enablers discussed below which can be utilized by emerging economies to overcome collaboration process barriers in risk sensitive urban planning.

The primary data reveals that establishing legal mandates and agreements for effective collaboration, including monitoring and evaluation, is essential as suggested by the study conducted in emerging economies, Indonesia (Nugraha & Lassa, 2018). Similar to the study by Giordano et al (2020), the primary data reveals that Select appropriate stakeholders and engage them in collaboration through proper stakeholder identification and through the mapping of their responsibilities. In addition, the experts stated that, in the Sri Lankan context, existing organisational functions need to be revisited, and organisations with similar functions and duplication tasks need to be merged to avoid a large number of organisations in the collaboration process.

Similar to the studies' findings which include emerging economies (Walsh et.al, 2013; Yumagulova & Vertinsky, 2019; Sitas et al., 2016), the experts suggested that stakeholder trust will increase participation and contribution in the collaboration process. In addition, the experts advised that trust should be promoted by a formal, defined, mandated collaboration process with transparency rather than having an ad hoc informal collaboration process. Therefore, legal mandates and policies should be in place to formalise the proper collaboration process. Furthermore, the experts stated that dedicated collaborative representatives or teams should be allocated in organisations with collaborative official job descriptions to avoid absence and ineffective participation and contribution due to workload. Furthermore, anticipate and manage the conflicts is not explicitly identified as a solution in Sri Lanka. This Study argues that since the collaboration process in Sri Lanka is conducted in an ad hoc manner without indicating stakeholders' roles and responsibility, anticipate and manage the conflicts (Webb, Petheram et al., 2014) seems like a difficult solution. In the Sri Lankan context, therefore, the primary data reveals that proper agreement on to anticipated issues among stakeholders is essential in the collaboration process.

6.2.5 Organisational capacity

The barriers and enablers associated with the organisational capacity theme are discussed in this section.

This study validates the findings from the literaturewhich includes findings from emerging economies, such as a lack of human resources and financial capacity (Malalgoda et al.,2013; Nguyen et al., 2018; Trapp et al., 2017; Shrestha & Dhakal, 2019; Webb, Petheram et al., 2014; Rendon et al., 2016; Therrien et al., 2019; Torabi et al., 2018; Valencia et al., 2019; Uittenbroek, 2016) and technical capacity (unavailability of required digital technology) to support collaboration (Hardoy et al., 2019; Rendon et al., 2016) which hinder organisations from contributing to collaborative RSUP. This study further explored that, due to a lack of human resources and technical capacity, organisations are not able to allocate collaborative tasks among existing staff due to overload and incapability, thereby they cannot generate and share relevant information according to collaborative needs. The empirical study further reveals that weak organisational leaders' lack of human resource management is another reason for not utilizing available resources towards collaboration activities. A lack of knowledge in terms of subject and technical knowledge is another key barrier identified in the literature (Malalgoda et al., 2013; Malalgoda, Amaratunga, 2015; Mwenje, 2019). Moreover, the experts have not directly stated that stakeholders are reluctant to undertake exploratory learning (Uittenbroek, 2016) in the Sri Lankan context; however, they have mentioned that stakeholders are not ready to share knowledge among themselves to develop together and have a competitive mentality. Therefore, the empirical study further revealed that the lack of knowledge capacity of organisational staff hinders collaboration by resulting in a lack of understanding of collaborative roles. Lack of subject knowledge further leads to ineffective contributions in the collaboration meetings and incapability to understand and fulfil collaboration needs. Organisations cannot recruit new staff, adopt advanced technologies, or enhance the technical capacity of staff by introducing training and development sessions due to the lack of financial capability as a root cause. Moreover, unsuitable recruitment processes and political interference in staff appointments are reasons for having staff with inadequate capability to support collaboration needs. Furthermore, the empirical study found that leading organisations cannot conduct an adequate number of collaboration meetings due to the unavailability of funds and, therefore, implementing effective collaborative consultation among stakeholders is challenging. Furthermore, as a key reason for the lack of funds, it is observed that there is a lack of financial plans and, additionally, the implementation roles

within financial plans are not clearly defined in the policies for supporting the collaboration process and developing organisational capacity as identified in the global context by the study (Rendon et al., 2016).

Most of these barriers which have been identified in the emerging economies under the organisational capacity theme (Nguyen et al., 2018; Shrestha & Dhakal, 2019; Valencia et al., 2019; Hardoy et al., 2019) are similar to barriers identified in Sri Lanka under this theme. Thus, the enablers idenified in the following section can be generalised to the emerging economies.

The empirical findings and the literature identified in the emerging economies (Kehew et al., 2013) suggest that policies and legislation should be strengthened to provide funding guidance to organisations to enhance their capacity to contribute effectively to the collaboration process. The experts further insisted that organisations need to move from paper-based digital storage systems and communication methods and should begin to adopt digital technologies that require collaboration needs, as indicated in the studies in the global context including the emerging economies (Walsh et.al, 2013; Coaffee et al., 2016; Monteiro et al., 2015; Kuller et al., 2019; Baloye & Palamuleni, 2016; van de Ven et al., 2016). These strategies follow the suggestions identified in the literature, such as: creating financial plans (Coaffee et al., 2016; Pieterse et al., 2018) and providing essential technical and financial resources to build organisational capacity for collaboration (Valencia,2019**;** Nemakonde & Van Niekerk, 2017).

Capacity building of the stakeholders in terms of subject and technical knowledge is essential to enhance the human resource capacity to effectively work towards collaboration, and this can be done through staff development activities such as knowledge development and training programmes, and research (Walsh et al, 2013; Broto et al., 2015; Malalgoda & Amaratunga, 2015; Chu, Brown et al., 2019; Malalgoda et al., 2014; Uittenbroek, et al., 2014; Uittenbroek, 2016; Nugraha & Lassa, 2018) to create an awareness of collaborative needs, an understanding of roles, and an effective contribution in the collaboration process. Furthermore, the experts stated that this capacity building can allow bureaucrats to stand against political interference.

Recruiting additional skilled staff to strengthen the collaboration capacity is another strategy identified in this study; this factor was also put forward in the studies in the emerging economies (Wamsler et al., 2014; Taylor, 2017). The empirical findings of the study found

that organisational financial capacity and political interference hinder effective recruitment processes leading to a lack of efficient human resources for collaboration needs. Therefore, this empirical study highlights the importance of a strong recruitment process with suitable criteria for selecting capable staff to undertake collaboration without any political interference. Furthermore, the experts highlighted that appointing a suitable organisational leader without any political interference is vital to managing the organisational resources effectively. This suitable appointment of staff and leaders enhances organisational capacity with regard to collaboration needs and contributes to effective decision-making.

The empirical study further found that NGOs provide risk-sensitive urban planning and development-related training sessions for their projects. Therefore, it is suggested to utilise and involve them in providing training for collaborative staff to improve their subject and technical knowledge. This suggestion helps to overcome the financial burden associated with the training and development process. On top of all, the study found some opportunities to receive required funding, such as funding from international bodies, for example, the Green Climate Fund, which will help to fulfil collaborative initiatives towards climate change adaptation. Also, utilising existing knowledge platforms can help staff to enhance their knowledge; for example, in Sri Lanka, a sustainable development knowledge platform is available that can be used and further enhance the capacity building of stakeholders.

  Finally, this study suggests utilising existing national plans and strategies to enhance stakeholders' knowledge development. The Climate Change Adaptation Strategy for Sri Lanka 2011-2016 has a proposal for the capacity building of organisational staff. The Disaster Management Plan 2022-2030 focuses on involving universities and research organisations in training officials and enhancing the capacity development of the stakeholders. Furthermore, the Disaster Management Plan 2022-2030 reports on the technical committee on training, education and public awareness which functions under the technical advisory committee which was formed under the National Disaster Management Council. This technical committee on training, education and public awareness plans and conducts training programmes for the capacity development of government bodies and the public, including educating school children and creating awareness. This study suggests using the above discussed opportunities for staff capacity development.

6.3 Policy proposals and changes required to enhance stakeholder collaboration in risk-sensitive urban planning.

In the Sri Lankan context, sectoral policies are available which consider RSUP (See section 4.8). However, an integrated focus on RSUP is lacking. It is important to note that, even though the leading planning agency (UDA) conducts collaborative meetings and invites other stakeholders to participate with regard to risk-sensitive urban planning, little collaboration amongst stakeholders occurs due to low levels of participation and contribution, the poor sharing of information and knowledge, ineffective collaboration processes, and unsupportive working environments. These conditions prevail because of weak policies and legislation which have prevented any integration among the policies of the relevant sectors.

Nilsson & Weitz (2019) argued that systems thinking is an effective approach to developing policies and understanding policy changes which involve stakeholders. This study has adopted this approach to identify the policy and legislative changes required to enhance stakeholder RSUP, as given in section 5.5. Altogether, nine key policy requirements have been identified to contribute to the research gap in policy requirements as indicated in the Figure 2-8: Theoretical framework of the study.

The identified policy requirements indicate that the first change required in the Sri Lankan context is that there should be a regular review of existing sectoral policies and legislation by stakeholders with regard to effective collaboration in RSUP. This change can lead to integration among sectoral policies which will lead to the creation of effective mandated policy implementation tools such as action plans and strategies. Hence, organisations can then appropriately adopt those plans and strategies by changing their mandates with regard to collaborative plans and strategies. These findings are further validated by the literaturewhich includes studies from emerging economies, which highlight the importance of policy development with stakeholder involvement (Sitas et al., 2016; Kehew et al., 2013) and the importance of harmonising and strengthening the laws and policies that support collaboration (Walsh et.al, 2013; Wamsler et al., 2020; Trapp et al., 2017; Shrestha & Dhakal, 2019; Bissonnette et al., 2018; Mwenje, 2019; Torabi et al., 2018; Uittenbroek, et al., 2014; Uittenbroek, 2016; Hegger et al., 2014; Amaratunga et al., 2018; Taylor, 2017; Parthasarathy, 2016; Papa et al., 2015). Furthermore, as mentioned in the study by Webb, Petheram et al. (2014), providing guidance and support that assists policymakers' awareness is essential. Therefore, the study shows that stakeholder involvement in the policymaking and reviewing

and updating process will provide the necessary guidance to policymakers to develop policies which are integrated and coherent with regard to collaborative initiatives. As a result, the lack of coherence in government policies and legal instruments (Webb, Petheram et al., 2014; Bissonnette et al., 2018), which is one of the key barriers to stakeholder collaboration, can be eliminated. Furthermore, even though the empirical study did not explicitly state the importance of adaptive policies, it can be argued that continuously reviewing and updating policies and legislation will help keep adaptive policies and laws, which is important in the collaborative RSUP context which is often characterised by uncertainty (Swanson & Bhadwal, 2009).

The second aspect that must be included in policies and legislation is defining stakeholders' roles and responsibilities within mandated collaboration procedures. This aspect is missing in the Sri Lankan context which leads to poor accountability. This factor creates several undesired consequences in the collaboration process, including ad hoc decisions, low participation and contributions, and high political pressure. Another consequence is, as several literature sources in the global context including those examining emerging economies indicate, a lack of legislative support and legislative authority to delegate stakeholders' responsibilities and duties is a barrier to stakeholder collaboration in RSUP (Malalgoda et al., 2013; Nguyen et al., 2018; Wamsler et al., 2014; Forino et al.,2018).

The third aspect of the policy requirements is that policies and legislations should dedicate shared powers to all stakeholders with signing authority in urban planning. This study found that since some stakeholders do not have powers within decision-making, their proposals and opinions are ignored. Furthermore, it is important to note that the key planning agency makes the final decisions, and these are not effectively communicated to other stakeholders alongside justifications for the decisions due to the agency not conducting an adequate number of collaborative meetings to discuss the decisions obtained from previous meetings. This situation creates conflicts, a lack of trust among stakeholders, superior mentality issues, and respect and recognition issues. Thereby, effective participation and contribution are lacking. Despite all such issues, effective risk-sensitive urban planning needs all the stakeholders' consensus in finalising the plan since they are the implementors of the plan. The experts also stated that, even though the planning agency publishes urban plans in the Sri Lankan government Gazette, other key stakeholders are not always following those plans. since some of the other stakeholders' sectoral proposals are excluded from the plans. Therefore, risk-sensitive urban plans remain just as paper documents. Hence, all key

stakeholders need to be accountable for urban plans by giving shared powers and decision-making authority. The literature further validates this concept in the global context (including emerging economies) by suggesting enabling power-sharing and shared responsibility, and accountability towards other stakeholders, which are important in multilevel governance (Giordano et al, 2020).

The fourth aspect of the policy changes that are required is that policies and legislation should determine the collaborative institutional framework for RSUP with required decentralised and neutral leadership features. In the Sri Lankan context, as discussed earlier, the UDA plays a leading role in the collaboration process and is the key decision-maker. This results in several issues as discussed earlier and, therefore, this study suggests having leadership with neutral features, such as having an external leader who is not a part of the collaboration network. Furthermore, the current governance arrangements hinder organisational coordination and supports silo working patterns. Therefore, there is a need to establish collaborative governance arrangements with the necessary decentralised features. Since the urban planning process is conducted at the local level, the study proposes having a collaborative network at the local level, involving all stakeholders with required formal and informal collaborations, with neutral leadership. Moreover, the required powers need to be decentralised at the local level to all required organisations to make collaborative decisions and share required information and knowledge. Therefore, the study suggests that policies and legislation should provide a collaborative institutional framework for RSUP (a detailed discussion about the collaborative institutional framework is given in section 6.4). A similar suggestion was identified in the global context, namely to create a collaborative institutional framework to remove traditional power-based relationships that hinder collaboration (Trapp et al., 2017; Hegger et al., 2014; Howell & Wilson, 2019; Diep, 2018). Moreover, the study by Trapp et al. (2017) stated that establishing decentralised organisational arrangements linked with the centralised system is essential to facilitate stakeholder collaboration.

As a fifth aspect, this study suggests that policies should allow for informal collaboration in RSUP and permit formal collaboration with external organisations such as NGOs, as required. Similarly, studies (Yumagulova & Vertinsky, 2019; Smedby & Neij, 2013) in the global context, including the emerging economies, have also stated that policies must provide space for setting up informal structures for promoting collaboration. In the Sri Lankan context, collaboration occurs only when stakeholders are invited for meetings. This approach needs to be changed by forming formal contracts and agreements among key stakeholders by

sharing powers and providing decision-making authority. Furthermore, the involvement of other stakeholders such as academic and research organisations, universities, and NGOs should also be supported for generating effective risk-sensitive urban plans.

The primary data further reveals that NGO involvement can assist in effective collaboration in many ways, such as in conducting training and development activities, since they are involved in many risk-sensitive urban development projects and already conduct training programmes related to their projects. Furthermore, NGOs can collaborate with communities well and represent their needs in the urban planning process since they are already working with communities at the ground level in several projects. Moreover, it is indicated that NGOs could contribute to providing necessary funding for collaboration, this would require formal agreements between the government agencies and the NGOs. However, the experts stated that current strict mandates and regulations do not allow financial trade-offs from informal collaboration. Hence, important proposals and suggestions from informal collaborations cannot be incorporated into the final decision-making. Thus, this study suggests that the policies and laws should promote the incorporation of necessary informal collaborations and allow for any formal contracts with NGOs according to the needs.

The sixth aspect is that policies and legislation should guide funding for these collaboration processes. Funding is key in terms of determining the effectiveness of collaboration in several ways as it affects many factors including the number of collaboration meetings in the planning process, adopting modern digital technologies for effective information sharing and planning activities, recruiting new competent staff to be involved in the collaboration process, and increasing awareness and subject and technical knowledge for enhancing stakeholders' collaboration. The existing studies also validated this finding by stating that allocating funding for building collaboration capacity through policies is key for effective stakeholder collaboration (Chu, Schenk et al.,2018).

The seventh aspect is that policies and legislation should encourage staff development activities, such as research and training sessions, to enhance subject and technical knowledge. Policies should encourage staff development activities such as training, research activities, and workshops. These are not promoted in the current Sri Lankan context and, therefore, there is a lack of competent representatives in the collaboration process. Therefore, planning agencies struggle to attain effective contributions and reliable data for planning activities. Furthermore, due to the lack of technical knowledge, some organisations still struggle to

adopt modern technologies such as cloud-based data sharing. Furthermore, the planning agency cannot obtain data in the required format for urban planning activities. Therefore, staff development activities regarding subject and technical knowledge are key for stakeholder collaboration.

The eighth aspect is that policies should provide criteria to revise the national common planning policies and plans without them being influenced by changes in government and political manifestoes. This policy requirement is key since trust in the planning process and plans is important to participate and contribute to collaborative RSUP. In Sri Lanka, the common national development plans get changed frequently due to changes in government and political manifestos without them giving consideration to the effectiveness of the plans. Once the national plan is changed, all the local urban plans need to be changed to make alignments with the national plan. This condition makes stakeholders lose trust in the plans and in the overall planning process. Therefore, maintaining a long-term national policy and development plan for the country without it getting changed by political pressure is fundamental for effective stakeholder collaboration.

As the final aspect, this study proposes a policy and legislative change that establishes mandated information and knowledge-sharing procedures among stakeholders. This mandated procedure will lead to changes in organisational mandates that then will provide accountability in providing accurate, reliable data for RSUP and will eliminate the data selling culture.

Furthermore, the study would like to highlight the existing studies conducted in Sri Lanka that support the need for the following policy changes. The studies of Malalgoda et al. (2013) and Malalgoda & Amaratunga (2015) highlighted that policies promoting effective collaboration are lacking and that there is a deficiency in legislation and legislative authority to delegate stakeholder responsibilities and duties in a coherent manner to support collaboration. Furthermore, some stakeholders have an interest and desire to implement collaborative initiatives, but they are not able to fulfil their aspirations since laws do not adequately delegate their responsibilities (Malalgoda et al., 2013). Hence, these researchers emphasise the need for effective policies and legislation to enforce risk-sensitive urban planning and implementation that involves the relevant stakeholders from various sectors and disciplines (Malalgoda et al., 2013). This thesis has proposed nine key policy requirements that help to overcome the above issues to enhance stakeholder collaboration effectively.

These policy changes or requirements help to overcome most of the barriers identified in emerging economies such as Sri Lanka and eliminate the key policy related barriers identified in the emerging economies such as an absence or lack of policies that promote collaboration (Shrestha & Dhakal 2019; Broto et al., 2015; Malalgoda & Amaratunga, 2015) and a lack of legislative support and legislative authority to delegate stakeholders' responsibilities and duties (Malalgoda et al.,2013; Nguyen et al., 2018). Therefore, this study claims that these policy proposals can be generalised out to the emerging economies to enhance the stakeholder collaboration context in RSUP.

6.4 A suitable inter-organisational collaboration structure

This section provides a comprehensive discussion of the findings from the primary data and the literature review and, in turn, proposes a suitable collaborative governance arrangement that facilitates stakeholder collaboration in risk-sensitive urban planning. In addition, in this section, the study combines primary data and literature review findings to develop test criteria that can be used to assess the suitability of inter-organisational structural types and features for collaborative RSUP. As a next step, the study evaluated the proposed structural arrangements with the experts using the developed test criteria and then selected and proposed a suitable structural arrangement with further improvements.

Regarding organisational structural types, the experts suggested that a network structure is suitable for facilitating horizontal coordination with various stakeholders with shared powers, and that a hierarchical structure hinders effective collaboration among stakeholders. However, the experts also indicated the importance of a hierarchical arrangement to govern an organisation with a top-down approach. Therefore, the countries currently committed to a bureaucratic culture require a hybrid of hierarchies and network arrangements to facilitate stakeholder collaboration. This argument is further validated by the studies of Gilfillan et al. (2017), Khayatzadeh-Mahani et al. (2019), and Lagreid and Rykkja (2015), which argue that countries which follow bureaucratic cultures can adopt hierarchical and supplementary network governance arrangements for collaboration purposes since these structural forms allow vertical management and horizontal collaboration to a certain extent. Furthermore, hierarchical features in governance arrangements are essential for facilitating balanced top-down and bottom-up approaches for effective RSUP (C40 cities climate change leadership group, 2020,2020). Hence, a self-governed shared network is unsuitable for RSUP since it

lacks leadership and the centrality to facilitate top-down approaches and is not capable of effectively managing a large number of stakeholders, which is required for effective RSUP.

In terms of structural features and required mechanisms, according to the primary data, power sharing and equality, neutral leadership, a decentralisation approach, a balanced top-down and bottom-up approach, vertical and horizontal integration, accommodating necessary informal and formal collaboration with non-governmental organisations, and inclusion of communities are considered as necessary features for successful collaborative governance. Effective leadership, vertical and horizontal integration with balanced top-down and bottom-up approaches with required decentralised features, and heterogeneity have also been identified in the literature (See section 2.3). Accommodating necessary informal and formal collaboration with non-governmental organisations has been supported by Voets et al. (2021) who argued that collaboration with public and private organisations, with accountability, is essential for effective collaborative governance. Therefore, the literature validates findings from the primary data. Even though the literature has indicated the importance of leadership, the primary data shows the importance of neutral leadership to ensure equality and power sharing among stakeholders, as stated also in the study by Munene et al. (2018). Therefore, this study considers neutral leadership as another key feature of the collaborative governance structure for RSUP.

Furthermore, according to the experts, a bottom-up approach that only focuses on temporary issues at the ground level without considering the holistic national focus is unsuitable for long-term plans such as RSUP. Therefore, the structure should be capable of facilitating a balanced top-down and bottom-up approach. Furthermore, in Sri Lanka, in some cases, the UDA head office is involved in developing plans if their regional offices cannot prepare comprehensive urban plans due to a lack of capacity. On considering this factor, the study suggests that having a bottom-up decentralised approach is essential to allow higher-level authorities to take responsibility for the tasks or functions that lower levels are not equipped to fulfil (Vu (2012) (as cited in Gilfillan et al., 2017). However, even though a decentralised approach is essential in the risk-sensitive urban planning process, the national-level dedicated organisation's decisive approval should be given to ensure the integration of the local urban plan with the national physical plan. Therefore, pure decentralisation at the local level regarding decision-making is unsuitable in a risk-sensitive urban planning context. However, other powers required for the planning process, including decision-making on information, knowledge, and resource sharing, need to be decentralised under the bottom-up, decentralised

approach which is lacking in the current context. In terms of innovative decision-making, in alignment with the primary data, this study suggests that the collaborative governance structure should accommodate various stakeholders such as universities, NGOs and other private organisations to create the heterogeneity feature in the structure as suggested by Hölscher et al. (2019) and Therrien et al. (2019).

6.4.1 Development of the test criteria

Based on the above discussion, the study developed two test criteria, named test A and test B, to propose or select the suitable collaborative governance arrangement for effective risk-sensitive urban planning based on structural type and features.

Test A (See Figure 6-1) is a primary evaluation to assess the suitability of the collaborative governance structural type for enhancing stakeholder collaboration in RSUP. Hierarchy, market, network, and a hybrid form of hierarchy and network are considered basic forms of organisational structures that coordinate actors in various ways (See section 2.3.2). Among them, the market-type structure is not considered in this context since it does not provide any kind of coordination among organisations. Therefore, test A only includes other structural forms that facilitate coordination and lead to selecting and rejecting structural types based on the risk-sensitive urban planning context, as discussed above.

Figure 6-1: Test A

Test B (See Figure 6-2) is a secondary evaluation based on the supportive features of the collaborative governance structure that facilitate collaboration. Risk-sensitive urban planning

requires cross-administrative scales, cross-sector and cross-administrative boundary collaboration among various actors to serve the purpose successfully. Therefore, the collaborative governance structure for RSUP requires adequate vertical and horizontal integration to foster stakeholder collaboration. In terms of vertical integration, for successful collaborative risk-sensitive urban planning, the experts suggested that the governance structure should allow for the following features:

(1) a balanced top-down and bottom-up approach, explained as follows: pure bottom-up approaches are suitable for solving contemporary issues that mainly come from the community; however, urban planning is always focused on the long term by considering the whole nation, therefore, urban planning needs to be integrated with the top-down approach. Thus, all urban plans are developed at the local levels by complying with the macro plan called the national physical plan in Sri Lanka. In addition, current issues and ideas, developed using the bottom-up approach, should be reviewed and accommodated into the national plan where possible. Therefore, a balanced top-down and bottom-up approach is essential in risk-sensitive urban planning. Moreover, the integration of urban plans with the national physical plan should be monitored and ensured in the planning and decision-making process by the responsible organisation for the national physical plan.

(2) a bottom-up decentralisation approach that allows national-level supervision and control where necessary: It is essential in risk-sensitive urban planning governance in which local-level organisations are typically involved in the urban planning process since a decentralised system enables decision-making powers and resources that are allocated at the lowest feasible or appropriate administrative level (C40 cities climate change leadership group, 2020). Therefore, the collaborative structure should be capable of accommodating the decentralisation approach and connections across different administrative levels or governance scales that can facilitate balanced top-down and bottom-up decision-making approaches. The literature suggests that, wherever formal direct connection does not prevail across different scales in governance, boundary-spanning organisations play a key role in connecting organisations at the various administrative levels and create vertical coordination and integration in the governance arrangement.

Regarding horizontal integration, since risk-sensitive urban planning is complex and requires innovative solutions, cross-sector, cross-actors (such as government and non-government organisations) and/or cross-administrative boundary collaboration with heterogeneity is essential which facilitates the various knowledge sharing, resources, and information and inter-organisational learning that lead to innovative solutions (Powell & Grodal, 2006). Therefore, the structure should be able to facilitate this horizontal coordination as a mandatory requirement. Moreover, to succeed in collaborative risk-sensitive urban planning, neutral leadership in collaborative governance is another essential feature for supporting collaboration in the governance arrangements by coordinating and monitoring the collaboration process. Finally, the structure should accommodate community participation to fulfil the collaborative governance requirement in risk-sensitive urban planning.

Based on this discussion, the assessment criteria for test B were developed, as shown in Figure 6-2.

Figure 6-2: Test B

Based on the discussion from the primary and secondary data, the assessment criteria was developed as shown in Figure 6-1 and Figure 6-2 to test the adequateness of a collaborative governance structure that can serve all collaborative governance requirements for risk-sensitive urban planning. Test A is followed by test B. Only if test A succeeds, test B will be performed to check the adequate features of the structure to support collaboration.

6.4.2 Application of the test criteria to propose suitable collaborative governance arrangements in RSUP.

Firstly, test A will be conducted to assess the adequateness of the inter-organisational collaborative structure type. If test A is passed, test B can be undertaken to check whether the structural arrangement has adequate features to facilitate stakeholder collaboration. Even though the type of organisation represents the features of the structures, sometimes, the intention of the development of the structure fails in practice. For example, a study by Jiren et al. (2018) discussed the governance arrangement which is initiated with the intention of a network governance arrangement, however, in practice it showed strong hierarchical features, and failed in fulfilling the requirements. Therefore, it is essential to assess the suitability of the features displayed by the inter-organisational collaborative structure in addition to the basic structural type of formation. Therefore, test B is introduced. In test B, vertical and horizontal integration, as two basic dimensions of a collaboration, are tested to see whether the structure facilitates cross-dimensional collaboration across boundaries, such as cross-administrative scales, cross sector, and cross actors. If both tests are passed, the heterogeneity level can be considered as an additional factor in selecting the best proposals since a successful collaborative governance structure for RSUP needs to foster innovative decision-making. These criteria can be used to compare the available structures in terms of rank and to select the best of all.

Based on these criteria, the current governance structure, and the proposed structural arrangements for Sri Lankan risk-sensitive urban planning (See section 5.6.2) were evaluated to select a suitable collaborative governance structure for RSUP in Sri Lanka, as discussed in the following sections.

The current collaborative arrangement for RSUP has a hierarchy arrangement from the UDA head office to their local offices and collaboration with other agencies at the local level which can be considered as a network feature, therefore, this falls under the hybrid of a hierarchy

and network structural arrangement and satisfies test A. However, the current structure does not allow the required decentralised approach for all local-level collaborative organisations to contribute effectively and make decisions in RSUP. An effective top-down and bottom-up approach is absent among the national physical and urban plans. Furthermore, UDA leadership creates a lead organisation-governed network at the local level that can hinder neutral leadership which requires effective collaboration. Therefore, the current governance arrangement fails to satisfy test B and thus creates a need to propose a suitable collaborative governance arrangement for effective stakeholder collaboration in RSUP.

The empirical study found various proposals for facilitating stakeholder collaboration in risk-sensitive urban planning. Among them were (i) the leadership of local authorities, as proposed by the study of Malalgoda & Amaratunga (2015), (ii) shared leadership with local authorities and (iii) the District Secretariat can facilitate the bottom-up approach and promote decentralised features. These proposals further accommodate the collaboration of other stakeholders at the local level under the local authority and district secretariat leadership. This structural arrangement represents the features of a "lead organisation governed network" (See section 2.3.2) in addition to the hierarchical structure and, therefore, satisfies test A. However, this structural proposal does not facilitate the balanced top-down and bottom-up approach and lacks neutral leadership since it has the local authority, one of the key stakeholders in RSUP, as a leader. Therefore, this proposal does not satisfy test B. Furthermore, primary data have further indicated that local authorities and District Secretariats are not capable enough to handle and lead RSUP and need to be empowered to be involved in RSUP.

A steering committee or a core team with key stakeholders and advisors are proposed as another structural arrangement by this empirical study. This structure facilitates collaboration among non-government organisations by including them as advisors. However, this proposal focuses on a top-down approach and collaboration among stakeholders is proposed at the national level with this steering committee, not at the local level where urban plans are currently prepared. Therefore, this structure hinders the decentralisation features at the local level. Therefore, since this structure falls under the hybrid of hierarchy and network category, it allows sectoral hierarchical arrangements and a network at the national level and thus satisfies test A but fails test B due to a lack of decentralisation and balanced top-down and bottom-up approach features.

As the next proposal, similar to the current governance arrangements, the experts proposed a collaborative network arrangement with the existing leadership of the planning agency UDA. This structural proposal satisfies test A and fails test B since it lacks neutral leadership among the stakeholders and a balanced top-down and bottom-up approach that integrates the National Physical Planning Department.

As a final proposal, the experts suggested having the leadership of the National Physical Planning Department for the local-level development plans. This structure allows all other stakeholders to form a network at the local level to develop risk-sensitive urban plans as in the current situation but with neutral external leadership. In addition, this network structure at the local level is capable of forming required formal and informal collaboration with NGOs and other research organisations, including universities, as a resource pool at the local level. This collaboration among diverse stakeholders increases the heterogeneity and facilitates innovative decision-making in RSUP (Powell & Grodal, 2006). Furthermore, the networks are formed with a high level of trust among the actors, and the actors are interdependent instead of being under central control (Faul, 2016; Bevir, 2012). This structure falls under the hybrid of hierarchy and network structure and satisfies test A. This structure also satisfies test B as it allows for the neutral leadership of the national physical planning department and balances top-down and bottom-up approaches in the development plans. Moreover, this structure is capable enough to permit required decentralised powers to all sectoral agencies to collaborate at the local level network. The structure can allow collaboration with NGOs that can act as boundary-spanning organisations by filling the gap between stakeholders, communities, and local actors (Farooqi, 2016). Furthermore, this structure can accommodate high community engagement with the support of NGOs and local authorities as network members who are dealing with, and representing, the community in several ways.

Accordingly, this study proposes a network administrative organisation (NAO) governed network that consists of the UDA, other required technical agencies including the DRR and CC sectors, research organisations, universities, private organisations, and community-based organisations at the local level, for preparing RSUP collaboratively with the neutral leadership of the National Physical Planning Department which will monitor and control the collaboration activities of the stakeholders in the network. With regard to adopting existing governance mechanisms as much as possible, the study utilises the existing governance arrangements proposed by the Town and Country Planning Ordinance No. 13 of 1946 and Act no 49 of 2000, the amendment of the Town and Country Planning Ordinance (D-1-2:

Town and country planning ordinance No. 13 of 1946 of Appendix D: Risk-sensitive urban planning and development related legislations and policies in Sri Lanka). Accordingly, the national physical planning council will be in the top hierarchy that includes all subject ministers and is chaired by the President in terms of approving all of the national development plans. Furthermore, at the national level an inter-ministerial coordination committee is available to assist the Council consisting of the secretariats from all the appropriate subject ministries. At the national level, the department of national physical planning's function is to prepare a national physical plan and policy. This study proposes delegating authority to the National Physical Planning Department to approve the local-level risk-sensitive urban plans prepared by key stakeholders in the local level network. This study also proposes a regional committee under the national physical planning department that consists of the provincial authority, local authorities, the district secretariat, and UDA members. This regional committee will function at the provincial level as a coordinating agency and boundary spanner between the local level network and the national physical planning department at the national level. This arrangement will help to ensure: (1) the integration of urban and non-urban plans at the district and provincial levels beyond administrative boundaries, and (2) the facilitation of the approval of urban plans by the National Physical Planning Department as a collaborative leader that will ensure the integration between the national physical plan and urban plans. The UDA will still act as a planner for urban areas by collaborating with other agencies at the local level with equal power. This proposal will eliminate the sole decision-making power of the UDA by removing the powers of the UDA's main planning committee at the head office as an approval agency. The UDA head office can still guide the local offices in the development of urban plans by collaborating with other key stakeholders as a planning agency under the supervision of the national physical planning department.

At the local level, this study proposes having a network, with equal powers, of key agencies such as planners, DRR sectoral technical agencies, and CC sectoral technical agencies in terms of developing accountable RSUP. Furthermore, universities, research organisations and NGOs can be included in formal or informal ways as collaborative members in the network for advice or for other supporting work regarding RSUP according to the requirements. Based on the stakeholder analysis conducted in this study (See section 4.12), the study proposes that all the state agencies who have already been given implementation powers in the development activities and have interests in DRR and CC activities need to be given equal

mandated powers and incorporated in the network that will provide accountability in planning to ensure effective implementation of plans. Finally, such a structure will facilitate community engagement as a key component of the collaborative governance arrangements. The local authority in the network will act as a key stakeholder with representatives elected by the public and will directly connect with the public as a local-level state organisation. Furthermore, NGOs can represent a community's needs satisfactorily as they already work with communities in several DM and CC activities. In addition, the network will further allow collaboration with several formal and informal community organisations in RSUP. As explained above, the proposed structure is given in Figure 6-3. The placement of the identified key stakeholders in this structure and their roles are presented in section 6.6.3 and section 6.6.5.

Figure 6-3: Proposed organisational structure for the Sri Lankan context.

Even though this structure is proposed for Sri Lanka, this study suggests that this kind of structure is applicable to other emerging economies since they also follow a strong bureaucratic culture as well as facing key governance related issues similar to Sri Lanka such as a lack of coordination mechanisms in governance arrangements (Nguyen et al., 2018;

Shrestha& Dhakal, 2019; Leck et al., 2018; Taylor,2016) and unsupportive intra-organisational structures for collaboration (Taylor, 2016).

This proposed collaborative governance structure and features for enhance the stakeholder collaboration in RSUP contribute the research gap identified in the literature as indicated in the Figure 2-8: Theoretical framework of the study.

6.5 Maturity grid development

This section explains the development of a maturity grid consisting of maturity levels with the name and definitions, indicators, and the indicators' attributes against each maturity level. The study developed this maturity grid using a literature review and primary data to fulfil the gap in theory as indicated in the Figure 2-8: Theoretical framework of the study. Organisations can use this maturity grid to identify their collaboration maturity level in Risk Sensitive Urban Planning (RSUP) and to understand the requirements needed to achieve a high level of maturity. In addition, this maturity grid helps to create awareness among stakeholders about where they are in terms of collaborative RSUP and provides a pathway to enhance the collaboration maturity of organisations towards collaborative RSUP.

6.5.1 Establishing the levels of the maturity grid.

Under the systematised literature review, six maturity levels were identified in the existing inter-organisational collaboration maturity models from level 0 (isolated) to level 5 (optimised/continuous improvement) (See to section 2.5.3.1). Each study that was reviewed had defined a different number of maturity levels in their maturity models according to their requirements and context. The examined maturity models consisted of three (Gilman & Kuhn, 2012) to six levels (Awasthy et al., 2018). The key features and standard descriptions of the six maturity levels are depicted in Table 2-11(See section 2.5.3.1).

Since this inter-organisational collaboration maturity model is developed for assessing the maturity of inter-organisational collaboration in RSUP, this study connects the stakeholder coordination levels in producing development plans (see Figure 03 in section 1.5.3) into five inter-organisational collaboration maturity levels (0 to 4) by aligning the lower-level maturity with a lower level of stakeholder coordination and a higher level of maturity with a higher level of stakeholder coordination (See Table 6-1). This table provides the connectivity among the identified inter-organisational collaboration maturity levels, the stakeholder coordination

levels, and a justification of the formation of the maturity levels for the maturity grid for stakeholder collaboration in RSUP. The study selected the name of each maturity level from the literature (See section 2.5.3.1).

Table 6-1: Development of maturity levels and its definition

Level of participation (See section 1.5.3)	Type of cooperation (See section 1.5.3)	Connections to the maturity level identified from the literature review (See section 2.5.3.1)	Justification	Maturity levels and names and definitions
Ignorance	Unilateral action	Level 0	In the ignorance level of participation, stakeholders do not have an awareness of RSUP, therefore, the organisations are isolated. There are no inter-organisational relationships.	Level 0: Isolated: The organisation is ignored and isolated; the organisation is not aware of collaborative RSUP; is not involved in inter-organisational collaboration for RSUP.
Awareness Informed		Level 1	In this awareness and informed level of participation, stakeholders know what is happening, and they receive information in one way; collaboration is not discouraged. Ad hoc and chaotic collaboration processes can be seen. Collaboration is unstructured and directed towards the interests of their own organisations. However, since there is no collaboration process available, this level of participation cannot be connected to level 2 of inter-organisational collaboration maturity.	Level 1: Initial: Organisations are aware of, and informed about, collaborative RSUP. Collaboration is unstructured and directed towards the interests of their own organisations.

Consultation	Coordination	Level 2	In this consultation stage, stakeholders are consulted, and the information flow is one way. In the discussion stage, a two-way interactive relationship and information flow is available between stakeholders. Therefore, the value of collaboration is recognised with clear collaborative objectives. The collaboration process is defined and documented. However, since no partnership contracts are available, this level cannot be connected to level 3.	Level 2: Linked: Organisations are involved in consultation or discussion with one- or two-way interaction relationships. The value of collaboration is recognised with clear objectives.
Discussion				
Co-design	Collaboration	Levels 3 & 4	In this codesign participation stage, stakeholders feel a sense of ownership and commitment to developing RSUP. Therefore, collaboration activities can be seen with defined collaboration processes with contracts in place. Collaboration processes are well-characterised and understood. Collaboration-related activities are considered as part of the workflow. This stage shows the characteristics of levels 3 and 4; however, since there is a lack of mutual dependency in decision-making, this stage cannot be connected to level 5.	Level 3: Integrated: Organisations involved in the designing process with a sense of ownership. Defined collaboration processes exist with the contracts well-characterised and understood. Collaboration-related activities are considered part of the workflow.
Co-decision making	Joint action	Level 5	In this co-decision-making stage, stakeholders are mandated to act with decision-making authority which provides mutual dependency in decision-making. Therefore, stakeholders have accountability for RSUP. There is reciprocal trust and mutual dependency	Level 4: Extended: Organisations are involved in the decision-making process of RSUP with mandatory power. Accountability in the RSUP exists. Mutual trust and dependency can be seen with high negotiating ability. Collaboration processes and information

			among the members of the network. Collaboration processes and information requirements are continuously reviewed and improved. The ability to negotiate with others is high.	requirements are continuously reviewed and improved.

6.5.2 Establishing the dimensions of the maturity grid.

From the systematised literature review, five dimensions were identified to measure the inter-organisational collaboration maturity of an organisation: administrative environment; system; process; technology; people (See section 2.5.3.2). Additionally, from the primary data, this study found several dimensions required for successful stakeholder collaboration in RSUP, such as politics, policies and legislations, governance, working culture, organisational capacity, information and knowledge sharing, and collaboration process (See section 5.4). Therefore, the study merged these two findings into five key dimensions that are required to assess the collaboration maturity of an organisation in RSUP as follows: (1) Administrative environment which includes policies and legislation, mandates and governance mechanisms that required to operate the organisational collaboration in RSUP; (2) Organisational system which includes strategy and culture; (3) Process which includes the cost management process; the knowledge sharing process; the information sharing process; the collaboration process, and the business process; (4) Technology which specifies the standard information technology requirements to collaborate effectively, and (5) People which specifies how the people involved in the collaboration process need to be to succeed the process.

6.5.3 Determining the indicators against various themes under the dimensions.

Based on these five key dimensions, this study developed the indicators and attributes that help to assess inter-organisational collaboration maturity in RSUP. This study again merged the literature review (LR) and primary data (PD) findings to derive suitable indicators from assessing the organisational collaboration maturity in RSUP to develop the indicators. As a primary data input, the study selected key factors from the primary data findings on the barriers and enablers that can determine the collaboration level of an organisation (See section 5.4). The indicators and attributes' development under each dimension are discussed below.

6.5.3.1 Administrative environment

This administrative environment dimension provides the basic outline of the required features of organisations that wish to be involved in successful collaborative RSUP under two key themes: (1) policies and legislation, and (2) governance which includes governing mechanism and governing structure. Therefore, the indicators developed based on these features will be

used to assess the maturity of the administrative environment of an organisation in inter-organisational collaborative RSUP.

6.5.3.1.1 *Laws and Policies*

This section discusses the indicators and attributes relating to laws and policies. Table 6-2 shows the laws and policies related indicators' development.

Table 6-2:Development of laws and policies related indicators.

Indicators	Features determining the attributes	Source
1. Laws and policies related to collaboration	1. Laws regarding collaboration with other bodies/Legal mandate for the collaboration (organisational legislation/contracts)	(Campos et al., 2013) +PD
	2. Mandates to provide accountability	PD
	3. Policies regarding collaboration with other bodies	(Campos et al., 2013; De Soria et al., 2016)
2. Laws and policies related to communication and data sharing	4. Legislative mandates need to be developed for data sharing	PD
	5. Mandates for the coordination and communication procedures	PD
	6. Mandates with a proper communication process system	PD
	7. Policies relating to technology and information standards	(Campos et al., 2013)

Table 6-2 shows the identified indicators that can be used to assess the inter-organisational collaboration maturity of an organisation in terms of risk-sensitive urban planning. Regarding attributes, Campos et al. (2013) stated that, at the lowest level of maturity, no government and institutional policies and laws relating to collaborative activities among organisations will be available. Organisations will gradually consider policies as an important factor and begin planning and implementing them as they mature. In the final stage of maturity, policies regarding collaboration, technology and information standards for collaboration can be seen. By following this maturity development trend, the attributes of the indicators in the RSUP context are established, with the justification, against each maturity level with variation as can be seen in Table 6-3. Table 6-3 shows the attributes of the laws and policy-related indicators against the defined maturity levels along with the justifications. The same concept is used for the development of the attributes of other indicators. Therefore, the justifications are not repeated.

Table 6-3: Attributes of policies and laws in terms of collaboration

Maturity levels and names and definitions	Justification	Attributes of policies and laws in terms of collaboration
Level 0: Isolated: Organisations ignore collaboration and are isolated; organisations are not aware of collaborative RSUP; organisations are not involved in inter-organisational collaboration for RSUP.	Since the organisations are isolated, there are no policies and legislation to create mandates for collaboration.	No policies and legislation to create mandates to collaborate.
Level 1: Initial: Organisations are aware and informed about collaborative RSUP. Collaboration is unstructured and directed towards the interests of their own organisations.	Organisations are aware of collaborative RSUP, and organisations have no mandates to collaborate in RSUP since organisations are not collaborate effectively. Furthermore, organisations have policies or laws that supports to inform or disseminate their decisions among other stakeholders since they all are aware about the collaborative RSUP at this level.	There are no policies and legislation to create mandates to collaborate, but they may be influenced to inform or disseminate their decisions among other stakeholders or else create enough interest to request information about the decisions of RSUP.
Level 2: Linked: Organisations are involved in consultation or discussion through one or two ways with other organisations. The value of collaboration is recognised with clear objectives.	Organisations interact for consultation and discussion.	Organisations have policies, mandates, or laws to participate in consultations and discussion meetings with other stakeholders in respect of RSUP.
Level 3: Integrated: Organisations are involved in the designing process with a sense of ownership. Defined collaboration processes exist with contracts. Collaboration processes are well-characterised and	Organisations should be involved in the risk-sensitive urban plan planning stage and, with their mandatory power, should feel a sense of ownership. However, decision-making authority is not given to	Organisations have supportive policies, policy implementation tools, mandates, laws, or contracts to contribute to risk-sensitive urban planning. However, signing authority is not given in their mandates.

Maturity levels and names and definitions	Justification	Attributes of policies and laws in terms of collaboration
understood. Collaboration-related activities are considered part of the workflow.	collaborative organisations. Therefore, accountability is less.	
Level 4: Extended: Organisations are involved in the decision-making process of RSUP with mandatory power. Accountability in RSUP exists. Mutual trust and dependency can be seen with high negotiating ability. Policies, processes, and requirements are continuously reviewed and improved.	Organisations are involved in the planning stage of risk-sensitive urban plans with signing authority.	Organisations have policies, policy implementation tools, mandates, or laws to undertake risk-sensitive urban planning with decision-making authority and accountability (signing authority). Therefore, the organisations' representative has signing authority in decision-making. These policies are continually reviewed and improved based on the lessons learnt.

Table 6-4 shows the attributes of the laws and policies in terms of communication and data sharing related indicators against the defined maturity levels.

Table 6-4:Attributes of policies and laws in terms of communication and data sharing

Maturity levels and names and definitions	Attributes of policies and laws in terms of communication and data sharing
Level 0: Isolated	No policies and legislation to create mandates regarding communication and data sharing
Level 1: Initial	Policies and legislation create the need or interest to communicate and share information relating to RSUP decisions with other organisations.
Level 2: Linked	Organisations have policies, mandates, or laws regarding data sharing and communication systems, including an information request process with other organisations during the consultations and discussions.
Level 3: Integrated	Organisations have policies, mandates, laws, or contracts to determine their information standards, information-sharing systems and communication systems in collaborative planning.
Level 4: Extended	Organisations have policies, mandates, or laws for communication and information-sharing systems to indicate the accountability of the provided information. These policies are continually reviewed and improved based on the lessons learned.

6.5.3.1.2 *Governance*

Table 6-5 shows the development of the governance related indicators.

Table 6-5:Governance-related indicators

Indicators	Features determining the attributes	Source
1. Degree of the supportive governance mechanism	1. Degree of formation of governance in terms of strategic governance, IT governance, process management governance	(Boughzala et al., 2014)
2. Governance structure and Collaborative task assignments	2. A suitable organisational structure with a decentralised approach for collaboration	PD
	3. Sub-unit or representation availability	PD
	4. Task composition and assignment / supportive task allocation or job description for the collaborative representatives/sub-units	(Fitterer & Rohner, 2010; Guédria et al., 2011) + PD
	5. Degree of flexibility in organisational structures	(Campos et al., 2013; Guédria et al., 2011)

	6. Level of a defined documented structure with a clear hierarchy of allocated functions (including assigned roles and flexibility of jobs)	(Campos et al., 2013)

Table 6-5 shows the identified indicators with regard to governance that can be used to assess the inter-organisational collaboration maturity of the organisation in terms of RSUP. The maturity of the governance can vary based on its maturity level. For example, at the lowest level of maturity, collaboration-related governance does not exist. As it matures, organisations will evolve from having defined governance measures to support collaboration (without implementation efforts and connectivity between measures and implementation plans) to having a proper plan for governance measures for collaboration with the connectivity of implementation. At the highest maturity levels, continuous feedback, improvement, and suitable governance adaptation for collaboration can be seen (Fitterer & Rohner, 2010). Table 6-6 shows the attributes of the governance mechanism related indicators against the defined maturity levels.

Table 6-6:Attributes of a supportive governance mechanism

Maturity levels and names and definitions	Attributes of a supportive governance mechanism
Level 0: Isolated	No governance mechanism towards collaboration, such as strategic governance, IT governance, and process management governance.
Level 1: Initial	Some governance mechanisms exist for communicating and sharing or receiving information with other organisations related to their RSUP decisions.
Level 2: Linked	Organisations have strategies, IT, process management governance mechanisms for data sharing and communication procedures, including a request process with other organisations in the consultation and discussion of risk-sensitive urban planning. The strategies are not adequately connected to the implementation stage.
Level 3: Integrated	Similar features as those on level 02 prevail. In addition, these governance mechanisms are connected to the implementation level.
Level 4: Extended	Similar features as those on level 03 prevail. In addition, these mechanisms are continually reviewed and improved based on lessons learned.

Table 6-7 shows the attributes of a supportive governance structure and collaborative task assignment related indicators against the defined maturity levels.

Table 6-7: Attributes of a supportive governance structure and collaborative task assignment

Maturity levels and names and definitions	Attributes of supportive governance mechanism
Level 0: Isolated	Organisations have a top-down approach with a hierarchical structure and no collaborative task is assigned to staff. No consideration of the availability of the sub-unit or representative to perform the collaborative requirements.
Level 1: Initial	Organisations have a top-down approach with a hierarchical structure, and there may be a collaborative task allocation to staff. A sub-unit or representative may be available to support RSUP.
Level 2: Linked	A sub-unit or representative is available to participate in the consultation/discussion process with task allocation alongside appropriate job description with the resources and limited authority to provide the necessary data without depending on the top management or head office. The organisation relies on top-down approach to decision-making.
Level 3: Integrated	A dedicated sub-unit or representative is available to participate in the risk-sensitive urban planning process with appropriate job description and task allocation with resources and the required authority to be involved in the planning process without top management interference. The organisation has a balanced top-down and bottom-up approach to decision-making.
Level 4: Extended	A dedicated sub-unit or representative is available to participate in the risk-sensitive urban planning process alongside appropriate job description and task allocation with decentralised decision-making authority on behalf of the organisation. The organisation has a balanced top-down and bottom-up approach to decision-making. The structure is continually and improved based on the lessons learned.

6.5.3.2 Process

The process dimension provides a basic outline of the required features of the organisational processes required for successful collaborative RSUP in five key themes: (1) business process management, (2) cost management process (3) collaboration process, (4) knowledge sharing process, and (5) information management process. Therefore, the indicators developed under

these process areas can be used to assess an organisation's process maturity in inter-organisational collaborative RSUP.

6.5.3.2.1 Business process management

Table 6-8 shows the identified indicators relating to business process management which can be used to assess the inter-organisational collaboration maturity of an organisation in terms of risk-sensitive urban planning.

Table 6-8:Business process management indicators

Indicators	Features determining the attributes	Source
Business process management	1. Level of business process alignment with collaboration activities	(Delgado et al., 2018; Guédria et al., 2011; González-Rojas et al., 2016; Ho et al., 2016)
	2. Degree of quality of outcome/performance of the collaborative business process	(Boughzala et al., 2014; González-Rojas et al., 2016; Ho et al., 2016; Schimpf & Christo, 2018)

As described in the literature, the maturity of the business process management can vary based on its maturity level. For example, at the lowest level, the alignment of business processes with collaboration is non-existent, and there are no plans to consider such collaborative alignment in the short- or long-term. In the following stages, the maturity evolves from considering collaborative business processes for inclusion within medium and short-term goals to collaborative business processes that are partially existent and are included in the organisation's strategic goals and plans. In the highest maturity stage, collaborative business processes are implemented to continuously improve the desired outcome (Campos et al., 2013). Based on this overview, the business process attributes for business process management are presented in Table 6-9.

Table 6-9:Attributes of business process management

Maturity levels and names and definitions	Attributes of business process management
Level 0: Isolated	Collaboration in, or contribution to, risk-sensitive urban planning as an organisational main business process does not exist.
Level 1: Initial	Risk-sensitive urban planning is considered in the main organisational business processes. Collaboration with, or contribution to, risk-sensitive urban planning is ignored in the organisational main business processes.

Level 2: Linked	Collaboration with, or contribution to, risk-sensitive urban planning is not aligned with the organisational main business processes. The degree of quality of outcome/performance of the collaborative business process is low.
Level 3: Integrated	Collaboration with, or contribution to, risk-sensitive urban planning is aligned with the organisational main business processes. The quality outcome/performance of the collaborative business process can be seen.
Level 4: Extended	Collaboration with, or contribution to, risk-sensitive urban planning is integrated with the organisational main business processes. The quality of the outcome/performance of the collaborative business process is high. The integration of the collaborative process into the main business processes are continually revisited and improved based on the lessons learned.

6.5.3.2.2 Cost management process

Table 6-10 shows the identified indicators relating to the cost management process of an organisation that can be used to assess the inter-organisational collaboration maturity of the organisation in terms of risk-sensitive urban planning.

Table 6-10:Cost management process indicators

Indicators	Features determining the attributes	Source
Cost management process	1. Level of financial support for collaboration	(Alonso-Manzanedo et al., 2014; Bukhsh et al., 2012)
	2. A clear cost-sharing mechanism is in a collaborative agreement	(Bukhsh et al., 2012)
	3. Clear cost-benefit analysis of collaboration	(Bukhsh et al., 2012)
	4. Enough fund allocation (policy) to allocate staff for collaboration/ policies should have financial plans	PD

The maturity of the cost management process can vary based on its maturity level. For example, the maturity of the cost management process can vary as follows. At low maturity levels, the cost management process of collaboration does not exist, and the cost of the collaboration process is high. In more advanced stages, the maturity evolves from cost management agreements and cost management process strategies to a cost-effective collaboration process with high satisfaction. There is continuous improvement in the cost management process, and actions will be taken to prevent cost-based problems in the

collaborative process at the highest maturity level with well-established cost-effective collaborative processes (Alonso-Manzanedo et al., 2014; Bukhsh et al., 2012). Table 6-11 depicts the cost management process attributes' development.

Table 6-11:Attributes of the cost management process

Maturity levels and names and definitions	Attributes of collaborative cost management
Level 0: Isolated	Cost management of the collaborative process is non-existent.
Level 1: Initial	Awareness regarding cost management of the collaborative process exists but is ignored.
Level 2: Linked	Cost management of the collaborative process is established regarding resource allocation for consultancy/discussion purposes. Sufficient fund allocation and financial support from top management can be seen.
Level 3: Integrated	Cost management of the collaborative process is well established. Fund allocation and financial support from the top management are available and may be incorporated at the policy level. Cost-benefit analysis can be seen. A clear cost-sharing agreement may be available.
Level 4: Extended	Cost management of the collaborative process is well established. Fund allocation and financial support from the top management are prominent and incorporated in the policies. An explicit cost-sharing mechanism agreement and a cost-benefit analysis can be seen. The cost management process is reviewed and continuously improved.

6.5.3.2.3 *Collaboration process*

Table 6-12 shows the identified indicators relating to the collaboration process management of an organisation which can be used to assess the inter-organisational collaboration maturity of the organisation in terms of risk-sensitive urban planning.

Table 6-12:Collaboration process indicators.

Indicators	Features determining the attributes	Source
Collaborative work plan and management	1. Level of collaborative work planning	(González-Rojas et al., 2016; Schimpf & Christo, 2018; Campos et al., 2013)
	2.Level of defined collaboration level and type	(Campos et al., 2013; De Soria et al., 2016; Alonso-Manzanedo et al., 2014; Cuenca et al., 2013)

Indicators	Features determining the attributes	Source
	3.The way collaboration is managed (i.e. are there any well-defined processes for collaboration?); level of communication among participants and how the communication is supported; extent of management involvement in collaboration; level of conflict resolution management and how it is handled	(Alonso-Manzanedo et al., 2014; Boughzala & De Vreede, 2015; De Soria et al., 2016; Fitterer & Rohner, 2010; Cuenca et al., 2013; Delgado et al,. 2018; Mäkelä & Virrantaus, 2013; Campos et al., 2013; González-Rojas et al., 2016)
	4.Attributes of collaboration practices (such as frequency of collaboration (regular/rare/often); how well an organisation is connected in committees and relevant bodies for identifying collaboration opportunities and contribution levels; aspects of resource sharing for collaboration; the kind of technology used to facilitate collaboration	(Boughzala & De Vreede, 2015; Boughzala et al., 2014; De Soria et al., 2016; Gilman & Kuhn, 2012); Ho et al., 2016); Awasthy et al., 2018)
	5.Level of prior evaluation to select collaborative partners	(Campos et al., 2013)
	6. Level of engagement of partners in collaborative decision-making/ level of participation from the organisation	(Delgado et al., 2018; Gilman & Kuhn, 2012; Ho et al., 2016; Plomp & Batenburg, 2010) + PD
	7. Monitoring and evaluation and lessons' learning system	PD
Awareness and allocation of suitable represent-ation	1.Degree of awareness of the collaboration process	(Bukhsh et al., 2012; De Soria et al., 2016; Gilman & Kuhn, 2012)
	2.Training and development should be arranged for the collaborative staff within organisations.	PD
	3.Same dedicated representatives in all stages of the collaboration process with the job description that indicates a required collaborative task	PD
	4.Suitable staff allocation (including representative) with the capability to fulfil the collaboration requirements (such as providing the required knowledge and data in a required format)	PD

However, the level of prior evaluation to select collaborative partners is unsuitable for RSUP since dedicated organisations are already available in the UD, DM, and CC sectors. Therefore, this study ignores that feature in developing the attributes. The maturity level of collaboration process management can generally be various as follows. Collaboration processes and management will not exist at the lowest level of maturity. In the following

stages, the maturity level evolves from having some informal written specifications for supporting collaboration activities to having a well-defined collaboration process with formal and written specifications for the collaborative process and its management. In the final stage, standard models for the collaborative processes exist that continue to be improved and considered in a company's short-and long-term plans for continuous improvement (Campos et al., 2013; Boughzala & De Vreede, 2015).

Table 6-13 depicts the collaborative work plan and management related attributes' development.

Table 6-13:Attributes of collaborative work plan and management

Maturity levels and names and definitions	Attributes of collaborative work plan and management
Level 0: Isolated	Collaboration work plan and management do not exist.
Level 1: Initial	Collaboration work plans and management are ignored. Organisations may be aware of the collaboration opportunities relating to risk-sensitive urban planning.
Level 2: Linked	The collaborative work plan is defined (formally or informally) in terms of consultations and discussions that includes the defined number of collaborative meetings, the list of stakeholders, the communication path, and the required resource allocation and technology requirements. Participation in collaboration meetings is mandatory. The organisation is open and aware of the collaboration opportunities relating to risk-sensitive urban planning with the connection of relevant bodies and committees. The influence of the top management in the process is absent. Monitoring and evaluation of the collaboration process and the digital communication system may be available.
Level 3: Integrated	The collaborative work plan is well defined in formal written specifications, including communication paths, required resource sharing and technology requirements. The organisation is connected with risk-sensitive urban planning bodies and committees for collaborative design. The influence of the top management in the process is medium. Conflict resolution agreements may be available, and monitoring and evaluation of the collaboration process are available. The digital communication system is available for efficient and quick responses and collaborative planning.
Level 4: Extended	A collaborative work plan is well defined in formal written specifications, including communication paths, required resource sharing and technology requirements. The organisation is connected with risk-sensitive urban planning bodies and committees for collaborative design and decision-making. The influence of the top management in the process

Maturity levels and names and definitions	Attributes of collaborative work plan and management
	is high. Conflict resolution agreements are available. Monitoring and evaluation of the collaborative contributions are available. A digital communication system is available for efficient and quick responses and collaborative planning. Collaborative work plans and processes will be reviewed and continuously improved based on lessons learned.

Table 6-14 depicts the awareness and allocation of suitable representation related attributes' development.

Table 6-14:Attributes of awareness and allocation of suitable representation

Maturity levels and names and definitions	Attributes of the collaborative work plan with suitable knowledge and awareness
Level 0: Isolated	Awareness of collaboration does not exist. No suitable collaborative task distribution can be seen.
Level 1: Initial	Awareness of collaboration does exist. However, awareness creation regarding the collaboration requirements and suitable collaborative tasks' distribution is ignored.
Level 2: Linked	Awareness of the collaboration requirements and process exists. A suitable dedicated representative with capabilities with proper collaborative task allocation and with a job description including the consultation/discussion process is available. The same representation from the organisation in all consultation/discussion meetings/processes is ensured. Training and development programmes may be available for the collaborative staff.
Level 3: Integrated	Awareness of the collaboration requirements and process exists. A dedicated, suitable representative with the required capabilities, proper collaborative task allocation, and with a job description including risk-sensitive urban planning is available. The same representation throughout the process is ensured. Training and development programmes are available for the collaborative staff.
Level 4: Extended	Awareness of the collaboration requirements and process exists. A dedicated, suitable representative with the required capability, proper collaborative task allocation, and with a job description including risk-sensitive urban planning is available. The same representation throughout the process is ensured with the dedicated accountability and authority to make decisions and signing authority is also assured. Training and development programmes are mandatory for the collaborative staff.

6.5.3.2.4 Knowledge sharing process.

Table 6-15 shows the indicators developed relating to the knowledge sharing process.

Table 6-15:Knowledge-sharing process indicators

Indicators	Features determining the attributes	Source
Knowledge sharing processes	1. Degree of knowledge sharing for collaborative decision-making	(Awasthy et al., 2018; Campos et al., 2013; Gilman & Kuhn, 2012; González-Rojas et al., 2016) + PD
	2. Usage of varying knowledge channels	(Campos et al., 2013)
	3. Existence of knowledge management systems	(Campos et al., 2013)
	4. Level of involvement in joint knowledge creation	(Boughzala & De Vreede, 2015; Delgado et al., 2018; Ho et al., 2016)
	5. The extent of knowledge which gets validated and reused among collaborating members	(Boughzala & De Vreede, 2015)

Table 6-15 shows the identified indicators relating to the knowledge-sharing process of an organisation that can be used to assess the inter-organisational collaboration maturity of the organisation in terms of risk-sensitive urban planning. There is no concern regarding knowledge management within the organisation at the lowest maturity level. Subsequent maturity levels evolve from actively detecting knowledge management needs, considering tacit knowledge, incorporating the development of a knowledge management system within the organisation plans to improve explicit knowledge capture, and having a knowledge management system. At the highest maturity level, organisations will have a well-established knowledge management system and ongoing plans for continuous improvement (Campos et al., 2013; González-Rojas et al., 2016). Table 6-16 depicts the knowledge sharing process related attributes' development.

Table 6-16:Attributes of the knowledge-sharing process

Maturity levels and names and definitions	Attributes of knowledge sharing process
Level 0: Isolated	No knowledge sharing and management relating to RSUP.
Level 1: Initial	An awareness of knowledge sharing and management relating to RSUP does exist but is, however, ignored.

Maturity levels and names and definitions	Attributes of knowledge sharing process
Level 2: Linked	Knowledge sharing can be seen, and the level of knowledge that gets validated and reused in the organisation is low. A knowledge management system or usage of various knowledge channels are not available.
Level 3: Integrated	A high level of knowledge sharing is available. The level of knowledge that gets validated and reused in the organisation can be seen. Knowledge management systems or usage of various knowledge channels may be available.
Level 4: Extended	A high level of knowledge sharing is available. The level of knowledge that gets validated and reused in the organisation is high. The organisation has a well-established knowledge management system and ongoing plans for continuous improvement utilising various channels.

6.5.3.2.5 *Information management process*

Table 6-17 shows the identified indicators relating to the information sharing and management process of an organisation that can be used to assess the inter-organisational collaboration maturity of the organisation in terms of risk-sensitive urban planning.

Table 6-17:Information sharing and management process indicators.

Indicators	Features determining the attributes	Source
Information sharing and management process	1. Degree of information sharing in terms of requirements and decision-making	(Alonso-Manzanedo et al., 2014; Cuenca et al., 2013; Delgado et al., 2018; Ho et al., 2016)
	2. Providing data according to the requirements	PD
	3. Data availability/information is available within responsible organisations.	PD
	4. Reliability of the data.	PD
	5. Digital technology-based data storage systems rather than paper-based documentation.	PD
	6. A straightforward procedure for information management among partners based on their function and security clearance	(Bukhsh et al., 2012; González-Rojas et al., 2016; Mäkelä & Virrantaus, 2013)
	7. Systems or procedures or regulations for data sharing	PD
	8. Availability of information that the collaborative members/partners can access	(Boughzala & De Vreede, 2015)

Indicators	Features determining the attributes	Source
	9. Level of timely sharing of information	(Latif et al., 2016; Mäkelä & Virrantaus, 2013)
	10. Use of information in productive collaboration	(Boughzala & De Vreede, 2015)
	11. Data selling culture	PD

At the lowest maturity level there are no identified information requirements or evidence of information sharing. In the subsequent levels, maturity evolves from a slight appearance of identifying, defining, and sharing some information among some collaborative members to complete information requirements and information-sharing processes being identified, defined, and accepted among all collaborative members. In the final stage, a high and satisfactory level of information sharing among collaborative members exists and continuously improves, and the intensive use of information for decision-making can be seen (Alonso-Manzanedo et al., 2014; Cuenca et al., 2013). Table 6-18 depicts the attribute development of information sharing process and management.

Table 6-18:Attributes of information sharing and management process.

Maturity levels and names and definitions	Attributes of information sharing and management process
Level 0: Isolated	No information sharing and management relating to RSUP.
Level 1: Initial	Information sharing and management relating to RSUP are ignored. Data can be sold according to the requirements of other organisations.
Level 2: Linked	Information sharing can be seen, but all relevant information may not be shared. A straightforward information sharing system is available with data sharing regulations. Data may not be shared in the format required for planning purposes. A data selling culture may be seen.
Level 3: Integrated.	Information sharing is high. An information-sharing system is available with data-sharing regulations' data in the required format. A digital data storage system is available for easy sharing. There is an availability of information that the collaborative members/partners can access. Most of the available information is used in collaborative planning.
Level 4: Extended	All relevant information is carefully shared with reliability. There is an availability of information that the collaborative members/partners can access. An information sharing system is available with data sharing

Maturity levels and names and definitions	Attributes of information sharing and management process
	regulations' data in the required format. A digital data storage system is available for easy sharing. Continuous improvement in the information-sharing system is available.

6.5.3.3 Organisational system

The organisational system dimension provides the basic outline of the required features of an organisational system for successful collaborative RSUP in terms of organisational culture and strategy. Therefore, the indicators developed under this process area will be used to assess the organisational system maturity of an organisation in inter-organisational collaborative RSUP. This organisational system dimension consists of two themes, namely organisational culture, and organisational strategy.

6.5.3.3.1 Organisational culture

Table 6-19 shows the identified indicators relating to the culture of an organisation that can be used to assess the inter-organisational collaboration maturity of the organisation in terms of risk-sensitive urban planning.

Table 6-19:Organisational cultural indicators

Indicators	Features determining the attributes	Source
Organisational culture	1. Level of organisational and managerial support for collaboration/support from organisational leadership	(Ho et al., 2016) + PD
	2. Level of trust	(Alonso-Manzanedo et al., 2014; Boughzala et al., 2014; De Soria et al., 2016; Mäkelä & Virrantaus, 2013)
	3. Respect for others' opinions	PD
	4. Conflicting interests and competition	PD
	5. Level of commitment and cooperation to collaborate	(Alonso-Manzanedo et al., 2014)
	6. Lack of enthusiasm and commitment to collaborative initiatives	PD
	7. Level of willingness to adapt to the organisational and technological changes required for collaboration	(Campos et al., 2013)

	8. Stakeholders stand against political interference.	PD
	9. Traditional silo-based organisational capabilities and thinking	PD
	10. Following old routines and practices	PD
	11. Common language usage	PD

Among the given features of the indicators depicted in Table 6-19, respect for others' opinions, and conflicting interests and competition are identified as sensitive features that cannot be disclosed and assessed. Therefore, this study excluded those features in developing the maturity model. The maturity of organisational culture can vary as follows. At the lowest level of maturity, collaborative culture will not exist and there will be an unwillingness to collaborate, and the organisational atmosphere is unsupportive of collaboration. In the following stages, maturity will evolve from the organisational management taking active actions to create a collaborative culture to a culture that embodies collaboration. At the highest level of maturity, reciprocal trust and willingness to adapt to changes will exist among the collaborative members, and a well-established collaborative culture is continuously looking to improve itself (Alonso-Manzanedo et al., 2014; Awasthy et al., 2018).

Table 6-20 depicts the organisational culture related attributes' development.

Table 6-20:Attributes of organisational culture

Maturity levels and names and definitions	Attributes of organisational culture
Level 0: Isolated	A collaborative culture does not exist. Traditional silo-based working culture prevails. There is no awareness of collaborative needs.
Level 1: Initial	An awareness of collaboration needs, and collaboration culture does exist. Unwillingness to collaborate and an unsupportive nature for collaboration can be seen. Traditional thinking and old routines and practices prevail.
Level 2: Linked	Willingness and commitment to collaborate may be available. Competitive views on other organisations may exist. Organisations may be practicing common language usage. Collaborative culture begins to appear.
Level 3: Integrated	Collaborative culture can be seen. Organisational top management supports collaboration. Stakeholders may stand up against political interference. Willingness and commitment to

Maturity levels and names and definitions	Attributes of organisational culture
	collaboration can be seen. Organisations practice common language usage.
Level 4: Extended	Similar features to those of level 3 exist. A well-defined collaboration culture is formed. In addition, a high level of trust in collaborative organisations and high commitment can be seen. Organisations practice common language usage. Continuous improvement in the collaborative culture can be seen.

6.5.3.3.2 *Organisational strategy*

Table 6-21 shows the identified indicators relating to the strategy of an organisation that can be used to assess the inter-organisational collaboration maturity of the organisation in terms of risk-sensitive urban planning.

Table 6-21:Organisational strategy indicators

Indicators	Features determining the attributes	Source
Organisa-tional strategy	1. Organisational staff selection (leaders) criteria should support the collaboration requirements.	PD
	2. Organisations should have suitable staff for collaboration with appropriate capability by having and utilising a proper recruitment system.	PD
	3. Staff selection criteria should be defined properly without political interference and appropriate staff job descriptions should be defined.	PD
	4. Allocate staff to develop data in the required format	PD
	5. Enough funding allocation (policy) to allocate staff for collaboration	PD
	6. Level of defined collaboration strategy specified as a part of the mission and vision statement	(Awasthy et al., 2018; Campos et al., 2013; Schimpf & Christo, 2018)
	7. Degree of alignment of organisational strategy towards collaboration	(Campos et al., 2013; Delgado et al., 2018; Ho et al., 2016)
	8. Level of employee-related strategies towards collaboration	(Awasthy et al., 2018; Boughzala & De Vreede, 2015; Delgado et al., 2018; Ho et al., 2016)
	9. Focus on incentives and future opportunities for the collaborative members	PD

	10. Supports research and development activities	PD

The maturity of organisational strategy can vary based on the maturity level of an organisation. For example, at the lowest level of maturity, no collaboration-related strategic decisions or identification of potential collaborative values exist, and collaboration is not included in the short-term or long-term goals. The maturity level of an organisational collaboration strategy can initially evolve by establishing a common vision, shared objectives, and collaboration strategy developments (without any agreements/contracts among the collaborative members) and then launching and implementing collaborative strategic decisions with well-formed contracts distributed among all the members. In the final maturity stage, an organisation will have continuous improvement in strategic decisions and in long-term organisational strategic changes, linking to collaboration actions with short-, mid- and long-term objectives (Alonso-Manzanedo et al., 2014; Campos et al., 2013)

Table 6-22 depicts the organisational strategy related attributes' development.

Table 6-22:Attributes of organisational strategy

Maturity levels and names and definitions	Attributes of organisational strategy
Level 0: Isolated	No interest towards collaboration is recognised. No collaborative vision, collaborative objectives, and collaboration strategy exist.
Level 1: Initial	Collaborative interest is recognised. Collaborative strategy is ignored and not included in the vision or objectives of the organisation.
Level 2: Linked	Organisations initially evolve by establishing a common vision, shared objectives, and collaboration strategy developments. Research and development activities may be included in the organisation's strategy. Clear funding strategies and employee development strategies with regard to collaboration (such as research and development, and collaboration incentives) may not be available.
Level 3: Integrated	Organisations begin to launch and implement collaborative strategic decisions with well-formed contracts distributed among all the members. The organisational business strategy is not aligned with the collaboration strategy. Capable collaborative staff selection criteria and recruitment processes can be seen. Funding strategies with regard to collaborative actions are determined. Research and development activities may be included in the organisation's strategy.

Maturity levels and names and definitions	Attributes of organisational strategy
Level 4: Extended	Collaborative actions are part of the mission and vision. Organisations have continuous improvement in strategic decisions and long-term organisational strategic changes, linking to collaboration actions with short-, mid-, and long-term objectives. The main organisational business strategy is aligned with the collaboration strategy. Appropriate collaborative staff selection criteria and recruitment processes can be seen. Funding strategies with regard to collaborative actions are determined.

6.5.3.4 Technology

The technology dimension provides the basic outline of the required features of an organisational system for successful collaborative RSUP in terms of organisational culture and strategy. Therefore, the indicators developed under this process area will be used to assess an organisation's information and communication technology maturity in inter-organisational collaborative RSUP.

6.5.3.4.1 *Information and communication technology*

Table 6-23 shows the identified indicators related to the ICT of the organisation that can be used to assess the inter-organisational collaboration maturity of the organisation in terms of risk-sensitive urban planning.

Table 6-23: Information and communication technology indicators

Indicators	Features determining the attributes	Source
Technology	1. Collaborative common digital platform for sharing data	PD
	2. Level of organisational interconnection within a common collaborative platform	(Campos et al., 2013; Delgado et al., 2018; Fitterer & Rohner, 2010)
	3. Advanced data storage for easy sharing, no digital data for sharing.	PD
	4. Level of ICT resources' usage for collaboration	(Boughzala et al., 2014; Campos et al., 2013)
	5. Degree of usability of technology for collaboration (user-friendly)	(Boughzala et al., 2014)
	6. Degree of interconnectivity and interoperability of available technology	(Boughzala et al., 2014; González-Rojas et al., 2016)
	7. Selection and use of appropriate collaborative decision-making supporting tools	(Gilman & Kuhn, 2012)

		8. Level of technology support for knowledge sharing	(Boughzala et al., 2014; González-Rojas et al., 2016; Latif et al., 2016)
		9. Using modern technology for communications rather than a paper-based system	PD

The findings from the literature show that there are no ICT platforms or digital data and sharing systems available for information and communication at the lowest maturity level, and tasks are carried out based on paper-based documentation. In the following stages, maturity evolves from having systems that could connect with others with limited ICT capacities and plans for improvements (due to the unavailability of large investments) to having a mature system that supports collaboration seamlessly. In the final stage, well-established information and communication technology platforms are available for collaboration, with continuous improvement built into the planning and implementation (Campos et al., 2013; Delgado et al., 2018; Bukhsh et al., 2012). Table 6-24 depicts the information and communication technology related attributes' development.

Table 6-24: Attributes of the information and communication technology

Maturity levels and names and definitions	Attributes of information and communication technology
Level 0: Isolated	Information and communication technology is not developed to support collaboration. No ICT platforms are capable of communicating with other organisations.
Level 1: Initial	Awareness of the use of information and communication technology with regard to collaboration exists. Information and communication technology is not developed to support collaboration, or ICT use in collaboration is ignored. ICT platforms may not be capable of communicating with other organisations. Digital data storage may be available.
Level 2: Linked	Organisations have systems that could connect with others with some ICT capacities to support collaborative requirements. Digital data storage is available. There are improvement plans to satisfy collaboration needs. The organisation is not connected with a collaborative common digital platform to support collaborative activities.
Level 3: Integrated	The organisation is connected with, and uses, appropriate user-friendly common digital platforms for collaborative design and communication. Digital data storage is available, and technology may support knowledge sharing, such as maintaining a collaborative knowledge platform.
Level 4: Extended	Similar features to those of level 3 exist. In addition, continued improvement in the ICT system to maintain effective collaboration can be seen.

6.5.3.5   People

The people dimension provides the basic outline of the required features of an organisational system for successful collaborative RSUP in terms of organisational culture and strategy. Therefore, the indicators developed under this process area will be used to assess the maturity of organisational staff in inter-organisational collaborative RSUP.

6.5.3.5.1 Collaborative representatives from an organisation

Table 6-25 shows the identified indicators relating to collaborative representatives of an organisation that can be used to assess the inter-organisational collaboration maturity of the organisation in terms of risk-sensitive urban planning.

Table 6-25:People-related indicators

Indicators	Features determining the attributes	Source
	1. Understanding the collaborative role	PD

Attributes of collaborative representatives	2. Understand the value of collaboration and an awareness of collaborative needs.	(Awasthy et al., 2018; Boughzala et al., 2014)
	3. Level of preparation to the effective contribution towards collaborative need	PD
	4. Involvement in proper training and development	PD
	5. Stakeholders' reluctance to undertake exploratory learning	PD
	6. Knowledge and capability of the collaborative staff to fulfil the collaborative needs	(Awasthy et al., 2018; Boughzala et al., 2014; González-Rojas et al., 2016)
	7. Availability of complementary skills and expertise	(Boughzala et al., 2014)
	8. Attributes of the collaborative members. (Such as motivation, willingness, and the interpersonal skills of those who participate in inter-organisational collaboration processes; engagement and participation; level of shared understanding and relationship building; level of interactivity and interdependence with other collaborative members)	(Alonso-Manzanedo et al., 2014; Boughzala & De Vreede, 2015; Campos et al., 2013; Awasthy et al., 2018; Boughzala et al., 2014; Delgado et al., 2018; Latif et al., 2016)
	9. Mentality and thinking	PD
	10. Representing the organisation appropriately.	PD

The maturity of the people's focus area can vary as follows: at the initial stage, there is no proper structure or planning for training people and no desire to collaborate, and there is only an implicit or informal arrangement to improve people's capabilities and motivate them. In the following stages, maturity evolves from considering the possibility of training and employees' motivation to having clear arrangements and plans for training and motivating employees to collaborate. In the final stage, plans for continuous training and mutual dependency among the collaborative members exist. Additionally, employees are willing to collaborate, and policies and incentives for collaboration skills are available in the organisation (Alonso-Manzanedo et al., 2014; Campos et al., 2013; Awasthy et al., 2018). Table 6-26 depicts the related attributes' development of collaborative representatives within organisations.

Table 6-26:Attributes of collaborative representatives of organisations

Maturity levels and names and definitions	Attributes of collaborative representatives of organisations
Level 0: Isolated	No awareness of any collaboration needs amongst the staff. Unavailability of dedicated collaborative staff in the organisation.
Level 1: Initial	An awareness of collaboration needs among the staff can be seen. Unavailability of dedicated collaborative staff in the organisation. The available existing staff have no understanding of collaborative roles and no intention to collaborate.
Level 2: Linked	Allocated collaborative staff may understand collaborative roles and have relevant knowledge, but preparation for any contribution may not be seen. Staff are involved in sufficient training and development, but reluctance to undertaken exploratory learning can be seen. Willingness, commitment, and interaction with other collaborative members may be low, and motivation through incentives and management support is low.
Level 3: Integrated	Dedicative collaborative staff understand collaborative roles with relevant knowledge. Staff are involved in training and development programmes for knowledge development. Commitment and interaction with other collaborative staff can be seen. Motivation through incentives and organisational management support with regard to collaboration are available.
Level 4: Extended	Similar features as those in level 3 are available. Actions are taken to continuously improve staff attributes and knowledge in respect of collaborative work and decision-making.

6.5.4 Maturity Grid for stakeholder collaboration in risk-sensitive urban planning

As the main outcome of the above discussion that integrates primary and secondary data findings, this study developed a maturity grid for assessing organisational collaboration maturity in risk-sensitive urban planning as depicted in Table 6-27.

The developed maturity grid summarises the indicators into 14 key indicators. These indicators include the nature of subjective aspects; therefore, the results may differ between an organisation's self-assessment and an external assessment of the organisation. However, the maturity grid includes all these subjective and objective measures to provide a comprehensive indication of collaboration maturity and guidance to enhance collaboration. This model can be applied to any emerging economies including Sri Lanka, since this model has been developed based on the literature as well as on primary data related to barriers and enablers for stakeholder collaboration in Sri Lankan context. As explained earlier in this study, Sri Lankan barriers and enablers are mostly aligned with the emerging economies and, therefore, the model can be used by stakeholders in all emerging economies.

Table 6-27: Maturity Grid of inter-organisational Collaboration in RSUP

Dimension	Indicators	Level 0: Isolated	Level 1: Initial	Level 2: Linked	Level 3: Integrated	Level 4: Extended
Administrative environment	1. Laws and policies related to collaboration	No policies and legislation to create mandates to collaborate.	There are no policies and legislation to create mandates to collaborate, but they may be influenced to inform or disseminate their decisions among other stakeholders or else create enough interest to request information about the decisions of RSUP.	Organisations have policies, mandates, or laws to participate in consultations and discussion meetings with other stakeholders in respect of RSUP.	Organisations have supportive policies, policy implementation tools, mandates, laws, or contracts to to risk-sensitive urban planning. However, signing authority is not given in their mandates.	Organisations have policies, policy implementation tools, mandates, or laws to undertake risk-sensitive urban planning with decision-making authority and accountability (signing authority). Therefore, the organisations' representative has signing authority in decision-making. These policies are continually reviewed and improved based on the lessons learnt.
	2. Laws and policies related to data sharing and knowledge sharing	No policies and legislation to create mandates regarding communication and data sharing	Policies and legislation create the need or interest to communicate and share information relating to RSUP decisions with other organisations.	Organisations have policies, mandates, or laws regarding data sharing and communication systems, including an information request process with other organisations during consultations and discussions.	Organisations have policies, mandates, laws, or contracts to determine their information standards, information-sharing systems, and communication systems in collaborative planning.	Organisations have policies, mandates, or laws for communication and information-sharing systems to indicate the accountability of the provided information. These policies are continually reviewed and improved based on the lessons learned.
	3. Degree of the supportive governance mechanism	No governance mechanism towards collaboration, such as strategic governance (strategic planning, investment planning, reporting structures); IT governance (which addresses not only technical aspects but also information system-related issues such as compliance	Some governance mechanisms exist for communicating and sharing or receiving information with other organisations related to their RSUP decisions.	Organisations have strategies, IT, process management governance mechanisms for data sharing and communication procedures, including a request process with other organisations in the consultation and discussion of risk-sensitive urban planning. The strategies are not adequately connected to the implementation stage.	Similar features as those on level 02 prevail. In addition, these governance mechanisms are connected to the implementation level.	Similar features as those on level 03 prevail. In addition, these mechanisms are continually reviewed and improved based on lessons learned.

		with standards/taxonomies in policies and procedures); and process management governance (which addresses how the organisation is guided and supported towards a process-centric organisation, formalisation in decision-making and supporting improvement in collaboration processes.				
	4. Governance structure and Collaborative task assignments	Organisations have a top-down approach with a hierarchical structure and no collaborative task is assigned to staff. No consideration of the availability of the sub-unit or representative to perform the collaborative requirements.	Organisations have a top-down approach with a hierarchical structure, and there may be a collaborative task allocation to staff. A sub-unit or representative may be available to support RSUP.	A sub-unit or representative is available to participate in the consultation/discussion process with task allocation alongside a appropriate job description with the resources and limited authority to provide the necessary data without depending on the top management or head office. The organisation relies on top-down approach to decision-making.	A dedicated sub-unit or representative is available to participate in the risk-sensitive urban planning process with a appropriate job description and task allocation with the resources and the required authority to be involved in the planning process without top management interference. The organisation has a balanced top-down and bottom-up approach to decision-making.	A dedicated sub-unit or representative is available to participate in the risk-sensitive urban planning process alongside a appropriate job description and task allocation with decentralised decision-making authority on behalf of the organisation. The organisation has a balanced top-down and bottom-up approach to decision-making. The structure is continually revisited and improved based on the lessons learned
Process	5. Business process management	Collaboration in, or contribution to, risk-sensitive urban planning as an organisational main business process does not exist.	Risk-sensitive urban planning is considered in the main organisational business processes. Collaboration with, or contribution to, risk-sensitive urban planning is ignored in the organisational main business processes.	Collaboration with, or contribution to, risk-sensitive urban planning is not aligned with the organisational main business processes. The degree of quality of outcome/performance of the	Collaboration with, or contribution to, risk-sensitive urban planning is aligned with the organisational main business processes. The quality outcome/performance of the collaborative business process can be seen.	Collaboration with, or contribution to, risk-sensitive urban planning is integrated with the organisational main business processes. The quality of the outcome/performance of the collaborative business process is high. The integration of the collaborative process into the main business

			collaborative business process is low.		processes are continually revisited and improved based on the lessons learned.
6. Cost management process	Cost management of the collaborative process is non-existent.	Awareness regarding cost management of the collaborative process exists but is ignored.	Cost management of the collaborative process is established regarding resource allocation for consultancy/discussion purposes. Sufficient fund allocation and financial support from top management can be seen.	Cost management of the collaborative process is well established. Fund allocation and financial support from the top management are available and may be incorporated at the policy level. Cost-benefit analysis can be seen. A clear cost-sharing agreement may be available.	Cost management of the collaborative process is well established. Fund allocation and financial support from the top management are prominent and incorporated in the policies. An explicit cost-sharing mechanism agreement and a cost-benefit analysis can be seen. The cost management process is reviewed and continuously improved.
7. Collaboration process management / collaborative work plan and process management	Collaboration work plan and management do not exist.	Collaboration work plans and management are ignored. Organisations may be aware of the collaboration opportunities relating to risk-sensitive urban planning.	The collaborative work plan is defined (formally or informally) in terms of consultations and discussions that includes the defined number of collaborative meetings, the list of stakeholders, the communication path, and the required resource allocation and technology requirements. Participation in collaboration meetings is mandatory. The organisation is open and aware of the collaboration opportunities relating to risk-sensitive urban planning with the connection of relevant bodies and committees. The influence of the top management in the process is absent. Monitoring and	The collaborative work plan is well defined in formal written specifications, including communication paths, required resource sharing and technology requirements. The organisation is connected with risk-sensitive urban planning bodies and committees for collaborative design. The influence of the top management in the process is medium. Conflict resolution agreements may be available, and monitoring and evaluation of the collaboration process are available. The digital communication system is available for efficient and quick responses and collaborative planning.	A collaborative work plan is well defined in formal written specifications, including communication paths, required resource sharing and technology requirements. The organisation is connected with risk-sensitive urban planning bodies and committees for collaborative design and decision-making. The influence of the top management in the process is high. Conflict resolution agreements are available. Monitoring and evaluation of the collaborative contributions are available. A digital communication system is available for efficient and quick responses and collaborative planning. Collaborative work plans and processes will be reviewed and

			evaluation of the collaboration process and the digital communication system may be available.		continuously improved based on lessons learned.
8. Collaboration process management/awareness and allocation of suitable representation	Awareness of collaboration does not exist. No suitable collaborative task distribution can be seen.	Awareness of collaboration does exist. However, awareness creation regarding the collaboration requirements and suitable collaborative tasks' distribution is ignored.	Awareness of the collaboration requirements and process exists. A suitable dedicated representative with capabilities with relevant collaborative task allocation and with appropriate job description including the consultation/discussion process is available. The same representation from the organisation in all consultation/discussion meetings/processes is ensured. Training and development programmes may be available for the collaborative staff.	Awareness of the collaboration requirements and process exists. A dedicated, suitable representative with the required capabilities, relevant collaborative task allocation, and with appropriate job description including risk-sensitive urban planning is available. The same representation throughout the process is ensured. Training and development programmes are available for the collaborative staff.	Awareness of the collaboration requirements and process exists. A dedicated, suitable representative with the required capability, relevant collaborative task allocation, and with appropriate job description including risk-sensitive urban planning is available. The same representation throughout the process is ensured with the dedicated accountability and authority to make decisions and signing authority is also assured. Training and development programmes are mandatory for the collaborative staff.
9. Knowledge-sharing process	There is no knowledge sharing and management process relating to RSUP.	An awareness of knowledge sharing and management relating to RSUP does exist but is, however, ignored.	Knowledge sharing can be seen, but the level of knowledge that gets validated and reused in the organisation is low. A knowledge management system or usage of various knowledge channels are not available.	Efficient knowledge sharing is available. The level of knowledge that gets validated and reused in the organisation can be seen. Knowledge management systems or usage of various knowledge channels may be available. .	Efficient knowledge sharing is available. The level of knowledge that gets validated and reused in the organisation is high. The organisation has a well-established knowledge management system and ongoing plans for continuous improvement utilising various channels.
10. Information management process	No information sharing and management relating to RSUP.	Information sharing and management relating to RSUP are ignored. Data can be sold according to the	Information sharing can be seen, but all relevant information may not be shared. A straightforward information sharing system is available with data sharing	Information sharing is substantial. An information-sharing system is available with data-sharing regulations' data in the required format. A digital data storage	All relevant information is carefully shared with reliability. There is an availability of information that the collaborative members/partners can access. An information sharing

		requirements of other organisations.	regulations. Data may not be shared in the format required for planning purposes. A data selling culture may be seen. format for the planning process.	system is available for easy sharing. There is an availability of information that the collaborative members/partners can access. Most of the available information is used in collaborative planning.	system is available with data sharing regulations' data in the required format. A digital data storage system is available for easy sharing. Continuous improvement in the information-sharing system is available.
Organisational system	11. Culture	A collaborative culture does not exist. Traditional silo-based working culture prevails. There is no awareness of collaborative needs.	An awareness of collaboration needs, and collaboration culture does exist. Unwillingness to collaborate and an unsupportive nature for collaboration can be seen. Traditional thinking and old routines and practices prevail.	Willingness and commitment to collaborate may be available. Competitive views on other organisations may exist. Organisations may be practicing common language usage. Collaborative culture begins to appear.	Collaborative culture can be seen. Organisational top management supports collaboration. Stakeholders may stand up against political interference. Willingness and commitment to collaboration can be seen. Organisations practice common language usage.	Similar features to those of level 3 exist. A well-defined collaboration culture is formed. In addition, a high level of trust in collaborative organisations and high commitment can be seen. Organisations practice common language usage. Continuous improvement in the collaborative culture can be seen.
	12. strategy	No interest towards collaboration is recognised. No collaborative vision, collaborative objectives, and collaboration strategy exist.	Collaborative interest is recognised. Collaborative strategy is ignored and not included in the vision or objectives of the organisation.	Organisations initially evolve by establishing a common vision, shared objectives, and collaboration strategy developments. Research and development activities may be included in the organisation's strategy. Clear funding strategies and employee development strategies with regard to collaboration (such as research and development, and collaboration incentives) may not be available.	Organisations begin to launch and implement collaborative strategic decisions with well-formed contracts distributed among all the members. The organisational business strategy is not aligned with the collaboration strategy. Capable collaborative staff selection criteria and recruitment processes can be seen. Funding strategies with regard to collaborative actions are determined. Research and development activities may be	Collaborative actions are part of the mission and vision. Organisations have continuous improvement in strategic decisions and long-term organisational strategic changes, linking to collaboration actions with short-, mid-, and long-term objectives. The main organisational business strategy is aligned with the collaboration strategy. Appropriate collaborative staff selection criteria and recruitment processes can be seen. Funding strategies with regard to collaborative actions are determined.

					included in the organisation's strategy.	
Technology	13. Information and communication technology	Information and communication technology is not developed to support collaboration. No ICT platforms are capable of communicating with other organisations.	Awareness of the use of information and communication technology with regard to collaboration exists. Information and communication technology is not developed to support collaboration, or ICT use in collaboration is ignored. ICT platforms may not be capable of communicating with other organisations. Digital data storage may be available.	Organisations have systems that could connect with others with some ICT capacities to support collaborative requirements. Digital data storage is available. There are improvement plans to satisfy collaboration needs. The organisation is not connected with a collaborative common digital platform to support collaborative activities.	The organisation is connected with, and uses, appropriate user-friendly common digital platforms for collaborative design and communication. Digital data storage is available, and technology may support knowledge sharing, such as maintaining a collaborative knowledge platform.	Similar features to those of level 3 exist. In addition, continued improvement in the ICT system to maintain effective collaboration can be seen.
People	14. Collaborative representatives from an organisation	No awareness of any collaboration needs amongst the staff. Unavailability of dedicated collaborative staff in the organisation.	An awareness of collaboration needs among the staff can be seen. Unavailability of dedicated collaborative staff in the organisation. The available existing staff have no understanding of collaborative roles and no intention to collaborate.	Allocated collaborative staff may understand collaborative roles and have relevant knowledge, but preparation for any contribution may not be seen. Staff are involved in sufficient training and development, but reluctance to undertaken exploratory learning can be seen. Willingness, commitment, and interaction with other collaborative members may be low, and motivation through incentives and management support is low.	Dedicative collaborative staff understand collaborative roles with relevant knowledge. Staff are involved in training and development programmes for knowledge development. Commitment and interaction with other collaborative staff can be seen. Motivation through incentives and organisational management support with regard to collaboration are available.	Similar features as those in level 3 are available. Actions are taken to continuously improve staff attributes and knowledge in respect of collaborative work and decision-making.

6.6 Development of a framework for enhancing stakeholder collaboration in RSUP

This section summarises the above discussion and provides a final outcome of the study as a framework that helps to enhance stakeholder collaboration in RSUP, which is presented below. Furthermore, the study provides each step-in detail as an application to enhance stakeholder collaboration in Sri Lanka. The study outcomes were validated, and the transferability or external validity of the study outcomes were tested, by exploring the applicability of the developed framework for broader contexts within Sri Lanka. Six experts who are experienced in the RSUP field in Sri Lanka were selected for the validation process. Table 6-28 shows the profiles of the experts. Among them two experts had not participated in the data collection process and the other four had already participated in the data collection process of this study as indicated in the Table 6-28. The framework and the five documents based on the outcomes were explained in detail to the experts.

Table 6-28: Profile of the experts utilised to validate the outcomes.

Expert ID	Description
VE1	Professor with research experience in a similar area
VE2 (Already participated)	Senior scientist in NBRO
VE3 (Already participated)	A high-level officer who has working experience in government and non-government organisations relating to climate change
VE4 (Already participated)	Disaster risk reduction specialist and has experience as an urban planner.
VE5 (Already participated)	A high-level officer in the UDA
VE6	A high-level officer in the DMC

However, according to a comment received from an expert about the identification of stakeholder roles and responsibilities, the study conducted another set of expert interviews to validate the findings, particularly focusing on identifying stakeholders' roles and responsibilities and the proposed collaborative governance structure. These experts' details are given in the Table 6-29.

Table 6-29: Experts profile

Expert ID	Description
VE1	Professor and highest-level officer in the UDA
VE2	Local governance expert
VE3	Highest-level officer in the DMC
VE4	Urban planner and local-level planning committee member from the UDA.
VE5	Higher level officer, District Secretariat office

The validation process of the framework and the suggestions given by the experts are given in Appendix N: Validation process of the framework. The final revised framework according to the expert interviews is presented below.

6.6.1 Framework for enhancing stakeholder collaboration in RSUP.

The framework developed for enhancing stakeholder collaboration in RSUP is shown in Figure 6-4.

Figure 6-4: Framework for enhancing stakeholder collaboration in RSUP.

6.6.2 Step 01

Step 01 provides a stakeholder collaboration context analysis in Sri Lanka in terms of identifying barriers and enablers that can be applied to enhance stakeholder collaboration in RSUP. The study has identified barriers and enablers consisting of strategies and opportunities that can facilitate, and be used as an opportunity for, stakeholder collaboration in RSUP (See section 5.4). Finally, all of the strategies and opportunities have been mapped into the framework to establish a contextual understanding of the stakeholder collaboration in RSUP and are presented in Figure 6-5.

External barriers

- Lack of supports from policies and laws for informal collaboration
- Inadequate enforcement of policies and laws
- Lack of policy implementation tools
- Lack of integration and coherence in government policies and laws
- Lack of legislative support for collaboration
- Lack of policy evaluation and update
- lack of funding guidance in policies
- No mandates and procedure for information and knowledge sharing

(1+4/A+B+C)

- Lack of political guidance and vision
- Political interference
- Frequent changes in national development policies

(1+2+3)

Inter organizational level barriers

- Ad hoc collaboration process
- No mandated defined collaboration process with correct stakeholder identification, feedback, monitoring and incentive mechanism
- Involvement of large number of organisations
- No equality and power sharing
- Lack of clarity in responsibility
- Data selling for money
- Lack of information and knowledge sharing

- Ccomplex and unsuitable governance arrangement *(1+4/C)*

- Lack of understanding among stakeholders *(1+6+7/D+E+F+G)*

Intra organizational level barriers

- Silo based working culture and pattern
- Lack of participation and representation in collaboration process (11)
- No same representative at all stage of collaboration process
- Lack of data
- Unreliability of the given data
- Data not available in required format
- Information are not available with relevant agency
- Inadequate funding (A+F)
- Lack of technical capacity

- Unsuitable organizational structure

- In adequate and ineffective management of staff
- Lack of knowledge of staff
- Not adopting modern digital technologies

(1+5+6+7+8+9+10+11+D+E)

Personal level barriers

- Lack of accountability and responsibility
- No collaborative task allocation with official job description
- Lack of motivation
- Personal judgement in collaboration practice
- Reluctant to share data
- Language barriers
- Unsupportive personal attributes of collaborative members (11)

- Administrative environment
- Information and knowledge sharing
- Collaboration process
- Organizational capacity
- Working culture

Strategies : (1) strengthening policies and laws and develop policy implementation tools through collaborative review; (2) collective stand against politicians; (3) Establish criteria for political appointment; (4) Establish collaborative governance with shared powers for identified stakeholders that leads required intra organizational structural changes; (5) include collaborative attributes in education system; (6) Capacity development of the organisations; (7) Adopt suitable recruitment system and appointment of suitable organizational leadership (8) Monitoring and evaluation (9) Motivation and top management influence towards collaborative culture; (10) Ensure common language usage; (11) Create trust

Opportunities : (A) International collaboration and commitments; (B) Existing policies and laws ; (C) Existing coordinating councils and committees; (D) Existing technical committees; (E) National plans and strategies; (F) NGOs; (G) Existing knowledge platform

Figure 6-5:Stakeholder collaboration context in RSUP.

The context analysis using the causal loop diagram (See section 5.5) further shows that external barriers influence the inter-organisational and intra-organisational level barriers that lead to, and enhance, the personal related barriers to stakeholder collaboration in RSUP. Furthermore, strengthening policies and laws is identified as a key strategy to overcome all barriers and to enhance stakeholder collaboration, in addition to the other proposed strategies. The requirements for strengthening policies and laws are provided in step 03.

6.6.3 Step 02

The study conducted a comprehensive stakeholder analysis in terms of RSUP and implementation to identify key stakeholders in RSUP using a document review of existing policies and legislations, national reports, plans, and strategy documents. Table 6-30 presents the key stakeholders who need to be involved in RSUP with the required proposed roles as step 02.

Table 6-30:Identification and mapping of stakeholders' roles and responsibilities

No	Key stakeholders	Key role	Proposed roles in RSUP
Planning agencies			
1	National Physical Planning Department	Decision makers (national, regional, local non-urban area planning)	Decision makers at the national level, collaborative leader.
2	Urban Development Authority	Planners and decision-makers for implementation (leading planning agency)	Decision makers (technical agency as urban planners).
3	Department of Land Use Policy Planning	Planners	Mandated collaborative member in RSUP
4	Local authorities	Implementation decision-makers	Mandated collaborative members in RSUP, representatives of the community through the citizen charter
5	District Secretariats / Divisional Secretariats	Implementation decision-makers	Mandated collaborative members in RSUP

No	Key stakeholders	Key role	Proposed roles in RSUP
6	CIDA	Regulatory planners for building codes and construction guidelines	Decision makers (collaborative regulations, construction guidelines' developers, and building codes' developers)
DRR and CC agencies			
7	Disaster Management Centre (DMC)	Coordinating agency in terms of DM	The decision maker (accountable agency for providing accurate risk maps)
8	Department of Irrigation (DI)	Technical agency – floods	The decision maker (accountable technical agency for flood disaster risks)
9	Geological Survey and Mines Bureau (GSMB)	Technical agency - earthquakes	The decision maker (accountable technical agency for earthquake related disaster risks and the mines)
10	National Building Research Organisation (NBRO)	Technical agency - landslide and research organisation	The decision maker (accountable technical agency for landslide-related disaster risks and advisors for others involved in disaster-related research areas)
11	Department of Meteorology (DoM)	Technical agency - cyclones, heavy rain, lightning, high wind forecasts and tsunami warnings	The decision maker (accountable technical agency for cyclones, heavy rain, lightning, high wind forecasts and tsunami related disaster risks)
12	Ministry of the Environment (Climate Change Secretariat (CCS))	Technical agency as a key agency dedicated to climate change	The decision maker (accountable technical agency for climate change)
Decision-making agencies for the development			
13	Central Environmental Authority (CEA)	Decision makers in the implementation	Mandated collaborative members in RSUP
14	Sri Lanka Land Reclamation & Development Corporation (SLLRDC)	Decision makers for implementation in low marshy lands.	Decision makers (as a key approval agency for implementation and as a responsible agency for landfilling)
15	Department of Coast Conservation and Coastal Resource	Planners and decision-makers for implementation for the coastal areas	Decision makers (as a key approval technical agency for implementation)

No	Key stakeholders	Key role	Proposed roles in RSUP
	Management (CCD)		
16	Mahaweli Authority (MA)	Decision makers for implementation in their purview	Mandated collaborative members in RSUP
17	Department of Wildlife (DWL)	Decision makers for implementation	Mandated collaborative members in RSUP
18	Department of Agriculture (DoA) (Soil Conservation Department)	Decision makers for implementation in the soil erosion area	Decision makers (as a key approval technical agency for implementation)
19	Department of the Forest (FD)	Decision makers for implementation	Mandated collaborative members in RSUP
20	RDA (Road Development Authority)	Implementation decision-makers	Mandated collaborative members in RSUP
21	RDD (Road Development Department)	Implementation decision-makers	Mandated collaborative members in RSUP
22	Sri Lanka Tourism Authority (SLTA)	Implementation decision-makers	Mandated collaborative members in RSUP
23	SEA (Sustainable Energy Authority)	Implementation decision-makers	Mandated collaborative members in RSUP
24	CEB (Ceylon Electricity Board)	Implementation decision-makers	Mandated collaborative members in RSUP
25	AD (Agrarian department)	Implementation decision-makers	Mandated collaborative members in RSUP
Advisors / Supporters			
21	NGOs	Advisors	Create formal or informal collaborations for advice and funding, conduct training and development activities, and engage and represent the community.
22	Universities	Advisors	Create informal or formal collaborations as an advisor by providing decision-making accountability if they provide technical input.
23	Research organisations	Advisors	Create informal collaborations according to the need of an advisor or formal collaborations

No	Key stakeholders	Key role	Proposed roles in RSUP
			by providing decision-making accountability if they provide technical input.
Community			
24	Community	Key contributors and suggestion makers	Create formal and informal collaborations in the RSUP process with community and community-based organisations.

The study identified all the key relevant stakeholders who are required to be involved in effective RSUP in Sri Lanka. All planning agencies, technical agencies, and implementation decision-making agencies are proposed, by the study, to delegate shared powers in decision-making to provide accountability in the planning process and plans. All the decision-makers will be given signing authority for plans and are required to take responsibility for the plans and their implantation. This accountability will lead to effective implementation by avoiding silo-based project plans and implementations that are not aligned with urban plans. Furthermore, the study suggests that the National Physical Planning Department should be the key leading entity for this collaboration process as an external stakeholder who is not involved in the urban planning process. This leadership will help to ensure neutral leadership that will ensure equality among the stakeholders who are involved in the planning process and helps to ensure the alignment of national physical plans with urban plans; it is important to have integrity among all the urban and non-urban plans and national plans. Furthermore, according to their staff's dedicated roles, the study considered DMC should be a coordinating agency, not a technical agency. DMC can be an advisor based on its staff's experience relating to early warning and response activities and research and development activities. However, in the validation process, the experts suggested that DMC can be a responsible agency for providing risk mapping in areas and should be an accountable party for the provided data. Furthermore, it is suggested that the DMC support, represent and engage the community by using their coordination arrangements at the sub-national level connected with the district disaster management coordination unit. Finally, the study suggests that the National Planning Department consider the alignment between the urban plans and the proposals received from the sectoral organisations for development activities as a key criterion for issuing funds.

6.6.4 Step 03

Based on the stakeholder collaboration system, the study identified the required policy requirements and changes in policies and laws to strengthen the existing policies and laws to foster collaboration in RSUP. These policy requirements are presented below.

(1) Stakeholders should collaboratively review policies and legislation at regular intervals for effective stakeholder collaboration in risk-sensitive urban planning (the stakeholders' list is provided in step 02)

(2) Policies and legislation should define mandated collaboration procedures with an indication of stakeholders' roles and responsibilities (stakeholders' identification and roles are provided in step 02)

(3) Policies and legislation should determine the collaborative institutional framework for risk-sensitive urban planning with required decentralised and neutral leadership features (that will support the collaborative governance arrangements proposed in step 04).

(4) Policies and legislation should delegate shared powers to key stakeholders with decision-making authority in urban planning (the decision-making stakeholders' list is provided in step 02)

(5) Policies and legislation should provide guidance for funding for these collaboration processes (e.g. guidelines for receiving funds from the national budget)

(6) Policies should provide criteria to revise the national common planning policy and plans without them being influenced by governmental changes and political manifestoes.

(7) Policies should allow informal collaboration in risk-sensitive urban planning and permit formalised collaboration with private organisations such as NGOs as required, which can lead to receiving several benefits from private organisations (for example, allowing the creation of formal collaboration with required agencies such as NGOs in order to receive funds and receive support for organisational capacity development; creating an international collaboration that provides funds).

(8) Policies and legislation should encourage staff development activities such as research and training sessions to enhance subject and technical knowledge.

(9) Policies and legislations should provide a mandated procedure for information and knowledge sharing in stakeholder collaboration in RSUP with an indication of accountability.

6.6.5 Step 04

This study presents a proposed collaborative governance structure that can facilitate effective stakeholder collaboration in RSUP and this is presented in this section. The governance arrangement indicates all the organisations identified in step 02 based on their roles. This collaborative arrangement poses a requirement to allocate sub-units or collaborative representatives with the required capacity to be involved in RSUP with delegated decentralised powers for decision-making. Furthermore, the study proposes a regional committee under the NPPD as a neutral collaborative leader. However, it is important to note that this regional committee should incorporate a UDA regional office member. However, since the study proposes NPPD as the leader and NPPC as an approval agency, the UDA will have less power in the planning process. Furthermore, the study has utilised the existing structures and powers as much as possible to propose the collaborative governance structure. However, according to the UDA Act, this proposal is not aligned with the powers dedicated to the UDA main planning committee as a decision-making agency for urban plans. On the other hand, this proposal brings the dedicated powers of NPPD back as planners, which is what they had before the creation of the UDA Act.

Furthermore, the study suggests adding or removing any organisations from the local level network with the required formal and informal connections according to the need of the urban area under consideration with proposed justifications while developing a plan (for example, the Mahaweli authority is only required to be utilised in the areas covered by the Mahaweli development agencies. Similarly, some technical agencies are not required in the areas where a particular disaster event has not taken place). The organisations indicated in the local level network must have a sub-unit or representatives in their purview area with required decentralisation powers to bring the top-down and bottom-up approach. Figure 6-6 shows a proposed collaborative government arrangement for RSUP in Sri Lanka.

Figure 6-6:Proposed collaborative governance arrangement.

6.6.6 Step 05

This study proposes an inter-organisational collaboration maturity grid as step 5 that will assist organisations to assess their inter-organisational collaboration maturity and will guide them to move forward to the desired highest collaboration maturity according to their requirements. This is a key step in stakeholder collaboration in RSUP as it will help to develop the capacity of the organisations towards increasing inter-organisational collaboration maturity. The maturity grid is already presented in section 6.5.4.

6.7 Final framework to enhance the stakeholder collaboration in RSUP.

The final framework for enhancing stakeholder collaboration in RSUP at a glance is given in the Appendix P: Framework for enhancing stakeholder collaboration in RSUP. This study asserts that, as previously discussed, the framework can be used in emerging economies, as these nations encounter comparable conditions and barriers akin to those observed in Sri Lanka.

6.8 Summary

This chapter provides a discussion and the outcomes of the study as a framework to enhance stakeholder collaboration in RSUP. This chapter provides a comparison with the global context, with a special focus on emerging economies and the Sri Lankan context by discussing the similarity and differences in the identified barriers and enablers from the literature review and the empirical data. The study also identified nine policy changes using the systems thinking approach in the Sri Lankan context with the suggestions identified in the global context. Furthermore, the study combined the literature findings and the primary data to propose a hybrid of hierarchy and network structure as a suitable collaborative governance structure for RSUP in Sri Lanka. The study utilises the literature and the primary data outcomes to develop a maturity grid to assess organisational collaboration maturity in RSUP. Finally, the study provides a validated framework to enhance stakeholder collaboration in RSUP that consists of all the study outcomes. The next chapter will conclude the study by explaining how the objectives were achieved and elaborating on the study's contribution.

7 Conclusion

7.1 Introduction

The conclusion based on this study is given in this chapter. This chapter consists of three key sections: (1) an explanation of how this research achieved its set objectives (section 7.2); (2) the contribution of the current research to the existing body of knowledge (section 7.3); and (3) the limitations of the study and future research proposals (section 7.4 and 7.5).

7.2 Achievement of research objectives

This study set out to investigate the inter-organisational changes required for enhancing stakeholder collaboration for considering the impact of climate-induced risk as a key element in urban planning. Hence, this study established five research objectives to be achieved through a qualitative mono method with a case study strategy. Literature reviews, semi-structured interviews, and document reviews were adopted as data collection techniques. Finally, the study outcomes were validated by experts in the Sri Lankan context. The following section explains the achievement of the research objectives in detail.

Objective 1

The first objective of the study was to identify and critically analyse the barriers to, and enablers of, inter-organisational collaboration for implementing risk-sensitive urban planning. In order to achieve the objective, the study first conducted a systematised literature review to identify the barriers to, and enablers of, stakeholder collaboration in RSUP in a global context including in emerging economies (See section 2.2.4). In addition, the literature findings were analysed using the ISM approach which showed that politics, policies and legislation, and governance are the key driving barriers to stakeholder collaboration in RSUP. Based on the knowledge gained from the literature review, the semi-structured interviews with the experts and the document review were conducted in the Sri Lankan context to identify the existing barriers and enablers to enhance stakeholder collaboration in RSUP. The collected primary data were analysed using thematic analysis. As a result, barriers and enablers were identified to enhance stakeholder collaboration in the Sri Lankan context under five key themes (See section 5.4) : (1) administrative environment which consists of policies and laws, governance,

and politics; (2) information and knowledge sharing; (3) the collaboration process; (4) organisational capacity, and (5) working environment.

Furthermore, the study adopted a causal loop diagram analysis under the systems thinking approach to critically analyse the barriers to stakeholder collaboration in RSUP (See section 5.5). This diagram captured the connections amongst the barriers which led to identifying the root causes and the driving barriers that lead to lack of stakeholder collaboration in RSUP. The diagram was developed using the experts' narratives and validated by subject-related experts. As a key outcome, the study found that policies and legislation determining the governance, politics, and collaborative staff's personal attributes are the root causes in determining the stakeholder collaboration context. Furthermore, the systems thinking approach shows that having strong policies and laws with suitable governance can help to overcome the personal attributes' related barriers and can control the political barriers. These causal loop diagram findings align with the ISM findings. In essence, policies and legislation, and governance, are the key elements that need to be addressed in achieving successful stakeholder collaboration in RSUP.

Furthermore, the empirical findings shows that strong policies and legislation supporting collaborative RSUP (which can support a mandated collaboration process, information and knowledge sharing procedures, and the uplifting of organisational capacity) can lead to effective collaboration, despite the existence of unsupportive working environments comprising staff with negative attitudes to other collaboration members, and can overcome political barriers. The literature highlights policy and governance barriers as key obstacles to stakeholder collaboration in emerging economies such as Sri Lanka. Therefore, these findings can benefit other emerging economies to enhance stakeholder collaboration in RSUP.

Objective 02

The second objective was to identify the policy changes that need to be introduced to overcome critical barriers. As the first step in achieving this objective, the study conducted a literature review to understand the policy and policy-making requirements in the global context including in the emerging economies (See section 2.4). As the next step, the study utilised the causal loop diagram, developed in section 5.5 under a systems thinking approach, to illustrate how various barriers are interlinked and lead to various conditions that can impact stakeholder collaboration. This systems thinking approach allows policymakers to see the interrelationships and feedback loops that may not be apparent in traditional linear cause-

and-effect thinking and, therefore, helps identify leverage points in the system to create a positive transformation and impact towards RSUP.

The study further undertook a document review to study existing policies and laws in the Sri Lankan context to understand the gap in the current context (See section 4.8). As a result, the study identified that weak policies and laws, unsupportive personal attributes, and political interference are the root causes that lead to ineffective participation and contribute to ad hoc and ineffective collaboration processes, unsupportive working environments and a lack of information and knowledge sharing which, in turn, leads to a lack of stakeholder collaboration in RSUP. By understanding the system, the study proposed nine policy changes to change the system towards substantially more successful stakeholder collaboration (See section 5.5). These policy changes are: (1) policies and legislation should be collaboratively reviewed by stakeholders at regular intervals for effective stakeholder collaboration in risk sensitive urban planning; (2) policies and legislation should define mandated collaboration procedures with clear stakeholders' roles and responsibilities; (3) policies and legislation should determine a collaborative institutional framework for risk sensitive urban planning with the required decentralised and neutral leadership features; (4) policies and legislation should delegate shared powers to all stakeholders with signing authority within urban planning; (5) policies and legislation should provide guidance to obtain funding for these collaboration process; (6) policies should provide criteria to revise the national common planning policy and plan without being influenced by governmental changes and political manifestoes; (7) policies should allow informal collaboration in risk sensitive urban planning and should permit the formalisation of collaboration with private organisations such as NGOs as required; (8) policies and legislation should encourage staff development activities such as research and training sessions to enhance subject and technical knowledge, and (9) policies and legislation should provide a mandated procedure for information and knowledge sharing in stakeholder collaboration in RSUP with an indication of accountability. The policy proposals suggested here can be extrapolated to other emerging economies because the policy-related barriers and other obstacles identified in Sri Lanka are commonly found in similar contexts in emerging economies.

Objective 3

The third objective was to investigate current inter-organisational collaboration structures and propose a suitable structure to stimulate stakeholder collaboration in RSUP. A systematised

literature review was conducted to identify a suitable inter-organisational collaboration struture and its features that would facilitate inter-organisational collaboration (See section 2.3). Furthermore, based on the primary data, the empirical study found several structural arrangement proposals (See section 5.6.2). In addition, the study identified specific requirements and features for a collaborative governance structure that will facilitate collaborative RSUP (See section 5.6.3). The study utilised the findings from the literature review and primary data and developed a test criteria to select the suitable collaborative governance structure for inter-organisational collaboration. Based on that, the study proposed a hybrid of a hierarchy and network structure with neutral leadership, with a balanced top-down and bottom-up approach, and with decentralisation with necessary powers as providing suitable collaborative governance arrangements for RSUP (See section 6.4). Furthermore, the study indicated that a pure network structure is unsuitable for countries that follow a bureaucratic culture such as Sri Lanka. A hybrid of a hierarchical structure and a network structure was identified as the most suitable for Sri Lanka as it allows Sri Lanka to make a smooth transition from the current hierarchical structures. The suggested inter-organisational collaboration structure can be implemented in other emerging economies since they also share a political background characterized by bureaucratic culture and encounter governance-related challenges similar to the barriers observed in Sri Lanka.

Objective 4

The fourth objective of the study was to develop a tool that will allow organisations to define a pathway to transform their collaboration maturity and to measure it as they transform their practices. A systematised literature review was conducted to identify the state of the art of inter-organisational collaboration maturity models and to identify the key elements of the maturity model, such as maturity levels and indicators (See section 2.5).

As the first step, the study compared the maturity levels of inter-organisational maturity models with stakeholder engagement levels in RSUP. As a result, the inter-organisational collaboration maturity levels were defined for stakeholder collaboration in RSUP. A set of indicators for measuring the maturity level of collaboration was finalised by integrating the maturity indicators identified from the literature review and the indicators picked from the barriers and enablers identified from the empirical study. Hence, the key indicators for assessing organisational collaboration maturity in RSUP were established (See section 6.5). The attributes of each indicator against the maturity levels were defined with the support of

the literature review findings. This work resulted in developing a maturity grid with maturity levels and indicators for measuring these levels (See Table 6-27). This maturity grid development allows organisations to identify their current maturity level in inter-organisational collaboration and to define a pathway to transform their collaboration maturity and measure it as they transform their practices.

The maturity model development integrates insights from literature reviews and primary data on barriers and enablers. The identified barriers and enablers in Sri Lanka correspond with those encountered in other emerging economies. Consequently, this model holds potential for application in other emerging economies as well.

Objective 5

The final objective was to develop a framework for enhancing stakeholder collaboration in risk-sensitive urban planning. Accordingly, the study developed a framework combining the above outcomes from each objective to enhance stakeholder collaboration in RSUP (See section 6.6). The framework consists of 5 key steps: (1) understanding the stakeholder collaboration context in RSUP; (2) identifying and mapping the stakeholders' roles and responsibilities; (3) strengthening policies and legislation through collaborative review and update; (4) establishing a collaborative governance structure, and (5) measuring organisational collaboration maturity and uplifting organisational capacity towards collaboration. In addition, the study provides guidance and presents the outcomes of applying each step in the Sri Lankan context. This comprehensive framework was validated by experts and is presented as a key outcome of the study to enhance stakeholder collaboration in RSUP (See section6.6.1). This ultimate framework for enhancing stakeholder collaboration is applicable not only to Sri Lanka but also to other emerging economies. This is because the policy, political, governance, and other barriers and conditions observed in Sri Lanka closely resemble those found in other emerging economies. Thus, the study concludes that this study's findings can be generalised to emerging economies.

7.3 Contribution of the research

The value of this research lies in its ability to generate new knowledge and insights that can contribute to theory and practice. Therefore, the following subsections elaborate on the significant contributions of the study to theory and practice.

7.3.1 Theoretical contribution

The study indicated the existing theory gap in proposing approaches to enhance stakeholder collaboration in RSUP which mainly focuses on inter-organisational collaboration between urban development, disaster risk reduction, and the climate change fields to create risk-sensitive urban development. The first systematised literature review was conducted to identify the barriers and enablers for stakeholder collaboration in the global context including in emerging economies. This is the first study that analyses the existing studies relating to urban development and CC from the global context including emerging economies. It identified the barriers and enablers and classified them under the five key themes such as administrative environment, information and knowledge sharing, working environment, collaboration process, and organisational capacity as an extension of the existing theories by reformulating them.

Similarly the inter-organisational collaboration structures and features that can facilitate stakeholders in a general stakeholder collaboration context have been identified through another systematic literature review. This study mapped those features against the various vertical integration levels and horizontal integration and indicated each stage with the suitable organisational structural types. As a result, A framework was developed which can guide the selection of a suitable organisational structure and features as per the required collaboration level. Also, test criteria were developed to understand the suitability of the organisational structural type to foster collaboration among stakeholders. These are considered as a considerable refinement, a reformulating, and a contribution to the existing theory.

Subsequently, the third systematic literature review was conducted to understand existing maturity models and their attributes that can help to measure stakeholder collaboration in different contexts. This study classified the maturity indicators from various collaboration contexts and classified them under key five themes similar to the themes identified in the barriers and enablers with the purpose of connecting these themes in the development of a maturity model in the risk sensitive urban planning context. This synthesis and classification can be seen as an extension and reformulation of the existing theory.

Furthermore, this study revealed that little research has been conducted to understand how best to enhance stakeholder collaboration in RSUP. There is no evidence of research that has adopted a system thinking approach to identify the barriers and enablers and to propose a

collaborative governance structure and policy requirements for implementing RSUP. (Refer to the theoretical framework presented in section 2.7)

7.3.2 Empirical contribution

This section refers to the new knowledge, insights, or evidence generated through the empirical investigation (primary data collection) conducted as part of the research. In terms of barriers and enablers within the stakeholder collaboration context, the study identified several new barriers and enablers in the Sri Lankan context that have   not been identified in the existing literature. Similarly, the research found that some of the barriers and enablers identified in the global context are unsuitable for the Sri Lankan context. Thus, the study claims that the identification of new barriers and enablers in Sri Lanka is the empirical contribution of the study. In addition, the use of the causal loop diagram under a systems thinking approach to understanding the stakeholder collaboration context in RSUP is a new concept adopted in this study. The externalisation of the linkage between the barriers brought new insight into how various barriers influence others to generate undesirable conditions for stakeholder collaboration in RSUP based on stakeholders' narratives. This diagram development is an empirical contribution in stakeholder collaboration in RSUP by identifying the interrelationship between the barriers and the root causes of the barriers or the key driving barriers for stakeholder collaboration. Furthermore, this systems thinking approach offers a unique and easy to use method for policymakers to understand what policy requirements are required in overcoming various barriers and enhancing the required collaboration in RSUP. The study has identified key policy requirements which are lacking in the existing literature and considered as an empirical contribution of the study.

Furthermore, the study has proposed a suitable collaborative governance arrangement with the required features for effective stakeholder collaboration in RSUP by modifying the findings from the literature using the empirical findings. . Moreover, the study developed a collaboration maturity grid in RSUP with the support of the literature review as well as the empirical findings relating to the barriers and enablers for stakeholder collaboration in RSUP.

All in all, the framework developed in the study is new knowledge which is relevant to both the Sri Lankan and emerging economies, achieved via the empirical findings of the study.

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7.3.3 Contribution to practice

The knowledge produced in this study contributes towards changing the current approaches practiced by different practitioners (such as researchers, policymakers, stakeholders, and bureaucrats) working towards collaborative RSUP. First of all, the methodology adopted in the study can be adopted by researchers in any context to enhance stakeholder collaboration. Secondly, the study provides approaches to enhance stakeholder collaboration that government, bureaucrats, and policymakers can utilise. Moreover, the study identifies the enablers, consisting of strategies and opportunities, that can be utilised to enhance stakeholder collaboration.

Furthermore, the systems thinking approach and the causal loop diagram developed in the study provide a robust basis for policymakers and legal drafters to develop and propose policies and laws in the RSUP context. In addition, the Sri Lankan government can adopt the proposed collaborative governance arrangement that can overcome bureaucratic culture and enhance collaborative RSUP. The study provides a basis for selecting suitable governance structures that suit a particular country's context. Moreover, the study developed an inter-organisational collaboration maturity grid that allows organisations or stakeholders to define a pathway to transform their collaboration maturity and to measure it as they transform their practices.

Finally, these research outcomes contribute to global policies such as the Sendai framework, the sustainable development goals, and the Paris climate agreement, which focus on multi-agency collaboration towards the creation of resilient and sustainable cities and human settlements. Moreover, this study falls under one of the priorities namely "foster interdisciplinary and multi-stakeholder collaboration" which are indicated in "A Framework for Global Science - in Support of Risk-Informed Sustainable Development and Planetary Health" by the International Science Council, Integrated Research on Disaster Risk (IRDR), and the UN Office for Disaster Risk Reduction (UNDRR) in November 2021.

7.4 Limitations of the study

This study provides comprehensive guidance for enhancing stakeholder collaboration in RSUP. However, the study does not investigate the community and community organisations-related collaboration aspects in detail as this has been out of the scope of this

study. However, this is an important area since communities are an important stakeholder in RSUP.

The semi-structured interviews were conducted among national and local experts covering the key stakeholders. However, the study could not approach all stakeholders identified in the stakeholder analysis due to the difficulty in approaching stakeholders within the limited time frame. Therefore, the outcome of this study should be further validated by involving all the missing stakeholders before implementation.

7.5 Further research proposals

1. A future study can focus on developing a comprehensive maturity model that includes detailed pathway descriptions consisting of steps to move from one collaboration maturity level to another with objective measures to determine the collaboration maturity.

2. Further research can be carried out to apply the proposed maturity grid in the Sri Lankan context as well as in other country contexts to identify the maturity levels of inter-organisational collaboration in RSUP.

3. Further research can be carried out to investigate the challenges in implementing risk sensitive urban plans and propose a suitable government mechanism to overcome the gaps in the effective implementation.

4. Further research can be carried out in the context of integrating the construction industry in the risk sensitive urban development context; this includes the role of the construction industry in risk sensitive urban planning, gaps in this planning, and in ways of overcoming these gaps.

5. Further research can be carried out to in depth analysis of bringing positive changes in the people mentality and behaviours towards collaboration despite their personal attributes.

6. Further research can be carried out to facilitate the empowerment of the Predesiya Saba's to handle the development activities considering the rapid urbanisation in the country.

7.6 Summary

This chapter describes the conclusions of the study under each objective and presents the contribution of the research to theory and practice. The limitations are also explained, and further research proposals are suggested.

The study findings indicates that politics, policies and legislation which influence governance, and the personal attributes of collaborative staff are the root causes which lead to a lack of stakeholder collaboration in RSUP. Among these root causes, political environments are unpredictable and change from time to time. Furthermore, the analysis shows that barriers created by the personal attributes of collaborative staff and even political interference can be limited by appropriate laws and policies. By this means, the study highlights that appropriate policies and laws need to be in place to overcome those barriers and thus help to enhance stakeholder collaboration in RSUP. Hence, the study proposes nine key policy and law changes that are required to create successful stakeholder collaboration in RSUP. Furthermore, the study proposes a hybrid of hierarchy and network structure as a suitable collaborative governance structure for the countries that follow a bureaucratic culture. Moreover, a balanced top down and bottom-up approach, required decentralised features at the local level, and provisions to engage communities are identified as essential features that need to be considered in collaborative governance formation.

As another aspect, creating stakeholders' awareness regarding their collaboration maturity level is vital to enable them to move towards a higher maturity level of collaboration by uplifting their capacity in all ways possible. Thus, the study developed an inter-organisational collaboration maturity grid, with fourteen indicators and 5 maturity levels, for the RSUP context that will assist stakeholders to understand where they are in terms of collaboration maturity; it also provides the pathway to move further along the collaboration maturity path.

In essence, this study provides various strategies to enhance stakeholder collaboration in RSUP and it is hoped that the study has contributed to existing knowledge to improve stakeholder collaboration in RSUP. Also, the findings can be utilised by the emerging economies that are facing a similar issue as justified in this study.

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Appendices

Appendix A: Search terms

Basic search terms of the study

"Stakeholder" and "risk sensitive" and "urban development" and "collaboration" and "Decision making" and "barriers" and "enablers".

Boolean operator for data base search (key terms developed with synonyms)

(((("stakeholder*" OR "actor*" OR "agent*" OR "agenc*" OR "organi?ation*" OR "institution*" OR "decision maker*" OR "policy maker*") AND ("Risk sens*" OR "Risk-sens*" OR "Disaster risk*" OR "Disaster reduc*" OR "Disaster risk reduc*" OR "Disaster management" OR "Risk Management" OR "Risk reduction" OR "Risk assessment" OR "Risk evaluation" OR "Risk based" OR "Disaster" OR "climate change adapt*" OR "climate change*") AND ("urban develop*" OR "Urban planning" OR "urban plan" OR "Urban proce*" OR "Urban design*") AND ("collaborat*" OR "Participat*" OR "intergrat*" OR "harmoni?*" OR "synergi*" OR "collaborative governance" OR "link") AND ("Decision making process" OR "Decision-Making process" OR "Plan proce*" OR "Planning proce*" OR "Develop* proce*" OR "design*" OR "Process design" OR "Design* method*" OR "Decision* proce*" OR "plan" OR "planning") AND ("issue*" OR "challenge*" OR "Problem" OR "difficult*" OR "boundar*" OR "barrier*" OR "opportunit*" OR "find*" OR "enabler*")))

Appendix B: Interpretive structural modelling approach application

The detail study presented in the published paper: Ganeshu, P.; Fernando, T.; Keraminiyage, K. Barriers to, and Enablers for, Stakeholder Collaboration in Risk-Sensitive Urban Planning: A Systematised Literature Review. *Sustainability* 2023, *15*, 4600. https://doi.org/10.3390/su15054600

Analysis of the Dependency of Barriers through Interpretive Structural Modelling

This section shows the interpretive structural modelling approach to identify such dependencies among the barriers to stakeholder collaboration and to identify the most dominant barriers with high driving power, using the four steps presented in Figure B1.

Figure B1. An interpretive structural modelling approach.

Step 01: Structural Self-Interaction Matrix (SSIM): In this step, the interrelationship of each pair of variables is established in the structural self-interaction matrix. This matrix is used to represent one of the following relationships of a variable: leads/drives another variable; or led/driven by another; or leads/drives each other, or no influential relationship. These relationships can be denoted as follows:

V: Variable i leads variable j (variable i will influence variable j).

A: Variable j leads variable i (variable i will be influenced by variable j).

X: Variables lead each other (variable i and j will influence each other).

O: no relationship between the variables.

Step 02: Initial and final reachability matrix development: During this step, the SSIM is transferred to a reachability matrix using 1 and 0 by replacing the indicators V, A, X, and O, as shown in Table B1. This initial reachability matrix is further processed to establish the final reachability matrix by including transitivity links among the variables. A transitivity link is considered as a link that influences a variable indirectly via another variable.

Table B1. Binary indication of the relationship between the variables.

Connection between Variables	Transformation in the Reachability Matrix	
	$i \rightarrow j$	$j \rightarrow i$
V	1	0
A	0	1
X	1	1
O	0	0

Step 03: level partitioning: Level partitioning is performed at this stage to establish a hierarchical relationship between the variables by further processing the final reachability matrix. In this step, two sets of variables are developed against each variable: (1) the reachability set consists of the variable itself and the other variables that are being influenced by this variable, and (2) the antecedent set consists of the variable itself and the other variables which are influencing this variable. Then, the intersection between each set is identified. A variable with the same reachability set and intersection set will be identified as a level 1 variable and removed from the list in the next step. The same process is iterated until it reaches the final top-level variable. Based on these levels, a diagram is developed to show the dependent relationships among the variables.

In addition to these steps, by using the calculated driving powers and dependent powers, a MICMAC (cross-impact matrix multiplication applied to classification) analysis is performed. The purpose of the MICMAC analysis is to analyse the drive power and dependence power of the factors to identify the key factors that drive the system in various categories. Based on their driving power and dependence power, the variables are classified into four categories, namely autonomous factors, linkage factors, dependent factors, and independent factors.

Step 04: MICMAC Analysis: During this analysis, a conical chart that represents the variable's total driving power and dependent power is produced. The total number of the driving power is equal to how many variables are led by this variable, including itself. Similarly, the total dependence power is calculated on how many variables influence this variable, including itself. Based on the calculation, variables are divided into four clusters, respectively: autonomous variables, dependent variables, linkage variables, and independent variables.

Establishment of Structural Self-Interaction Modelling and Reachability Matrix

Following step 01, Table B2 presents the Structural Self-Interaction Matrix (SSIM) developed for the identified barrier themes using expert opinions. This study adopted the Delphi method to develop the SSIM using four experts from academia and industry. Since this study was looking at barriers within a global context, the academics were selected based on their research exposure in a global context. Similarly, industry practitioners were selected based on their working experience in various countries. Interviews were conducted with experts to develop a matrix, and then differentiations among the experts' opinions were again considered until data saturation was reached.

The relationships among the barrier themes were established pairwise based on the experts' opinions as follows. For example, the influence of the policies and legislation-related barrier theme on itself is represented by "X"; its influence on the governance theme was represented by "V"; the influence of politics on this theme was represented by "A"; and the absence of a connection with other barriers was represented by "O". The SSIM was then used to produce the initial reachability matrix (Table B3). The final reachability matrix (Table B4) was produced, including transitivity links marked as "1*". For example, the initial reachability matrix indicates that policies and legislation-related barriers lead to leadership-related barriers, and leadership-related barriers lead to conflict-of-interest barriers. Therefore, policies and legislation-related barriers indirectly influence the conflict-of-interest barriers. This relationship was included in the final reachability matrix as a transitivity link.

Table B2. Structural self-interaction matrix of barriers.

Barrier categories	Barrier themes ID	Barriers to Stakeholder Collaboration in Risk-Sensitive Urban Planning	External Barrier				Inter-Organisational Barriers			Intra-Organisational Barriers			People-Related Barriers		
			Policies and Legislation-Related Barriers	Governance-Related Barriers	Politics-Related Barriers	Leadership-Related Barriers	Organisational Interest-Related Barriers	Communication and Coordination-Related Barriers	Collaboration Processes-Related Barriers	Organisational Structure-Related Barriers	Organisational Culture-Related Barriers	Organisational Resource capacity-Related Barriers	Intrinsic Barriers	Profession-Related Barriers	Knowledge-Related Barriers
External barriers	1	Policies and legislation-related barriers	X	V	A	V	V	V	V	O	V	V	O	V	O
	2	Governance-related barriers		X	A	V	V	V	V	V	V	V	O	V	V
	3	Politics-related barriers			X	V	V	V	V	V	V	V	O	O	O
Inter-organisational barriers	4	Leadership-related barriers				X	X	V	V	V	V	V	V	X	X
	5	Organisational interest-related barriers					X	X	A	O	A	O	V	X	X
	6	Communication and coordination-related barriers						X	X	A	A	A	A	X	X
	7	Collaboration processes-related barriers							X	A	A	A	A	A	A
Intra-organisational	8	Organisational structure-related barriers								X	V	A	V	O	X
	9	Organisational culture-related barriers									X	V	X	V	X
	10	Organisational resource capacity-related barriers										X	X	O	X
People-relate	11	Intrinsic barriers											X	A	X
	12	Profession-related barriers												X	X
	13	Knowledge-related barriers													X

Table B3. Initial reachability matrix.

Barrier categories	Barrier themes	Barriers to Stakeholder Collaboration in Risk-Sensitive Urban Planning	External Barriers	Inter-Organisational Barriers	Intra-Organisational Barriers	People-Related Barriers	Driving

			Policies and Legislation-Related Barriers	Governance-Related Barriers	Politics-Related Barriers	Leadership-Related Barriers	Organisational Interest-Related Barriers	Communication and Coordination-Related Barriers	Collaboration Processes-Related to Barriers	Organisational Structure-Related Barriers	Organisational Culture-Related Barriers	Organisational Resource Capacity-Related Barriers	Intrinsic Barriers	Profession-Related Barriers	Knowledge-Related Barriers	
External barriers	1	Policies and legislation-related barriers	1	1	0	1	1	1	1	0	1	1	0	1	0	9
	2	Governance-related barriers	0	1	0	1	1	1	1	1	1	1	0	1	1	10
	3	Politics-related barriers	1	1	1	1	1	1	1	1	1	1	0	0	0	10
Inter-organisational barriers	4	Leadership-related barriers	0	0	0	1	1	1	1	1	1	1	1	1	1	10
	5	Organisational interest-related barriers	0	0	0	1	1	1	0	0	0	0	1	1	1	6
	6	Communication and coordination-related barriers	0	0	0	0	1	1	1	0	0	0	0	1	1	5
	7	Collaboration processes-related barriers	0	0	0	0	1	1	1	0	0	0	0	0	0	3
Intra-organisational barriers	8	Organisational structure-related barriers	0	0	0	0	0	1	1	1	1	0	1	0	1	6
	9	Organisational culture-related barriers	0	0	0	0	1	1	1	0	1	1	1	1	1	8
	10	Organisational resource capacity-related barriers	0	0	0	0	0	1	1	1	0	1	1	0	1	6
People-related barriers	11	Intrinsic barriers	0	0	0	0	0	1	1	0	1	1	1	0	1	6
	12	Profession-related barriers	0	0	0	1	1	1	1	0	0	0	1	1	1	7
	13	Knowledge-related barriers	0	0	0	1	1	1	1	1	1	1	1	1	1	10
		Dependence power	2	3	1	7	10	13	12	6	8	8	8	8	10	

Table B4. Final reachability matrix.

Barrier Categories	Barrier Themes ID	Barriers to Stakeholder Collaboration in Risk-Sensitive Urban Planning	External barriers			Inter-organisational barriers				Intra-organisational barriers			People-related barriers			Driving Power
			Policies and Legislation-Related	Governance-Related Barriers	Politics-Related Barriers	Leadership-Related Barriers	Organisational Interest-Related Barriers	Communication and Coordination-Related Collaboration	Collaboration Processes-Related Organisational	Organisational Structure-Related	Organisational Culture-Related Barriers	Organisational Resource Capacity-Related	Intrinsic Barriers	Profession-Related Barriers	Knowledge-Related Barriers	
External barriers	1	Policies and legislation-related barriers	1	1	0	1	1	1	1	1*	1	1	1*	1	1*	12

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			1	2	3	4	5	6	7	8	9	10	11	12	13	Driving power
	2	Governance-related barriers	0	1	0	1	1	1	1	1	1	1	1*	1	1	11
	3	Politics-related barriers	1	1	1	1	1	1	1	1	1	1	1*	1*	1*	13
Inter-organisational barriers	4	Leadership-related barriers	0	0	0	1	1	1	1	1	1	1	1	1	1	10
Inter-organisational barriers	5	Organisational interest-related barriers	0	0	0	1	1	1	1*	1*	1*	1*	1	1	1	10
Inter-organisational barriers	6	Communication and coordination-related barriers	0	0	0	1*	1	1	1	1*	1*	1*	1*	1	1	10
Inter-organisational barriers	7	Collaboration processes-related barriers	0	0	0	1*	1	1	1	1*	1*	1*	1*	1*	1*	10
Intra-organisational barriers	8	Organisational structure-related barriers	0	0	0	1*	1*	1	1	1	1	1*	1	1*	1	10
Intra-organisational barriers	9	Organisational culture-related barriers	0	0	0	1*	1	1	1	1*	1	1	1	1	1	10
Intra-organisational barriers	10	Organisational resource capacity-related barriers	0	0	0	1*	1*	1	1	1	1*	1	1	1*	1	10
People-related barriers	11	Intrinsic barriers	0	0	0	1*	1*	1	1	1*	1	1	1	1*	1	10
People-related barriers	12	Profession-related barriers	0	0	0	1	1	1	1	1*	1*	1*	1	1	1	10
People-related barriers	13	Knowledge-related barriers	0	0	0	1	1	1	1	1	1	1	1	1	1	10
Dependence power			2	3	1	13	13	13	13	13	13	13	13	13	13	

MICMAC Analysis—Classification of Barrier Groups Based on Their Driving and Dependence Power

The final reachability matrix was converted to a conical matrix which calculates the total driving power and dependence power for each barrier group (Table B4). Thus, these barrier groups can be classified into four clusters based on their driving and dependence power (Figure B2). Cluster 1 consists of autonomous barriers with weak driving power and weak dependence power, and these barriers can be considered as less influential on other barriers and have a low chance of being influenced upon. Cluster 2 consists of dependence barriers that have high dependence power and weak driving power. In our analysis, none of the barriers fell into these two clusters. Cluster 3 consists of linkage barriers that have high driving power and high dependence power (e.g., leadership, communication and coordination, knowledge, competition and different interests, personal intrinsic barriers, profession-related barriers, organisational structure, organisational culture, organisational resource capacity, and collaboration process). Since these are linkage barriers, the elimination of one barrier in this group will help to remove or lower the other barriers in the same cluster as well. Finally, cluster 4 consists of independent

barriers with high driving power and less dependence power (e.g., politics, policies and legislation, governance). The removal or lowering of these barriers, which have high driving power, can have a significant impact on the removal or lowering of the barriers in the other three clusters.

Figure B2. MICMAC analysis of barriers' themes.

Relationship Diagram of the Barriers to Stakeholder Collaboration in RSUP

Figure B3 was developed to show the relationships among the barrier groups. According to the diagram, political barriers, policies and legislation-related barriers, and governance-related barriers are the most influential barriers in the hierarchy due to their high driving power and low dependence power. Hence, these barriers are identified as the most prominent barriers to stakeholder collaboration in risk-sensitive urban planning. The elimination of these barriers will help to avoid forming other low-level barriers due to their driving power.

Figure B3. Hierarchical arrangement of barriers based on their interdependency.

Appendix C: Newspaper articles that discuss the huge climate induced natural disaster events in Sri Lanka over the past decade.

C-1: Disaster Events reported in 2021.

Figure C-1-1: Flood event in November 2021 (Source: Daily news,2021)

The monsoon rains which lashed the country during the past few days has claimed at least six lives and affected thousands of families. Here a woman in Mabima, Kaduwela tries to turn out a raft to tide over the situation. Pic: Sulochana Gamage

At least six persons were killed and seven others including a 10-year-old boy were reported missing and over 130,000 people have been affected as inclement weather swept through many parts of the country during the past few days, police and relief officials said yesterday.

FigureC-1-2: Flood event in June 2021 (Source: Sunday observer ,2021)

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News

Landslide warnings continue to be in place for many areas

By Jayani Madawala
View(s): 281

With the floods receding, and other risks posed by the torrential rains fading, people evacuated from high-risk zones are slowly returning home. About 22 persons were killed in the recent floods and landslides, and over 250,000 affected.

The Ratnapura, Galle, Colombo, Kalutara and Kegalle Districts were the worst affected.

Assistant Director – Disaster Management Centre, Kegalle, Anushka Chamila said in that district, where the highest number of casualties (6 deaths) were reported due to landslides, that they were conducting ground inspections. Landslides caused by the recent rains are being identified and marked.

The landslide early warning red alert issued for the Warakapola Divisional Secretariat in the Kegalle District was extended by the National Building Research Organisation.

Meanwhile, Level 2 landslide warnings were issued for Ratnapura, Kandy, Nuwara Eliya, Galle, Kalutara, Kegalle, Colombo, and the public were advised to be watchful of possible slope failures, rock falls, cutting failures, and ground subsidence, following continuous rain in these areas.

Senior Scientist at the National Building Research Organisation (NBRO), Dr Wasantha Senadeera said: "As the Met Department predicted that a number of areas around the country could experience heavy rainfall, we have extended the red alerts issued.

Inundated lives Pix by Akila Jayawardana

Figure C-1-3: Land slide event in 2021 (Source: The Sunday times,2021)

C-2: Disaster Event reported in 2018.

Figure C-2-1: Flood event in June 2018 - Source: Daily news

C-3: Disaster Events reported in 2017.

Figure C-3-1: Flood event in July 2017 - Source: Sunday observer

Floods and landslides in Sri Lanka kill at least 150 people

Dodangoda village in Kalutara, Sri Lanka. Rainfall of at least 10cm is expected over the next day and a half. Photograph: Dinuka Liyanawatte/Reuters

Torrential rains and mudslides have displaced more than 100,000 Sri Lankans, with more extreme weather expected

Landslides and floods in Sri Lanka have killed at least 151 people and the country faces the risk of more mudslides as torrential rains continue.

More than 100 people are still missing after the worst rains in the Indian Ocean island since 2003. The state-run National Building Research Organization warned people in seven out of the country's 25 districts on Sunday to evacuate from unstable slopes if rains continued for the next 24 hours.

Most viewed

Live Russia-Ukraine war latest: Biden says Putin 'cannot remain in power'; US offers Ukraine further military support - live

Russian soldiers release Ukraine town's mayor and agree to leave after protests

Figure C-3-2: Flood event 2017 (Source- The guardian,2017)

Sri Lanka landslides and rain kill 37 people with over 150 still missing

President says loss of life is devastating after flooding forces more than 137,000 people from their homes

📷 Sri Lankan military rescuers respond to a landslide in Bulathkohupitiya. Photograph: AFP/Getty Images

The death toll from three days of torrential rain and landslides in Sri Lanka has risen to 37, with more than 150 people missing and rescuers still pulling bodies from the mud.

Figure C-4-1 Land slide and flood event in 2016 (Source: The Guardian)

NDTV

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Home > World > Over 60,000 People Affected By Sri Lanka Flash Floods

🕐 This Article is From Dec 24, 2018

Over 60,000 People Affected By Sri Lanka Flash Floods

Over 60,000 people have been affected by flash floods and heavy winds in Sri Lanka's northern part after days of heavy rains, officials said on Monday.

World | Indo-Asian News Service | Updated: December 24, 2018 4:53 pm IST

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Image credit: istockphoto.com/yogesh_more

The Meteorology Department warned of more rains in the north, east. (Representational)

Figure C-4-2: Flood event in 2016: NDTV

C-5: Disaster Events Reported in 2010

Figure C-5-1: Flood event in 2010: CNN news

Appendix D: Risk-sensitive urban planning and development related legislations and policies in Sri Lanka

This section discusses the key legislations and policies related to risk-sensitive urban planning and development to understand the governance mechanisms and process of RSUP, including the key stakeholders and their powers.

D-1: Laws and policies related to the urban development sector.

D-1-1: Housing and town improvement (H&TI) ordinance of 1915

In 1915, when Sri Lanka was a British colony, the Housing and Town Improvement Ordinance was enacted. This ordinance aimed to provide better housing and improve the towns by overcoming existing unsanitary conditions and congested town settings with overcrowded people. Moreover, this ordinance empowered the local authorities, such as municipal councils, urban and town councils, and delegated powers to implement the ordinance (Kumara S.Y.G.I.., n.d.).

This ordinance provided the power to the local government to control urban development in terms of preventing and providing a remedy for unsanitary environmental conditions. The mayor or chairperson is empowered to take this responsibility. These powers include building construction and demolition, approval for alterations, an inspection of building operations, demarcation of street lines, developing properties setting apart streets and back lanes, demarcation of public streets according to standards presented in the ordinance schedule, and construction of private streets.

Local authorities were given powers to acquire any land or building, or part of land or building considered necessary for the purpose of the ordinance, with compensation. According to the ordinance, the implementation responsibilities have been given to the local Authority, but the political Authority may not appear to control or prevent any activity by force in the general context (Kumara S.Y.G.I.., n.d.). This ordinance applies to the basic level of the city but does not have powers to manage, develop and control rapid development or modern city context (Kumara S.Y.G.I.., n.d.). Even though this ordinance focuses on providing the remedy for unsafe building construction in urban areas in Sri Lanka, this

ordinance does not encourage or consider the collaborative, sustainable urban development concept with climate-induced disaster risk reduction.

D-1-2: Town and country planning ordinance No. 13 of 1946

This ordinance is developed for the purpose of planning in both town and country as defined in the ordinance as follows:

"An ordinance is to authorise the making of schemes with respect to the planning and development of land in Ceylon, to provide for the protection of buildings and objects of interest or beauty to facilitate the acquisition of land for the purpose of giving effects to such schemes and to provide for matters incidental to or connected with the matters aforesaid."

To serve according to the ordinance, a national consultative body known as the Central Planning Commission was established to advise the minister responsible for planning and developing land in the country. Usually, local authorities are unable to plan for the town's development due to a lack of resources and technical capacities. Especially towns which are historically, religiously, and architecturally famous. According to this ordinance, the Minister in charge of town and country planning can declare the town area as a special development area with special required plans. Due to the limitations of financial resources and manpower, many local authorities had been unable to prepare Town Planning Schemes for their respective towns. Some towns in the country were important due to their history and location of architecturally prominent and important religious structures. Under this law, the Minister in charge of the subject of town and country planning can declare such towns or areas to be developed as special projects or planned towns. The Department plans and implements new town development in collaboration with the respective local Authority.

The ordinance had the important feature that the urban local authorities would continue as the Planning and executive authority for planning schemes. This ordinance aimed at the capacity improvement of urban local authorities to prepare planning schemes and implement of prevent and remedial measures according to the Housing and town improvement ordinance 1915 (Kumara S.Y.G.I.., n.d.). Furthermore, this ordinance led to the creation of the Town and Country Planning Department and the appointment of the Government Town Planner as the head of the department. According to the Urban Council Ordinance, the Department of Town and country Planning's function is to prepare planning schemes and provide technical assistance to municipalities and towns in developing town planning schemes (Kumara S.Y.G.I.., n.d.). This ordinance has been amended as follows: No.9 of 1950; No.29 of 1953;

no 10 of 1955; No.22 of 1955; No.49 of 2000 due to the purpose

of practice, implementation of policy, and budget allocation (Kumara S.Y.G.I.., n.d.). After the establishment of UDA, UDA is responsible for the development of urban plans, and the department of national physical Planning is responsible for preparing national physical plans and development plans for non-declared areas by UDA.

D-1-3: Act no 49 of 2000, the amendment of the town and country planning ordinance.
According to Act No.49 of 2000, the Town and Country Planning Ordinance No.13 of 1946 was amended. Section 11. Amendment in section 24 of the principal ordinance facilitates the bottom-up approach by allowing public participation in the physical plan. According to this law, section 16 – amendment in UDA law, UDA has to coordinate, develop, and control the development scheme and proceed with their works subject to the guideline of the national physical plan.

- *Establishment of National physical plan council was established under this act.*

The council's functions are to approve, with or without modification, the national physical plan policy and the draft national physical plan submitted by the inter-ministerial coordinating committee.; request the national physical plan department to ensure the fund from its annual budget for implementing the plan; give directions to the inter-ministerial coordinating committee about the implementation timeline.

- *Establishment of the inter-ministerial committee*

This committee is responsible for submitting a national physical plan to the national physical planning council. If this plan affects the interest of any ministries not included in the committee, it can request the secretary of that particular ministry to present and vote at the committee meeting. The committee will also consider this request in their meeting with the already-appointed members.

The functions of the committee include cause of the draft national policy plan prepared by the Director General of the national physical plan and revision or update in the plan from time to time according to necessity, asking the modification and reviewing the draft policy plan before submitting to the national physical plan council, and advise council regarding the declaration of any subjected area, and implement the decision from the council. This committee provides an opportunity to collaborate on national physical Planning,

- *Establishment of the Department of national physical plan*

The National Physical Planning Department (NPPD) is the successor to the Town and Country Planning Department, which was established under the provisions of the Town and Country Planning Ordinance No.13 of 1946. The amendment to the Ordinance by Act No.49 of 2000 amplified the scope of the provision in the original enactment to formulate a National Physical Planning Policy and prepare the National Physical Plan. The change of the title of the department came in this light.

Vision of the department is to formulate National Physical Planning Policies, Plans and Strategies and to ensure and monitor the implementation of such National Policies and Plans through Regional and Local Plans with the object of promoting and regulating integrated Planning of economic, social, physical, and environmental aspects of land and territorial waters of Sri Lanka.

The department includes functions such as: formulating a national physical plan policy and preparing a national physical plan; Preparing physical planning guidelines for regional and local physical planning authorities; Assist provincial council in preparing a regional physical plan; Making recommendations to the inter-ministerial committee on plans in accordance with national physical plan policy for the submission to council; Review and examine the national physical policy plan where necessary to recommend the coordination committee; Monitor and execute the national physical plan sanctioned by the council; Assist the council and committee in all activities upon their request.

The powers are given to the department to perform the functions as follow: carry out surveys, investigation, research, and studies necessary for the functions related to the national physical planning policies; get an opinion from experts, professional, general public regarding the national physical plan; establish connections with the international agencies has a similar function to the national physical planning department; establish and maintain information data bank national physical plan and regional physical plan; involve consultation with a pool of experts in all aspects in terms of developing a national physical plan; to call and obtain all relevant information regarding the national physical plan from all ministries or all relevant public-private organisations; adopt all measures which are necessary to prepare and perform national physical plan.

- *Technical advisory committee*

This committee is known as the advisory committee and helps in the national physical plan development.

Representative from Institute of town and country planning; institute of Engineers; survey institute; RDA nominated by the minister in charge of subject of transport; land use policy planning division nominated by the minister in charge of subject of lands; CEB nominated by the minister in charge subject of power; ministry of finance nominated by the minister in charge subject of finance; ministry of planning nominated by the minister in charge subject of planning; one experience person in the physical planning; one experience person in water resource.

National Physical planning council

Inter- ministerial coordination committee

Department of national physical plan

Technical advisory committee

Regional planning Committee

1. Chairman (president)
2. Vice chairman (minister in charge of the national physical planning- Ministry of urban development, 2022)
3. Secretary (secretary of the ministry in charge of the national physical planning- Ministry of urban development, 2022)
4. Ministers in charge for the following subjects: economic planning, financial, land, agriculture, industry, housing, urban development, transports, highway, ports, civil aviation, coast conservation, environment, forestry, tourism, irrigation, power, culture, provincial councils, plan implementation, health.
5. Chief ministers of all provinces.

1. Chief secretary of the provincial council – Chairman
2. A representative from local Authority
3. The district secretariats of the province
4. A representative of the UDA and RDA
5. A officer does not belong to the rank of assistance superintend of the survey from the survey department.
6. not more than three persons nominated by the minister who have knowledge in economics, environment, physical planning, administration, or any other field related to physical planning.

1. Chairman (secretary of the ministry in charge of the national physical planning- Ministry of urban development, 2022)
2. Secretariats of the ministries in charge for the following subjects: physical planning, economic planning, finance, land, agriculture, industry, housing, transport, highways, ports, civil aviation, coast conservation, environment, forestry, tourism, irrigation, power, home affairs, provincial councils, plan implementation, culture, fisheries, Mahaweli development, plantation, construction.
3. Chief secretaries of all provinces
4. Director general national physical planning
5. Director general of UDA
6. Director general of BOI

Figure D1-1: National physical planning administration in Sri Lanka

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D-1-4: National physical plan policy (2017-2050)

The national physical plan policy is formed by the National physical planning department, Sri Lanka, with the support of the technical advisory committee and stakeholders' involvement. One of the long-term targets of the policy is sustainable urbanisation. One of the expectations of the national physical planning council is to provide attractive, serviceable areas of the island that are free from natural hazards and less vulnerable to disasters and climate change impacts.

This national physical plan needs to be understood and implemented at the provincial level by the provincial Planning and implementing authorities and at the local level by various national and regional level agencies and local authorities.

According to the national physical plan policy, all proposed prepared plans for the local area developments by the urban development authority or any development agencies authorised to do such plans shall strictly adhere to the national physical plan. Suppose there is any deviation required for any important reason. In that case, it will be reviewed by the Inter-Ministerial Coordination Committee (stated in Section 2.3.3 of the national physical plan and Policy 2017-2050) and approved by the National Physical Planning Council (stated in Section 6.3.1 of the national physical plan and Policy 2017-2050).

D-1-5: The urban development authority Act of 1978, No 41

Power and functions provided to the local authorities and the Department of Town and Country Planning are insufficient to handle the complexity and issues of rapid urbanisation in Sri Lanka after the independence. Therefore, the Urban development authority was established in 1978 under the law of urban development authority act of 1978 (Kumara S.Y.G.I.., n.d.). According to the amendment in the urban development authority act of 1982, the urban development authority mandatorily needs to prepare the development plan for the areas declared under the act, and the urban development authority is an authorised agency to control physical development in those areas. UDA has declared all Municipal Councils, all Urban Councils and 207 Pradeshiya Sabha's out of 276 as Urban Development Areas (UDA, 2022).

UDA has the Authority to declare the area for development in the country and establish an advisory committee to provide advice to the plan for the declared areas. According to Act no 4 of 1982, a planning committee has been appointed to advise UDA in terms of the Planning

and implementation of the development plan. According to section 8. c of act 41 of 1978 UDA has the power to call upon government agencies to consult with the Authority for any development activities. Still, local authorities have the Authority to conduct urban development activities in their area under the housing and town improvement ordinance and town and country planning ordinance without conflicting UDA activities, and UDA has empowered local authorities to implement their activities. If any conflicting activities take place between the local authorities and UDA, The UDA will take the Authority under the urban development act.

D-1-6: Road development authority act - No. 73 of 1981

Under this act Road development authority and road development advisory council are established with the responsibility and powers includes: to declare an area as a development area shall define that area by setting out the metes and bounds of such area; to prepare at the request of any Government agency road development projects and planning schemes on behalf of such agency and to co-ordinate with, or assist in, the execution of such projects or schemes; to provide road planning services for the benefit of Government agencies or other persons in such areas.   Moreover, when implementing any programme or development work relating to road planning and road development within any development area, it shall be the duty of the Authority to implement such programme or development work in consultation with any Government department, public corporation, or local Authority.

The functions of these councils are to advise the minister on policy and measures on road research, road planning and road development; and to advise the Minister or the Authority, as the case may be, on any matter relating to the exercise, performance or discharge of any power, duty or function of the Authority, that may be referred to the council by the Minister or the Authority.

D-1-7: An act to amend the Sri Lanka land reclamation and development corporation act, no. 15 of 1968

The Colombo District Low-Lying Areas Reclamation Development Board was established under Act No. 15 of 1968. The objectives of this agency are to reclaim and develop marshy and low-lying areas and retain the custody management and control of such vested lands. The Organization was changed to Sri Lanka Land Reclamation & Development Corporation (SLLRDC) according to Act No. 52 of 1982 to the Colombo District (low-lying areas)

Reclamation and Development Board Act No. 15 of 1968. The original act has gone through several amendments, such as Act No. 52 of 1982 and Act No. 35 of 2006.

The Sri Lanka Land Reclamation & Development Corporation (SLLRDC) is one of the agencies under the Ministry of Urban Development and Sacred Area Development responsible for the reclamation and development of low-lying marshy areas while recognising the need to pressure adequate retention areas for flood waters. Moreover, the existing scope has been extended, including the constancy and construction work in the engineering field. Moreover, this corporation also undertakes the reclamation and development of lands on a commercial basis to solve the problem of the lack of developed lands essential for development programs.

As per the recent amendment to the act, by Act No. 35 of 2006, the corporation will be empowered to take legal action against unauthorised reclamation activities and pollution of water bodies.

D-1-8:   Sri Lanka sustainable development act, No. 19 of 2017.

This act provides the establishment of the sustainable development council that includes ex officio members; the secretary to the president; the secretary to the Ministry of the Minister assigned the subject of Sustainable Development; the secretary to the Ministry of the Minister assigned the subject of National Planning or his nominee; the secretary to the Ministry of the Minister assigned the subject of environment or his nominee; and other eight members.

Provide the legal framework for developing and implementing such National Policy and Strategy on Sustainable Development; promote the integration and maintain the equipoise of environmental, economic, and social factors in the making of all decisions by the government; and promote strategies to overcome them.

Under section 10, the council's powers include: facilitating the achievement of national, regional, and international commitments relating to sustainable development; to coordinating with the project-approving agencies to achieve the seventeen sustainable development goals.

To facilitate the achievement of national, regional and international commitments relating to sustainable development; to formulate National Policy and Strategy on Sustainable Development in consultation and with the concurrence of all relevant parties and nine Provincial Councils and place before the Cabinet of Ministers for approval; to review and update the National Policy and Strategy on Sustainable Development periodically as and

when the Cabinet of Ministers so decides; to facilitate and monitor the mechanisms and progress review processes of the implementation of such National Policy and Strategy on Sustainable Development; to borrow such sums of money as may be necessary for discharging of its functions; to identify, introduce and follow up the mechanisms, audit mechanisms and all other matters relating to sustainable development; to promote sustainable development including research and development, innovation, education awareness and eradication of poverty.

Therefore, it's clear that the sustainable council in Sri Lanka is responsible for implementing sustainable development goals and monitoring and evaluating performance.

D-1-9: National land use policy of 2009

Sri Lankan national land use policy 2009 focuses on proper land use planning to avoid disasters in urban development. The policy goal stated, "Rational utilisation of lands as a resource, in the national interest, in order to ensure food security, a high quality of life, equity and ecological sustainability".

Several objectives were designed to achieve the goal, including two DRR focus as follows: Take steps to minimise the vulnerability of land to natural and human-induced hazards; Promote land uses that minimise environmental hazard. It is important to note that a lack of objectives is stated, especially for climate change.

D-1-10: Local government policy

Local authorities (Municipal councils. Urban councils, and Predesiya Saba) come under the local government in Sri Lankan administrative system. These local authorities are the key stakeholders in terms of urban development activities and decision-making on development. Therefore, the policy for local government in terms of collaboration is discussed below.

This policy focuses mainly on inter-agency collaboration and public participation. Under sections 4.6.1.1 and 4.6.1.2 under inter-agency coordination are provisions for stimulating participatory mechanisms for local authorities to realise the highest possible level of cooperation and coordination with relevant ministers and agencies. Furthermore, it emphasises the cross-sectoral collaboration among local government and required institutions.

Particularly, under section 4.1.4, as a planning authority, some provisions are given to the local government regarding collaboration. The policy ensures the partnership of the local

Authority in divisional development planning and creates a common environment for well-coordinated integrated rural and divisional Planning.

The policy also pays special attention to bringing the Divisional Administration and the local Authority to a common platform of Planning and coordination by developing appropriate institutional space and mechanisms for harmonious co-existence. The policy envisages that all major partners in local development will coherently integrate their activities under the coordination of the Local Authority.

Furthermore, this policy emphasises the importance of ensuring the implementation of a national physical plan and coordinating with UDA for the urban areas for the development plans and activities. Furthermore, it is stated that local authorities need to consider the physical environment and disaster risk reduction in the Planning in the way of obtaining technical guidance and assistance from related Ministries and allied technical authorities; the local Authority shall identify the disaster-prone areas, potential disaster risks and hazards and formulate a comprehensive, area-specific plan of action based on locally Identified strategies and rapid response systems, having regard to the policy and operational guidelines issued for the purpose, as per the Disaster Management Act.

D-2: Laws and policies related to disaster management.

D-2-1: Flood Protection Ordinance created in 1924.

The Flood Protection Ordinance was created in 1924 to protect the areas subject to damage from floods. According to this act, the irrigation department director is responsible for declaring the flood area and taking action to protect them by initiating relevant schemes. Under this ordinance, a flood authority exists in all identified flood areas to maintain dams, drainage trenches, outfalls and other works required to protect the area from flood risk. Moreover, Inspecting, Approving, rejecting, or directing the development schemes proposed in flood areas is the responsibility of the irrigation department to avoid the risk of flood.

D-2-2: Disaster management act no 13 of 2005

Under the disaster management act of 2005, the National Disaster Management Council (NDMC) and Disaster management centre (DMC) are formed. NDMC functions include the preparedness of disaster management plan; prevention and mitigation of disasters; direct coordination and monitor the activities of DMC; facilitating liaison with organisations and persons pursuing hazard, vulnerability and risk reduction studies and implementing action

programmes and commissioning such studies and action programmes; to initiate programmes relating to prevention and mitigation of disaster and the provision of relief, rehabilitation and reconstruction. Functions of the DMC are assisting the Council in the preparation of the National Disaster Management Plan and the National Emergency Operation Plan and proposals for upgrading the same when it becomes necessary; issuing instructions and guidelines to appropriate organisations, non-governmental organisations, district secretaries and divisional secretaries on activities relating to disaster management and initiating and implementing work programmes in coordination with such organisations and secretaries. In addition to that. The technical advisory committee consists of experts appointed by the NDMC to assist the NDMC and DMC in discharging their functions.

D-2-3: National disaster management policy (draft published – not 2010)

The aim of the National Disaster Management Policy is to establish and maintain sustainable mechanisms, systems, structures, programs, resources, capabilities and guiding principles for disaster risk reduction, management, mitigation, preparing for and responding to disasters and threats of disasters in Sri Lanka in order to save lives and property, minimise harm and ensure the physical and psychological health of the survivors, minimise disruption of economic activity and damage to the environment and to ensure the sustainability of development; immediate recovery of essential services in case of occurrence of a disaster; and medium and longer-term reconstruction and rehabilitation to a higher standard than before, in collaboration with all relevant stakeholders.

The policy developed for the purpose includes a clear understanding of the roles and responsibilities of all stakeholders concerned with disaster management so that disasters can be managed more effectively. One of the policy priorities is, during normal times, the highest priority in disaster management will be accorded to preparedness to ensure the safety of the people, mitigation, prevention, and integration in development to the best possible extent to reduce risk and ensure sustainable development in the country.

Accordingly, the principle guidance of policy includes: (1) ensuring inter-ministerial, inter-sectoral and inter-agency coordinating mechanisms for all disaster management activities; (2) decentralising disaster risk management activities with a delegation of activities, resources and funds to provincial councils; local authorities; District Secretariats, Divisional Secretariats, Grama Niladhari and Village Organisations; (3) harnessing, integrating, and coordinating activities of all stakeholders including NGOs, private sector and civil society

towards a concerted effort with minimal duplication; (4) ensuring the provision of safe housing (temporary or/and permanent), to those in IDP camps, if necessary, relocating them from original locations within minimum possible time.

Moreover, the main concerns under these policies are environment and development, including infrastructure with the integration of disaster risk reduction in development and in the environmental management process. Disaster risk management concerns and activities of the following key sectors of development will be captured with the Total Disaster Risk Management (TDRM). (Physical Planning, Urban Development, Forestry, Lands, Agriculture, Land Development, Mining, Irrigation, Health, Sanitation, Education, Housing, Drinking Water Supply, Roads, Environment, Coastal and Marine Area Management, Tourism, Industry, Fisheries and aquatic resources, Power and Transport.)

In addition to that, the policy provides some of the strategies according to the plan. Such as: (1) mitigation for loss reduction and integration in development DMC will work with relevant agencies and take measures for long term risk reduction by adopting suitable mitigation measures - Safe Building Construction; Guidelines and Building Codes, and making their use mandatory by inclusion in planning and development regulations; (2) Integration of disaster consideration in land-use planning/zoning through Land Use Policy Planning Division (LUPPD) - Integration in Land Use Zoning and Development Plans of LAs making the process mandatory through Urban Development Authority (UDA) regulations; (3) Integration of DRR in Regional Structure Plans by National Physical Planning Department (NPPD); (4) Integration of DRR into the National Development Process and the National Plan - Inclusion of Disaster Impact Assessment (DIA) in the Environment Impact Assessment (EIA) process of the Central Environmental Authority (CEA) - Imposing regulations against misuse of natural resources by individuals / agencies leading to triggering of hazards/disasters - Integration of mitigation during reconstruction after a disaster.

Furthermore, after checking the validity, this policy has a provision for updating the disaster management policy in 10 years if required.

D-3: Laws and policies related to climate change.

D-3-1: National climate change policy 2016

According to the global policies, Sri Lanka will actively involve in the global efforts to minimise greenhouse gas emissions within the framework of sustainable development and principles enshrined in the United Nations Framework Convention on Climate Change (UNFCCC), and its Kyoto Protocol (KP). Under this context, the National climate change policy for Sri Lanka was developed in 2012 with the goal of "Adaptation to and mitigation of climate change impacts within the framework of sustainable development" with the objective including: Taking adaptive measures to avoid/minimise adverse impacts of climate change to the people, their livelihoods and ecosystems; Mitigate greenhouse gas emissions in the path of sustainable development; Enhance knowledge on the multifaceted issues related to climate change in the society and build their capacity to make prudent choices in decision making; Develop the country's capacity to address the impacts of climate change effectively and efficiently; Mainstream and integrate climate change issues in the national development process.

The policy statements contribute to risk-sensitive urban Planning and development as follows: (1) Develop strategies and mechanisms to prevent/mitigate and manage disasters caused by climate change and protect the communities, ecosystems and natural and built environment; (2) Strengthen legal and regulatory mechanisms to take effective measures to meet climate change challenges by integrating legal requirements into the respective sectors that ensure equitable enforcement of these regulatory provisions; (3) develop and strength inter-institutional coordination and collaborating, and monitoring mechanism in all level related to climate change activities; and (4) Foster good governance practices at all levels to improve mutual understanding and trust among stakeholders to ensure accountability of implementing of the policy.

D-3-2: Nationally determined contributions 2021

The Ministry of the Environment has published and presented the Updated Nationally Determined Contributions in 2021 to the United Nations framework convention on climate change (UNFCCC) as a part of the Paris Agreement. In that publication, section 5.1.8 has four nationally determined contributions that empathise the importance of mainstream disaster risk reduction and climate change adaptation or mitigation in the urban planning sector. Such as (1) enhancing the resilience of human settlements and infrastructure through

mainstreaming climate change adaptation into national, sub-national and local level physical planning; (2) incorporating Disaster Risk Reduction (DRR) into the urban and human settlement planning/implementation in areas of high vulnerability to climate change risks; (3) establish a climate-resilient built environment; (4) minimise the impact of slow onset events (sea-level rise) on coastal settlements and infrastructure. Among them, the first and second are targeted for 2025, and the balance two are targeted for 2030.

D-4: Laws and policies related to environment.

D-4-1: Coast conservation act No 57 of 1981

Under this act, the director of cost conservation's responsibilities includes the formulation and execution of schemes of work for coast conservation within the Coastal Zone, and for the conduct of research, in collaboration with other departments, agencies and institutions for the purpose of coast conservation.

This act provides provisions for preparing the coastal zone management plan to regulate and control development activities within the coastal zones. Moreover, the coast conservation advisory committee was established under this act, and the function of the council covers: advising the minister on all development activities proposed to be commenced in the coastal zone, reviewing the environmental impact assessments furnished to the director in connection with applications for permits under section 14, and make comments if any, thereon to the director; inform the director of the need for schemes of work within the coastal zone, whenever such need arises; and advise the minister or the director on any other matter relating to coast conservation that may be referred to the council by the minister or the director.

The coast conservation department is responsible for the environmental impact assessment for all development proposals within the coastal zone. In other areas, the National Environmental Authority is responsible for the environmental impact assessment.

D-4-2: National environmental act 1980 (No. 47 of 1980).

Under this law, the central environmental Authority (CEA) and the environmental council have been appointed. Moreover, a district environmental authority was also established in each district to follow the functions includes as follows:

1. To recommend to the Minister national environmental policy and criteria for the protection of any portion of the environment with respect to the uses and values, whether tangible or intangible, to be protected and the quality to be maintained. The extent to which the discharge of wastes may be permitted without detriment to the quality of the environment and long-range development uses and Planning, and any other factors relating to the protection and management of the environment.
2. To conduct, promote and coordinate research in relation to any aspect of environmental degradation or the prevention thereof and to develop criteria for the protection and improvement of the environment.
3. To publish reports and information with respect to any aspects of environmental protection and management.
4. To undertake investigations and inspections to ensure compliance with this act and to investigate complaints relating to noncompliance with any of its provisions.
5. To report to the minister upon matters concerning the protection and management of the environment and upon any amendments it thinks desirable in existing legislation concerning any portion of the environment. and upon any matters referred to by the minister.
6. To establish and maintain liaison with other countries and international organisations with respect to environmental protection and management.
7. To promote, encourage, co-ordinate and carry out long-range environmental protection and management planning.

Under section 15 of the act, land use management, the Authority has functions such as consulate with the council with the assistance of the ministry in a subject of Lands, formulate, and recommend to the minister a land use scheme in terms of adaptability of land for community development, agriculture, industry or commerce; method for exercising control by the government over the use of land in areas where environmental control is deemed necessary; and a policy for influencing the location of new areas for the resettlement of persons and the methods for assuring appropriate controls over the use of land in and around such areas.

According to the national environmental (Amendment) Act, No. 56 of 1988 (Certified on 12 December 1988) amended in 1988. Environmental impact assessment is necessary for large-scale projects and projects in a sensitive area. Central Environmental Authority (CEA) is

responsible for these tests, excluding the coastal area where Coast Conservation Department is responsible for the test.

Only ten types of areas are declared under the control of the Central Environmental Authority, and their actions are limited to these areas.

01.   Ecosystems with unique characters. (E.g., The areas with high biodiversity areas consisting of endemic or threatened floral and faunal species.)

02.   Places with landscape or geologically or geographically important and with aesthetic value. (e.g., Waterfalls, hot water springs, caves, including limestone)

03.   Hydrologically important places. (e.g., Wetlands, catchment areas, important waterways, lakes)

04.   Landscapes with tourist attractions. (e.g., Beaches, mountain ranges, rivers, viewpoints)

05.   Feckless lands with a high risk of accidents. (e.g. Landslide prone areas, areas which have a high tendency to erode)

06.   Areas/ landscapes which are scientifically important.

07.   Areas important for flood retention.

08.   Buffer Zones of environmentally important areas declared under other Acts and Ordinances.

09.   Areas which are identified to be protected/ Conserved by Master Plans of other institutes/ areas which have been recommended to be protected by other policies or scientific studies.

10.   Areas which have been identified to protect/conserve under other programmes or identified by scientific studies.

D-4-3: National environmental policy 2003

National environmental policy principle includes having effective governance arrangement that will be ensured through the decentralisation of environmental management services to the maximum possible extent. Accordingly, the policy statement includes having an institutional framework for comprehensive environmental management that will be strengthened through capacity-building, legislative instruments and improved interinstitutional coordination and linkages; Environmental management will be through

participatory, transparent, predictable and accountable decision-making processes at all levels; Environmental management systems will be encouraged to be flexible so as to adapt to changing situations (e.g. climate change, invasive species and living genetically-modified organisms) and adopt the Precautionary Principle; Responsible public-private and community partnerships and linkages will be promoted at all levels of environmental management and conservation;. Education at all levels, together with research, will be promoted in a manner designed to increase the level of awareness of all aspects of the environment and its care and management among all stakeholders.

Moreover, one of the key concepts in the policy is having sustainable development National development that meets the needs and aspirations of the present generation without compromising the ability to meet those of future generations, which have as much right to nature and natural resources as we do.

D-4-4: National wetland policy 2006

This policy insists on protecting the wetland when designing and implementing all upcoming development projects with the participation of all relevant stakeholders, including the community. Wetland management under this policy includes sustainable use and equitable benefit sharing, habitat conservation, and integrated management at all stages will involve participatory and collaborative processes.

According to the police following arrangements will be made to ensure sustainable development in the wetland area. According to section 5.2.1, Local level Wetland Management Committees will be established under the provisions of the National Environment Act, with the assistance of government agencies responsible for wetlands, and divisional, district and provincial level committees will be established as appropriate to facilitate these committees.

According to section 5.2.2, A multi-stakeholder National Wetland Steering Committee will be established to advise on wetland issues, and the ministry will establish a National Wetland Management Unit in charge of the subject of the environment to oversee and facilitate policy implementation. Moreover, according to section 5.2.3, it is mentioned that existing legislation will be revised as necessary to bring it into conformity with this policy.

Appendix E: Overview of laws and policies

Table E1: Overview of the Laws and policies related to RSUD.

No	Policies and legislation	Description	UD	DM	CC	Stakeholder collaboration related provisions	Authorised organisation
Laws related to urban Planning							
1	Housing and Town Improvement (H&TI) Ordinance of 1915	This ordinance provides the power to local government to control the urban development in terms of prevent and provide remedy for insanitary conditions in the environment and unsafe building construction for urban habitants. This ordinance is applicable to the basic level of city but not having powers to manage, develop and control rapid development or modern city context.	X			-	Local Authorities (Municipal council, Urban councils, and Predesiya Sabas)
2	Town and Country Planning Ordinance No. 13 of 1946/ Act No.49 of 2000, the amendment of the Town and Country Planning Ordinance	Prepare national physical plan and physical planning guideline to regional and local physical planning authorities. Assist provincial council to prepare regional physical plan. In accordance with the Urban Council Ordinance, the department of national physical planning department function is to prepare planning schemes and to provide technical assistance to municipalities and towns amunicipalities and towns in the development of town planning schemes.	X			-	Department of national physical Planning

No	Policies and legislation	Description	UD	DM	CC	Stakeholder collaboration related provisions	Authorised organisation
	No.13 of 1946.	The Department in collaboration with the respective local authority carries out Planning and implementation of new towns development. The ordinance had the important feature that the urban local authorities would continue as the Planning and executive authority for planning schemes, and it should be aligned with the national physical plan.					
3	An act to amend the Sri Lanka land reclamation and development corporation act, no. 15 of 1968	Sri Lanka land reclamation and development corporation is established and responsible for developing marshy and low- lying areas and retaining the custody management and control of such vested lands while recognizing the need to pressure adequate retention areas for flood waters.	X	X			SLLRDC
4	The Urban Development Authority Act of 1978, No 41 and Urban Development Authority Law (amendment of 2000)	The urban development authority mandatorily needs to prepare the development plan for the areas declared under the act and urban development authority is authorised agency to control physical development in those areas. Still, local authorities have authorities to conduct urban development activities in their area under the housing and town improvement ordinance and town and country planning ordinance without conflicting UDA activities and UDA has empowered local authorities to implement their	X			According to section 8.c of the act no 41 of 1978 UDA has power to call upon any government agencies to undertake consultation with the authority for any development activities. UDA development plans will be display for the public comment or	The urban development authority.

No	Policies and legislation	Description	UD	DM	CC	Stakeholder collaboration related provisions	Authorised organisation
		activities. If any conflicting activities taking place between the local authorities and UDA, The UDA will take the authority				organizational comment for 60days.	
5	Municipal council ordinance, Urban council ordinance, Predesiya Saba ordinance	Responsible for the local area development activities. (Giving approval for all development activities (jointly work with UDA representative for the decaled urban areas only, planning for non-urban areas, if it's a urban area planning need to align with the UDA plan)	X			-	Municipal councils, Urban councils, Predesiya sabas
6	Predesiya Saba act	Construct, new road, bridge, tunnels, and other thoroughfares and modify them (e.g., expand with compensation) Permission for building construction in the area, approval from UDA if its UDA declared area and the square feet limit exceed according to the circular.	X			-	Predesiya sabas
7	Municipal council audience no 29 of 1947 and subsequent arrangement	Public heath, utilities, and throughfares, and in general managing public facilities. Permission for deindividualize property construction also.	X				Municipal council

No	Policies and legislation	Description	UD	DM	CC	Stakeholder collaboration related provisions	Authorised organisation
8	Urban council ordinance no.61 of 1939		X				Urban council
9	Land development ordinance no 19 of 1935	Responsible for grant permission for land use and land commissioner has rights to consider the special cases for the grant and he assign his duties and powers to government agent (GA) and land officers. 3 (b) for the general supervision and control of all Government Agents and land officers in the administration of State land and in the exercise and discharge of the powers and duties conferred and imposed upon them by this Ordinance.	X	-	-	-	Land commissioner General's department District secretariat (GA)
10	The condominium law Law Nos 10 of 1973 Act Nos 46 of 1982, 24 of 2003	Assist the management corporation to establish and maintain for use by owners or occupiers of such condominium parcels, facilities such as roads, access ways, lawns, gardens, parks, playgrounds and other open spaces, of to be directly involved with such activities in the event of the management corporation failing to establish and maintain such facilities. Board of management includes UDA national housing development authority. But no DMC or environmental CCS	X			-	Condominium Management Authority

No	Policies and legislation	Description	UD	DM	CC	Stakeholder collaboration related provisions	Authorised organisation
		Certification process for the condominium property first UDA approval (primary approval and local authority approval is necessary)					
11	Greater Colombo economic commission law	Acquire sell lease land for the purpose of industrial site, or use of employers for the general economic development. Layout industrial estate for sell or lease	X			No Powers under the environmental act can be exercised by this authority without consultation	BOI
12	Road development authority act - No. 73 of 1981	Declare an area as a development area shall define that area by setting out the metes and bounds of such area; to prepare at the request of any Government agency road development projects and planning schemes on behalf of such agency and to co-ordinate with, or assist in, the execution of such projects or schemes; to provide road planning services for the benefit of Government agencies or other persons in such areas	X			It shall be the duty of the Authority to implement such programme or development work in consultation with any Government department, public corporation, or local authority. Council has members from different ministries as mentioned in 3.1.5	The road development authority
13	Construction industry development act, no. 33 of 2014	The act focusses on: ensure the implementation of the National Policy on Construction (that focusses DRR and CC); promote sustainable growth of the construction industry with special attention to the design and development of energy efficient buildings and structures; promote appropriate research and dissemination and publication of research work on any matter relating to the construction industry and its development; formulate, in consultation with	X	X	X		CIDA

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No	Policies and legislation	Description	UD	DM	CC	Stakeholder collaboration related provisions	Authorised organisation
		other relevant authorities, the standards in construction industry and categorize such standards as compulsory and voluntary standards; and implement the codes of conduct, practices, procedures and processes and documentations relating to construction industry as being formulated by the Authority. There are powers dedicated to CIDA to serve the purpose including the powers: acquire in any manner and hold, take, or give on lease or hire, mortgage, pledge, sell or otherwise dispose of any movable or immovable property; to appoint, employ, remunerate officers, servants and agents for the purposes of this Act and to exercise disciplinary control over such officers, servants and agents					
14	Sri Lanka sustainable development act, no. 19 of 2017	Provide the legal framework for developing and implementing such National Policy and Strategy on Sustainable Development; to promote the integration and maintain the equipoise of environmental, economic, and social factors in the making of all decisions by government; and promote strategies to overcome them.	X	X	X		Sustainable development council
15	Mahaweli Authority of Sri Lanka Act (No. 23 of 1979)	The Minister may, with the approval of the President from time to time, by Order published in the Gazette declare any area which in the opinion of the Minister can be developed with the water resources of the Mahaweli Ganga or of	X				Mahaweli Authority

No	Policies and legislation	Description	UD	DM	CC	Stakeholder collaboration related provisions	Authorised organisation
		any major river to be a special area (herein after referred to as " Special Area ") in or in relation to which the Authority may, subject to the other provisions of this Act, exercise, perform and discharge all or any of its powers, duties and functions.					
Policies related to urban Planning							
16	National physical planning policy	One of the long-term targets of the policy is sustainable urbanisation and one of the expectations of the national physical planning council is provide attractive serviceable areas of island that are free from natural hazards and less vulnerable for disasters and climate change impacts. Moreover, all local development plans initiated by the local agencies includes UDA, should need to be align	X	X	X	-	Department of national physical Planning
17	National land use policy 2009	Focuses proper land use planning to avoid disasters in urban development	X	X		-	Land use policy planning department
18	Local government policy	Ensure the implementation of planning activities based on the national physical plan and coordinated work with UDA for urban declared areas.	X			Provision for collaborate with all relevant agency if required including public participation. Coordinate with DMC in terms of develop risk sensitive urban Planning.	Municipal council, urban council, and Predesiya Saba

No	Policies and legislation	Description	UD	DM	CC	Stakeholder collaboration related provisions	Authorised organisation
		4.1.2.4 The local authority shall be given full discretion and assistance to exercise their authority in regard to Planning, administrative, fiscal and financial matters concerning their jurisdiction.					
19	National policy on local government action plan 2012-2014 ministry of local government and provincial council	Emphasis establishing local authorities as a planning authority. Formulate and adopt a Conceptual Framework for Local Government Planning and Local Area Development. To ensure proper implementation of the National Physical Planning Law under which LGA is given the status of Planning Authority of the area and to inform, direct and guide the LGAs and their partners and local stakeholders on the powers and limits of LGAs as the Planning Authority of the area and to set parameters and perimeters for GA involvement in Planning and coordination of major development work of the partners of local development with the view to ensure convergence of interventions to produce the desired impacts. The initiative is expected to prevent the concurrent use of varying, and at times conflicting, standards, criteria, approaches, and strategies that are counterproductive. The Framework, therefore, shall replace the multiple planning processes with a well-coordinated multi-level planning process thereby creating a	X	X			Local authorities

No	Policies and legislation	Description	UD	DM	CC	Stakeholder collaboration related provisions	Authorised organisation
		common platform for well-coordinated Planning and execution of local area development. Local Government planning process and procedures to make local bodies the planning authority of the area with special responsibilities on issues such as disaster management, climate change adaptation and planning and facilitating local economy.					
20	Draft resettlement policy framework 2016	This policy does not speak about the DRR and CC.	X				
21	Involuntary resettlement policy 2001	The Project Executing Agencies (PEAs) will be responsible for complying with all the requirements for planning and implementing resettlement according to the NIRP. The CEA will be responsible for the review of impacts and mitigating. measures of projects involving involuntary resettlement. A Steering Committee will be formed comprising the MLD, CEA, PEAs and other relevant agencies to exchange experience on resettlement, and coordinate and oversee the implementation of the policy	X			Since its drafted in 2001, does not contain DMC role	

No	Policies and legislation	Description	UD	DM	CC	Stakeholder collaboration related provisions	Authorised organisation
22	National policy on construction	Can establish the evaluation and monitoring process for the construction activities according to the national construction policy;	X			Ministries responsible for the subjects of Construction, Disaster Management, Power and Energy, and Environment will collaborate to establish norms and guidelines in consultation with the relevant professional bodies, research organizations and the universities to formulate disaster resilient, energy efficient and environmentally sustainable construction practices	CIDA
23	DRAFT National Policy and Strategy on Sustainable Development, 2020.	Provide strategies and goals for disaster resilience urban development	X	X	X		Sustainable development council

No	Policies and legislation	Description	UD	DM	CC	Stakeholder collaboration related provisions	Authorised organisation
Laws related to disaster management							
24	Flood protection Ordinance created in 1924	Approve, reject, or direct the development schemes proposed in flood area, According to this act, Director of irrigation department is responsible for declare the flood area and take actions for protect them by initiating relevant schemes.	X	X			Department of irrigation
25	Disaster management Act No 13 of 2005	DMC functions include facilitate liaison with organizations and persons pursuing hazard, vulnerability and risk reduction studies and implementing action programmes and commissioning such studies and action programmes; to initiate programmes relating to prevention and mitigation of disaster and the provision of relief, rehabilitation, and reconstruction.	X	X		Issuing instructions and guidelines to appropriate organizations, non-governmental organizations, district secretaries and divisional secretaries on activities relating to disaster management and initiating and implementing work programmes in co-ordination with such organizations and secretaries.	DMC
Policies related to disaster management							
26	National disaster management policy ,2010	Ensuring provision of safe housing (temporary or/and permanent), to those in IDP camps, if necessary, relocating them from original locations within minimum possible time. Environment and developments including	X	X		Ensuring inter-ministerial, inter-sectoral and inter-agency coordinating mechanism for all disaster management activities;	NDMC DMC

No	Policies and legislation	Description	UD	DM	CC	Stakeholder collaboration related provisions	Authorised organisation
		infrastructure with the integration of disaster risk reduction in development and in environmental management process. Establish and maintain sustainable mechanisms, systems, structures, programs, resources, capabilities and guiding principles for disaster risk reduction, management, mitigation, preparing for and responding to disasters and threats of disasters in Sri Lanka				clear understanding of the roles and responsibilities for all stakeholders concerned with disaster management so that disasters can be managed more effectively and collaborate with all stakeholders	
Laws related to Environment and climate change							
27	National Environmental Act 1980 (No. 47 of 1980) and National Environmental (Amendment) Act, No. 56 of 1988 [Certified on 12 December 1988] amended in 1988	Checking the land use for the development, Conduct the environment impact test for the large developments other than the coastal area. Environmental management systems will be encouraged to be flexible to adapt to changing situations (e.g., climate change)	X		X		Central Environmental Authority Ministry of environment Ministry of environment

No	Policies and legislation	Description	UD	DM	CC	Stakeholder collaboration related provisions	Authorised organisation
	Laws related to Environment						
28	Soil conservation act no 25 of 1951 and subsequent amendments	declare any area defined in the Order to be an erodible area for the purposes of this Act and take prevention or mitigation of soil erosion and at the protection of land against damages by flood and drought.		X		h) the cambering and cross-draining of roads and paths under the control of any Government department or local authority and the prohibition or control of the scouring of drains and water-channels; or	Department of agriculture
29	Coast Conservation Act No 57 of 1981	Regulate and control development activities within the costal zones. Conduct the environment impact test for the developments in the coastal area.	X	X		conduct of research, in collaboration with other departments, agencies and institutions for the purpose of coast conservation.	Coast conservation department
30	The forest ordinance no16 of 1907.	The Minister may, by Order to be published in the Gazette, declare as "reserved forests" (a) lands resumed by the State according to the Lands Resumption Ordinance; (b) lands that have been declared to be property of the State; (c) lands that have been acquired by the State for public purposes. The Minister may make regulations on the protection and conservation of reserved forests, as well as the transit of all forest produce by land or water. The Minister may also delegate the	X	-	X		Forest department

No	Policies and legislation	Description	UD	DM	CC	Stakeholder collaboration related provisions	Authorised organisation
		control of reserved forests to a Conservator of Forests, appointed according to the provisions of section 58. Any development activities under this area need to be align with this ordinance requirements					
31	The fauna and flora protection ordinance of 1937	Declare that any specified area of State land shall for the purposes of this Ordinance be a National Reserve and may by that Order or by any Order subsequently published in the Gazette declare that the whole or any specified part of any such National Reserve. Any development activities in this area need to be align with the provisions of the ordinance as specified below: No person or organisation, whether private or State shall within a distance of one mile of the boundary of any National Reserve declared by Order made under section 2, carry out any development activity of any description whatsoever, without obtaining the prior written approval of the Director. Environmental impact assessment also needs to be done in this area.	X	-	X	-	Department of wildlife
32	Felling of trees (Control) Act no 9 of 1951	An Act to provide for the prohibition, regulation, or control of the felling of trees. Therefore, all development activities need to be considered this.	X		X	-	CEA, District and divisional secretariat
33	National heritage wilderness	Declaration of national heritage wilderness areas control the development activities	X				Ministry of environment

No	Policies and legislation	Description	UD	DM	CC	Stakeholder collaboration related provisions	Authorised organisation
	area acts no 3 of 1988						
Policies related to Environment and climate change							
34	National Environmental policy 2003	Having sustainable development National development that meets the needs and aspirations of the present generation without compromising the ability to meet those of future generations, which have as much right to nature and natural resources as we do.	X		X	Education at all levels, together with research, will be promoted in a manner designed to increase the level of awareness of all aspects of the environment and its care and management among all stakeholders.	Central Environmental Authority

Ministry of environment |
| 35 | National Climate change policy 2012 | Adaptation to and mitigation of climate change impacts within the framework of sustainable development; Minimize the greenhouse gas emissions within the framework of sustainable development; Mainstream and integrate climate change issues in the national development process; Develop strategies and mechanisms to prevent/mitigate and manage disasters caused by climate change and protect the communities, ecosystems and, natural and built environment; Take adaptive measures to avoid/minimize adverse impacts of climate change to the people, their livelihoods, and ecosystems | X | | X | Develop and strength inter institutional coordination and collaborating, and monitoring mechanism in all levels related to climate change activities | Ministry of Environment

Climate change secretariat |
| 36 | Updated nationally determined | Mainstream the disaster risk reduction and climate change adaptation or mitigation into the urban planning sector with the actions of enhance | X | X | X | | Climate change secretariat |

No	Policies and legislation	Description	UD	DM	CC	Stakeholder collaboration related provisions	Authorised organisation
	contributions under the Paris agreement on climate change Sri Lanka (July 2021)	the resilience of human settlements and infrastructure through mainstreaming climate change adaptation into national, sub-national and local level physical planning; incorporate Disaster Risk Reduction (DRR) into the urban and human settlement planning/implementation in areas of high vulnerability to climate change risks; establish a climate-resilient built environment; minimize the impact of slow onset events (sea-level rise) on coastal settlements and infrastructure. Incorporate Disaster Risk Reduction (DRR) into the urban and human settlement planning/implementation in areas of high vulnerability to climate change risks. establish a climate-resilient built environment					Ministry of Environment
Policies related to Environment							
37	National wetland policy 2006	This policy insists to protect the wetland when designing and implementing all upcoming development projects with the participation of all relevant stakeholders including community. The following committees will be established to ensure the sustainable development in wetland. The district level, Provincial level, local level wetland management committees will be established, and multi-stakeholder National Wetland Steering Committee will be established	X		X	Multi-stakeholder National Wetland Steering Committee will be established for the purpose of advising on wetland issues and a National Wetland Management Units will be established by the Ministry in-charge of the	The National Wetland Steering Committee (NWSC) Central Environmental Authority

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No	Policies and legislation	Description	UD	DM	CC	Stakeholder collaboration related provisions	Authorised organisation
		for the purpose of advising on wetland issues and a National Wetland Management Units will be established by the Ministry in-charge of the subject of environment to oversee and facilitate policy implementation.				subject of environment to oversee and facilitate policy implementation.	
38	The national forest policy of 2000	To conserve forests for posterity, with regard to biodiversity, soils, water, and historical, cultural, religious, and aesthetic values; to increase the tree cover and productivity	X	-	X	-	Forest department
39	The national watershed management policy of 2004	Conserve, protect, rehabilitate, sustainability uses and manage the watersheds				Coordinate and monitor all activities under the watershed area and secure system of integrated management	
40	The national wildlife policies	To conserve wildlife resources, through protection, research, education, sustainable use and benefit sharing, for the benefit of present and future generation.	X		X	To monitor events and take action needed to maintain consistency between the national wildlife policy and other sectoral and inter-sectoral policies. To promote co-operation among stakeholders through participatory decision making at all levels	Department of wildlife
41	The national policy on air	The Ministry in charge of Transport and the Urban Development Authority (UDA) will consider the recently completed studies on	X		X	Policy stated that management of air quality is a collective	

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No	Policies and legislation	Description	UD	DM	CC	Stakeholder collaboration related provisions	Authorised organisation
	quality and management	improving traffic flow and improved transportation planning and formulate and implement a transport policy that will improve air quality.				responsibility and obligation of all sectors, including the state agencies, private sector and citizens groups. The public, as the ultimate beneficiaries and custodians of the environment, play a pivotal role in implementing this policy. All the relevant agencies should continue to promote awareness so that the interests of all stakeholders can be met.	
42	The national energy policy of 1997	Focusing the protection of the environment and climate change in terms of low carbon emission from any activities.	X		X		Under the ministry of environment

Appendix F: Review of urban development plans

Table F-1: Overview of urban development plans

Province	District	Development plans	Summary	CC aspects	DRR aspects
Western	Colombo	10 plans were published, but based on the access and English language availability, only 3 plans were selected for review.	Beira Lake: The document mentioned stakeholder consultation took place, and no details of participated stakeholders.	Green building guidelines are available	Lacking proposal considering the DRR consideration in that area
			Homagama: A stakeholder list was given	The lacing of CC consideration in that area	Lacking proposal considering the DRR consideration in that area other than the consideration of disaster situations in the industrial zone approval
			Moratuwa: A stakeholder list was given	Global warming has been identified as a threat, and the green city concept proposed	Prevention methods provided for the parks located in flood and cyclone areas. Installation of an alarm system in the coastal area is proposed.
	Gampaha	4 plans were published, but based on the English language availability, only 3 plans	Negombo: A stakeholder list was given	Landscape towards the climate change (e.g., Increase Forest cover, prevent eco system)	Disaster management plans

Province	District	Development plans	Summary	CC aspects	DRR aspects
		were selected for the review	Biyagama: A stakeholder list was given	CC considered and green concepts proposed	DRR plans
			Kelaniya: The stakeholder list was given	CC considered and green concepts proposed	DRR plans
	Kalutara district	All published 3 plans reviewed	Beruwala: The stakeholder list was given	CC considered and green concepts proposed	DRR plans
			Kalutara: A stakeholder list was given	CC considered and green concepts proposed	Disaster management plans
			Panadura: No details given about stakeholder consultation	Climate change consideration is lacking (only a few proposals for green concepts and city: Protect the canal and Ganga reservations	Flood risk has been identified and indicated, and DRR plans are lacking
Central	Kandy	1 published plan reviewed	Kandy: The stakeholder list was given	CC considered green concepts proposals	DRR plans
	Matale	1 plan was available, and the full document was not published	-	-	-
Southern province	Matara	1 published plan reviewed	Matara: A stakeholder list was given	CC considered green concepts proposals	DRR plans
	Galle	1 plan is available and not reviewed since the English	-	-	-

Province	District	Development plans	Summary	CC aspects	DRR aspects
		language version is not available			
	Hambanthota	1 published plan reviewed	Hambanthota: A stakeholder list was given	CC considered as green concepts proposals (tree plantation)	A disaster risk reduction plan is not available.
UVA	Badulla	1 published plan reviewed	Badulla: A stakeholder list was given	CC considered as green concepts proposals	Disaster mitigation plans
	Ella	1 published plan reviewed	Ella: The stakeholder list was given	CC considered as green concepts proposals	Disaster management plans
	Kataragama	1 published plan reviewed	Kataragama: A stakeholder list was given	CC considered as green concepts proposals	A disaster risk reduction plan is not available.
Sabaragamuwa	Rathnapura	1 published plan reviewed	Rathnapura: A stakeholder list was given. Since this plan clearly stated administrative stakeholders and environmental stakeholders, including DM and CC, based on the scope of the study only they have chosen (infrastructure-related consultancy agencies are not considered)	CC considered as green concepts proposals	Disaster risk reduction plans

Province	District	Development plans	Summary	CC aspects	DRR aspects
	Emblipitiya	1 published plan reviewed	Emblipitiya: A stakeholder list was given	CC considered as green concepts proposals	A disaster risk reduction plan is lacking
	Balangoda	1 published plan reviewed	Balangoda: A stakeholder list was given	CC considered as green concepts proposals on a small scale (greenhouse for agrarian)	DRR plans
	Mawanella	1 published plan reviewed	Mawanella: Nothing mentioned about stakeholder consultation in the published version	Climate change mitigation is lacking	DRR is lacking
	Rambukkana	1 published plan reviewed	Rambukkana: Nothing mentioned about stakeholder consultation in the published version	Climate change mitigation is lacking	DRR is lacking
Northwestern	Kurunegala	All three published documents were reviewed.	Kurunagela: stakeholder list was given	CC considered as green concepts proposals	Disaster risk reduction plans
			Maho: A stakeholder list was given	CC considered as green concepts proposals	Disaster risk reduction plans
			Kalpitiya: A stakeholder list was given	CC considered and green concepts proposals	Little consideration for disaster RR (no separate section)
Northcentral	Anuradhapura	All three published document was reviewed.	Anuradhapura: detailed report is not available for the review of	-	DRR plan available

Province	District	Development plans	Summary	CC aspects	DRR aspects
			CC and DRR. However, the Stakeholder list was given.		
	Mihinthalaya		Mihinthalaya; Stakeholder list given	CC considered as green concepts proposals	Little consideration for disaster RR (no separate section)
	Polonnaruwa		Polonnaruwa: Stakeholder list given	CC considered as green concepts proposals	Disaster management plan available
Northern	Mannar	1 published plan reviewed	Mannar: A stakeholder list was given	CC considered as green concepts proposals	Disaster management plan available
Eastern	Ampara		Nintavur: Stakeholder list given	CC considered as green concepts proposals	Disaster management plan available
			Ampara: stakeholder list is not given	CC consideration is lacking	Lacking (only disaster identification available)
			Kalmunai: stakeholder list is not given	Tree plantation considered for CC	DMP given
	Batticaloa	1 published plan reviewed	Mentioned as a stakeholder meeting Conducted, but the list is not given	CC is considered as green concepts proposals, a climate resilient action plan (Comes under DRR)	DRR plan given
	Trincomalee	2 plans were published, and due to the English language availability and	-	-	-

Province	District	Development plans	Summary	CC aspects	DRR aspects
		full document unavailability, no plan was reviewed			

Appendix G: Evidence of ethical approval

Appendix H: Example of themes generation

Table H-1: Themes generation

No	Quote	Sub Code	Code	Sub theme	Theme	Category
1	*"The policy coherence is very bad in Sri Lanka compared to the other south Asian countries. We have policies but unfortunately those policies are not thought of most of the coherence" (P1NE6)*	Lack of laws and policy integration	Inadequate enforcement of policies	Policies and legislation related barriers	Administrative environment	Barriers
	"There are different independent policies and those are not interconnected" (P1NE3)	Lack of laws and policy integration				
	I personally feel the policies are there, and policies have a certain level of coherence. For example, coastal zone management plan, national physical plan, and urban zone development plan in the local area. But inadequate coherence in government policies to implement. (P1NE2)	Lack of laws and policy integration				
	"in the Sri Lankan context, the legislations are separately addressed for the separate sectors" (P1NE9)	Lack of laws and policy integration				
	"You must have a legal framework for enforcement. if you do not have any enforcement power or implement strategy, then policies remain as a policy" (P1NE4)	Policies are not supported by laws				
	"There is huge level of collaboration support in legislation is required. But what happens is the collaboration become optional. There are lot of opportunity to collaborate but that is not mandatory. Because there are no legal support and legislative authority to do that, it is very optional, if you want you can do it if not you can omit it. If you omit there are no problem. (P1NE6)	Laws are not supporting the collaboration				
	"Now we have lot of challenges Infront of us, climate change, sea level rise, DRR, global policies, therefore now of course we have to revisit, evaluate, monitor, and should update according to the global agenda and current challenges. (P1NE4)"	-	Lack of policy evaluation and update			

"Some time we have some stakeholders' discussion, but high powers go to UDA, and they can do whatever they want" (P1NE5)	-	Lack of power sharing and equality	Governance		
There is no interest in these matters. Not all staff focus on the work. Therefore, there should be accountability. They just participate and not risk-taking mentality P1LE8.	-	Lack of accountability			

Appendix I: MAXQDA Analysis tool usage

Appendix J: Stakeholder participation in terms of RSUP in NPP and UDA plans

Table J-1: List of stakeholders in RSUP

No	Organization	National Physical Plan	UDA plans																						
			Moratuwa	Negombo	Biyagama	Kelaniya	Beruwala	Kalutara	Kandy	Matara	Hambantota	Badulla	Ella	Kataragama	Rathnapura	Emblipitiya	Balangoda	Kurunagela	Maho	Kalpitiya	Anuradhapura	Mihinthalaya	Polonnaruwa	Mannar	Nintavur
	Development related organisations																								
	Government organizations																								
1	Department of national physical planning		X			x								x		x				x	x	x	x		
2	Urban Development Authority	X	X																						
3	Mahaweli Development Authority	X							x		x					x								x	
4	Sri Lanka Land Reclamation and Development Corporation	X	X			x	x	x																	
5	Urban Settlement Development Authority	X																							
6	Condominium Management Authority	X																							
7	Land Use Policy Planning Department	X	X	X	x							x	x			x								x	x
8	Department of provincial land commissioner												x		x										
9	Land reform commission														x	x									

No	Organization	National Physical Plan	Moratuwa	Negombo	Biyagama	Kelaniya	Beruwala	Kalutara	Kandy	Matara	Hambantota	Badulla	Ella	Kataragama	Rathnapura	Emblipitiya	Balangoda	Kurunagela	Maho	Kalpitiya	Anuradhapura	Mihinthalaya	Polonnaruwa	Mannar	Nintavur
10	Department of Survey	X													x			x		x				x	x
11	National Housing Development Authority	X	X		x	x	x	x		x	x					x				x					x
12	Resettlement Authority	X																							
13	Ministry of Megapolis and Western Development	X	X																						
14	Department of Land Commissioner General	X																							
15	Department of building		X																						
16	Southern development authority													x											
17	Local government assistance commissioner							x																	
18	Provincial council														x		x				x			x	
19	Municipal council		X	X							x	x			x			x			x		x		
20	Urban council						X	X								x	x							x	
21	Predesiya Saba				X	x	X	X		x		x	x	x		x		x	x	x	x		x	x	x
22	District secretariat		X		x		x	X		x	x			x	x	x				x	x				
23	Divisional secretariat		X	X	X	x	x	X	x	x	x	x	x	x		x	x	x	x	x	x	x	x		x
24	GN						X								x	x									

No	Organization	National Physical Plan	Moratuwa	Negombo	Biyagama	Kelaniya	Beruwala	Kalutara	Kandy	Matara	Hambantota	Badulla	Ella	Kataragama	Rathnapura	Embilipitiya	Balangoda	Kurunagela	Maho	Kalpitiya	Anuradhapura	Mihinthalaya	Polonnaruwa	Mannar	Nintavur
25	Regional engineers' office							x																	
26	Private sector housing developers								x																
27	Executive engineers' office														x										
28	Public Utilities Commission	X																							
29	Department of Sri Lanka Railways	X	X	X	x		x	x	x			x	x					x	x					x	
30	Sri Lanka Transport Board	X	X					x		x	x		x		x			x			x	x			
31	Department of Motor traffic	X																							
32	National Transport Commission	X																							
33	Provincial road passenger transport authority			X	x	x		x		x					x			x	x		x	x			
34	Civil Aviation Authority	X	X																						
35	Road Development Authority	X	X	X	x	x	x	x	x	x	x	x		x	x	x	x		x	x	x	x	x	x	x
36	Road development department																							x	
37	Provincial road development authority				x		x	x	x				x	x		x					x	x			
38	Ceylon Electricity Board	X	X		x	x	x	x		x	x	x		x	x		x	x			x		x		
39	Sri Lanka Telecom Ltd	X	X				x	x							x		x	x							
40	Sri Lanka Ports Authority	X									x													x	

No	Organization	National Physical Plan	Moratuwa	Negombo	Biyagama	Kelaniya	Beruwala	Kalutara	Kandy	Matara	Hambantota	Badulla	Ella	Kataragama	Rathnapura	Emblipitiya	Balangoda	Kurunagela	Maho	Kalpitiya	Anuradhapura	Mihinthalaya	Polonnaruwa	Mannar	Nintavur
41	National Water Supply & Drainage Board	X	X	X	x	x	x	x	x	x	x	x	x	x	x		x	x	x	x	x	x	x	x	x
42	national community water supply department							x							x										
43	Department of Health Services	X																							
44	Water Resources Board	X																							
45	Planning Division/ Ministry of Fisheries and Aquatic Resources	X																							
46	Department of fisheries																							x	
47	Ceylon Fishery Harbours Corporation	X					x																		
48	International Water Management Institute	X																							
49	Information & Communication Technology Agency Sri Lanka	X																							
50	Department of Community Water Supply	X																		x					
51	Lagoon development authority			X																					
	Academic organizations																								
52	University of Moratuwa	X	x																						
53	University of Peradeniya								x																

No	Organization	National Physical Plan	Moratuwa	Negombo	Biyagama	Kelaniya	Beruwala	Kalutara	Kandy	Matara	Hambantota	Badulla	Ella	Kataragama	Rathnapura	Emblipitiya	Balangoda	Kurunagela	Maho	Kalpitiya	Anuradhapura	Mihinthalaya	Polonnaruwa	Mannar	Nintavur
54	University of Ruhuna									x															
55	University of UWA wellasa												x												
56	Rajarata University of Sri Lanka																					x			
	Disaster Management and climate change			x																x					
	Government organizations																								
57	Ministry of Disaster Management	x											x												
58	DMC	x						x	x						x						x	x	x	x	x
59	Department of Meteorology	x													x					x			x		
60	National Building Research Organization (NBRO)	x	x						x		x	x	x		x										
61	Climate Change Secretariat (CCS)	x																							
62	UN Habitat	x																							
63	UNDP	x																							
64	Irrigation department			x	x	x			x	x	x		x	x	x	x			x		x	x	x		x
65	District irrigation department						x																		
66	Provincial irrigation department						x	x												x					
	Environmental related organisation																								

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No	Organization	National Physical Plan	Moratuwa	Negombo	Biyagama	Kelaniya	Beruwala	Kalutara	Kandy	Matara	Hambantota	Badulla	Ella	Kataragama	Rathnapura	Emblipitiya	Balangoda	Kurunagela	Maho	Kalpitiya	Anuradhapura	Mihinthalaya	Polonnaruwa	Mannar	Nintavur
			UDA plans																					
67	Coast Conservation Department	x	X	x			x	x			x									x				x	
68	Coastal resource management and costal department																								x
69	Department of Forest Conservation	x													x	x		x	x	x		x	x		
70	Centre for Environmental Justice	x																							
71	Central Environmental Authority	x	x	x	X	x		x	x	x			x	x	x	x	x	x	x	x	x		x	x	x
72	Provincial environmental authority																	x		x					
73	District ocean environmental authority	x						x																	
74	Marine Environment Protection Authority	x																							
75	Sustainable energy authority																							x	
76	Department of Wildlife Conservation	x							x									x	x			x	x	x	
77	Botanical garden department								x																
78	Environment Foundation	x																							
79	Department of Fisheries and Aquatic Resources	x		X			x													x				x	
80	Geological Survey & Mines Bureau	x						x							x	x				x					
81	Lanka Mineral Sands Ltd	x																							

No	Organization	National Physical Plan	UDA plans																					
			Moratuwa	Negombo	Biyagama	Kelaniya	Beruwala	Kalutara	Kandy	Matara	Hambantota	Badulla	Ella	Kataragama	Rathnapura	Emblipitiya	Balangoda	Kurunagela	Maho	Kalpitiya	Anuradhapura	Mihinthalaya	Polonnaruwa	Mannar	Nintavur
82	National Aquaculture Development Authority	x																							
83	National Aquatic Resources Research and Development Agency	x		X																					
84	Petroleum Resources Development Secretariat	x																							
85	Wildlife department										x														
86	Department of Agriculture	X							x								x		x						x	x
87	Research organisations	x																							
88	Department of census and statistic		x														x								x	
89	National enterprise development authority		X																						
90	Sri Lankan tourism development authority			X			x			x				x									x			
91	Board of investment			X	X					x		x	x												x	
92	Industrial development board							X	x															x	x	
93	Department of archaeology			X		x	x			x	x	x	x		x		x	x	x	x			x	x	x	
94	Agrarian service office				X	x	x	x		x		x					x		x				x			x
95	Export agriculture department				X	x		x		x																

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No	Organization	National Physical Plan	Moratuwa	Negombo	Biyagama	Kelaniya	Beruwala	Kalutara	Kandy	Matara	Hambantota	Badulla	Ella	Kataragama	Rathnapura	Emblipitiya	Balangoda	Kurunagela	Maho	Kalpitiya	Anuradhapura	Mihinthalaya	Polonnaruwa	Mannar	Nintavur
																						UDA plans			
96	Department of agrarian development																					x	x		
97	national Gem and jewellery authority						X																		
98	Rubber research institute						x																		
99	Provincial tourist board								x												x		x		
100	National resource management centre								x																
101	Ministry of industry															x									
102	JICA (Japan)								x																
	Community representation																						x		
103	Gem union						x																		
104	Three-wheel association			x	x	x						x													
105	Carpenter association																								
106	Trade association		x	x	x	x	x						x	x		x		x			x	x			x
107	Fisherman association						x													x					x
108	MC as community representatives			X																					
109	Youth council							x																	
110	Farmer's organisation									x						x					x				
111	Residential and commuter											x													

No	Organization	National Physical Plan	Moratuwa	Negombo	Biyagama	Kelaniya	Beruwala	Kalutara	Kandy	Matara	Hambantota	Badulla	Ella	Kataragama	Rathnapura	Emblipitiya	Balangoda	Kurunagela	Maho	Kalpitiya	Anuradhapura	Mihinthalaya	Polonnaruwa	Mannar	Nintavur
112	Commercial community											x							x						
113	School van owners' association																	x							
114	Hotel association																				x				

Annexure K: Semi-structured interview guideline

Section 01: Personal Information

      1.1 Name: …………………………………………………………………………

      1.2 Organisation:…………………………………………………………….

      1.3 Designation: …………………………………………………………………

      1.4 Relevant experience :……………………………………………..

Section 02: Stakeholder Collaboration in risk-sensitive urban planning

Explanation of the research study

Enhancing stakeholder collaboration in risk-sensitive urban planning.

Risk-sensitive urban planning is an urban development process including disaster risk reduction and climate change adaptation or mitigation. However, stakeholder collaboration among stakeholders is lacking due to several factors. Thus, the study focuses on understanding the current stakeholder collaboration context by identifying the barriers and enablers, such as recommendations or strategies and the opportunities to enhance the collaboration among the stakeholders that leads to creating an effective risk-sensitive urban plan.

1. What is your opinion on current risk-sensitive urban planning decision-making? and is there any collaborative mechanism towards RSUP?

2. What are the barriers to stakeholder collaboration in RSUP? Moreover, explain the reasons for these barriers?

    -Policies and legislations

    -Governance.

    - Politics

    -Working environment

    -Organizational capacity

-Information and knowledge sharing

- Collaboration process

3. What are the enablers and strategies for stakeholder collaboration in RSUP?

- Policies and legislations

- Governance

- Politics

- Working environment

- Organizational capacity

- Information and knowledge sharing

- Collaboration process

4. Is there any limitation to implementing the identified enablers?

5. If yes, what are the reasons and how to overcome them?

6. What is your opinion of existing policies and legislation supporting stakeholder collaboration in RSUP?

7. What are the improvements required in current policies and legislation?

8. What is your opinion about the current governance system for facilitating stakeholder collaboration in RSUP?

9. What are the features essential in governance arrangement to foster collaboration in RSUP?

10. What is your suggestion for a suitable collaborative governance arrangement or structure?

11. In your opinion, who will be the suitable collaborative leader to foster collaboration?

12. Any other suggestions and recommendations?

Appendix L: Sample interview transcript

An explanation of the study was given, and personal information was obtained.

Q: What is your opinion on risk-sensitive urban planning decision-making? Is there any collaborative decision-making involving DRR climate change sectors in urban planning?

A: about 10- 15 years back, there was very little concern about disaster and climate risk in urban planning. However, now, there is a greater effort in this collaborative planning. One of the greater things is that, In Sri Lanka, we have multi-tier responsibilities in decision-making. We have certain urban development decision-making that goes with the local authority, especially urban and municipal councils. On top of that, we have provincial councils also engaging in certain development works which overlap with the urban areas. Moreover, we have nationally different institutions and ministries working on these, so we have urban development authority exclusively working on urban development. At the same time, we have a national physical planning department and disaster management centre. So many others, even the Ministry of Highway and Transport, are engaging. I still feel there is a greater issue of collaboration, but at the same time, there is much more room for us to consider the disaster management and climate change aspects.

I do not feel that municipal or urban councils are considering climate change and disaster risk reduction in their urban planning, especially at the very local level. There are certain, but I think it is heavily inadequate. When it comes to urban development, of course, now initiation and discussion are going on. But I feel the evolution of DRR and CCA, and mitigation is happening at a greater pace than it absorbs by the national level intuition. My generic answer is it is happing but inadequate.

Q: Urban development authority plans, and national physical plan development are done with the consultation of several stakeholders. But in addition to that, do they have any collaboration mechanism?

A: I do not think they have a collaboration mechanism; for example, we don't have land use planning in Sri Lanka. Unfortunately, we don't have a wider level of land use planning or zoning aspects. There are a lot of initiatives by different organisations that have it. It is heavily ineffective because the responsibilities are laid with a number of institutions. And at the same time, there is a kind of halfway power evolution in Sri Lanka. Certain aspects have

been devolved to the provincial council under the 13th Amendment. Along those, certain powers go to the local and national governments. But when it's come to the issues like DRR and climate change, of course, we have dedicated institutions for that, like climate change secretariats and disaster management centres etc., but if you look at the theories and practical aspects of this, those agencies cannot implement those. The implementation agencies are somewhere else. For example, if you look at climate Chane adaptation in Sri Lanka, there are sector-wise plans, there are urban development plans, tourism plans, agriculture plans, and water management plans. Implantation is aligned with some other institutions. It's a multi-stakeholder engagement, but those engagement is not happing. For example, I have recently seen Sri Lankan government has national determinants contributions under the Paris Agreement for climate change. There is an implementation plan developed. Now there is a steering committee consisting of representatives of all the implementing agencies. That's intervention. I think very high-level decision-making is quite important. But we need to focus more on implementing this and getting the ground-level people engaged, the local authorities, even the district secretariats and divisional sectarists. At the same time, I do understand if we have collaborative members, the implementation decision-making process will take a long time. For example, think about expressway construction as a part of urban development and how many organisations came to oppose the plan at the last moment. So, sometimes, it is seen as a blocker. So, there are issues. I think my suggestion is about capacity building within the institution. I think climate change capacities within urban development are needed to enhance a great level of disaster management, and the same with municipal and urban councils. Their knowledge exposure and capacity are very low level.

Q: local authorities need to align with urban development plans and national physical plans according to the law. However, is it happing in practice?

A: I don't see a perfect overlap between the national physical and urban development plans. My personal perspective. There are differences. The national physical plan was probably developed some years back, and UDA has an Up-to-date plan. I think Department of national physical planning don't have powers to influence or implement their plans. They don't have legal provisions for implementing things. The legal provision for the implantation is with the UDA. And certain overlap with the local authorities as well. Local authorities also have certain powers, sometimes they can challenge UDA, but they don't do it simply because of the finances.

UDA comes with the physical development process with money. They are better positioned to influence other stakeholders because they have the money. They have an investment where the local authorities and other stakeholders are not financial, they do, but they cannot compare the availability of finance with UDA. So, I think, ultimately, UDA will implement their plans. Some sort of adjustment is there. I am not saying that they are consulting. But we don't have a structured plan and process for consultation. There are no guidelines, regulations, and no rules. It is very ad-hoc. So, you can do whatever consultation, just a meeting and say, we have consulted. No one to challenge it. Because what the basis you can challenge that process. That is an issue.

Those are not defined in policies, regulations, and implementation plans as well.

Q: What are other barriers to stakeholder collaboration in RSUP? And could you please explain the reasons for these barriers?

A: DM and CCA deal with local people in a different governance arrangement, I mean the central government. However, UDA deals with another arrangement, that is, local government. This is a kind of a big issue we have created without considering the collaboration. We have done the 13th amendment evolution without thinking about how to collaborate with the central government subjects. This 13th Amendment came from India, it's a big country, and they don't have central government penetration to the local level. But in Sri Lanka, we have the government penetration right at her village level. We have Grama Niladhari Division. Creating a separate system creates a never-ending clash between Predesiya Saba and the district secretariat. Pradesiya saba is with the political leadership. They try to fight with the divisional sectarians who are government servants, not going into the political aspects. So always the clash. It's a kind of clash between bureaucratic and local politicians. I don't feel that we can solve the issue in the near future. We need a very drastic political and structural change. What we expect is knowing that there are some issues, we need to find a way to manually do that. You know there are so many models that have been tested. For example, there are collaborative committees have been established. It is co-chaired by the chairman of Predesiya Saba and the divisional secretariat, and they tried to do that. And this matter also comes to the bigger issue: these divisional secretariat boundaries do not perfectly overlap with the Predesiya Saba boundaries. We have a few examples of Sri Lankan where the boundaries of divisional secretariats go across around two or three local authorities. And we have one local authority which cut a cross between a few divisional

secretariats. This is one angle. The second angle is climate; disaster management is highly integrated with the ecosystem and natural environment. And the ego system boundaries are not aligned with local authorities' boundaries. When you are designing a road by one of the local authorities in a local authority area, they will consider their local authority boundaries. If their road is flooded, they will perfectly elevate it to their local authority. But elevating that road may create a flood in other local authorities because there are no ecosystem boundaries. Therefore, we need a transboundary collaboration as well. I think this transboundary collaboration has been completely forgotten in all levels of Sri Lanka, not only Sri Lanka but in other countries as well. We have certain issues when it comes to India as well since they have several states.

Q: I have also identified several barriers from literature and categorised them under different themes, as you can see (the list of barriers is presented). First of all, what is your opinion In Sri Lanka what is your opinion about policies in Sri Lanka? Is there is lack of collaborative policies?

A: The policy coherence is very bad in Sri Lanka compared to the other South Asian countries. We have policies, but unfortunately, those policies are not thought of most of the coherence. I think we have an absence of policies that promote collaboration. We have Sectoral policies, and they focus on considering risk-sensitive urban development. But not, any collaborative actions were defined.

Q: Can you elaborate more about the lack of coherence?

A: I told you a lot of examples. Let's take a rural road development project in a local authority. We have roads that have been declared under different local authority levels. When it comes to the grass root level municipal councils, they will develop a road that doesn't align with any other urban development work. When it comes to waste management, things are pretty bad.

Q: what about the lack of legislation support for collaboration?

A: in terms of collaboration, a huge level of collaboration support in legislation is required. But what happens is the collaboration becomes optional. There is a lot of opportunity to collaborate, but that is not mandatory. Because there are no legal support and legislative authority to do that, it is very optional; if you want, you can do it; if not you can omit it. If you omit it, there are no problems.

Q: According to the legislation, councils such as National Physical Planning and disaster management councils consist of stakeholders. Does it mean they are really collaborating?

A: yes, you are right; we have so many; we have the sustainable development council overriding everything. Those councils are there, but they are less effective. Even though they have legislative support, sometimes they are not prominent. Sometimes I don't know. I think a big issue in Sri Lanka is that the National Disaster Management Council has not been met for years. So, I think it's ineffective.

Q: Ineffective mainstreaming in legal instruments.

A: Yes, I agree.

Q: separate mandates for different ministries.

A: Of course, there are different mandates, and overlapping mandates are not very clear. When its overlap is not clear, how to do it.

Q: Lack of defined financial plans.

A: yes, ad-hoc financial plans for large infrastructure, we have financial plans. But for the medium and small-scale infrastructure, we have very ad-hoc financial plans.

Q: Is that what you mean earlier, that these local authorities are dependent on UDA?

A: yes. Local authorities have different infrastructure plans, and since they don't have money, they invest in different small projects. And they go behind provincial councils to get their money to invest and, again, at a national level also. Ministers are involved based on the political decision, not integrated, or aligned with the existing plans.

Q: lack of revisit and evaluation of policies

A: Of course. Look at our climate change policy; we have been doing many climate change actions that are not aligned with the policies. Luckily, they are now revising it now.

Q: last climate change policy was developed in 2012. Now they have published national determinates of contribution. Is that also can be considered policy?

A: policy directions and documents can come from NDC. But CCS also recognised that national climate change policy isn't aligned with the NDC. The policy was developed in 2012, and at that time, main global policies were not taking place, like Paris Agreement or NDC at all. CCS is now revisiting and updating policies according to the NDC.

Q: I noticed the stakeholder collaboration strategies and prioritised that in NDC. Even though, what is being as hinder for shareholder collaboration?

A: I think one reason is the international pressure, not like international pushing us. Specially Climate change and DM agreements are developed internationally, and Sri Lanka also recognised and agreed to that. So, three are no other options other than doing this collaboration. I think that's a positive side of international collaboration. That's why these initiatives are started.

Q: so, why is the collaboration not happening properly?

A: We have so many policies. But there is no proper integration between them. Of course, for example, the water and agriculture policies are clearly linked. But in this sector, these linkages are not established, and how to strengthen these links and how effective collaboration happens through these linkages are missing, as you have correctly identified. That needs to be done.

Q: Lack of clear-cut and overlapping responsible among stakeholders.

A: That's what I said that we have never overlapped the policies together and seen the linkages. Then only, we identify how the responsibilities work. What are the individual responsibilities and shared responsibilities? That has not been done. That needs to be done. Some of the procedures are identified. I think this NDC is a good starting point. On the other hand, ineffectiveness, and lack of accountability. I think we have issues of accountability, respective of shared responsibilities or not. Overlapping responsibilities amplifies this less accountability, same with ineffectiveness due to lack of human resources, finances, institutions etc. can lead to ineffectiveness, and again these overlapping responsibilities are amplifying this ineffectiveness.

Q: Lack of coordination mechanism in governance arrangement.

A: I agree. I have discussed this earlier.

Q: rigid formalised hierarchical governance structure with top-down coordination?

A: I do agree. It is rigid, and at the same time, there should be some room for engagement even at the local level You can definitely engage the general public also for consultation. I know there is a Pirajavasava system within the local authorities. I think they are not using it. I think it's an option. I think these are not only rigid and but there also are two governance

structures. The government is very rigid, but at the same time, we have a very flexible structure with the local authorities. Whatever is said, it is very top-down.

Q: What is your opinion about the informal collaboration? Even though legislation, policies do not provide provisions in collaboration.

A: Yes, this is government should think of. It is difficult to go and reach out to all the stakeholders earlier, but with IT, it's easy now. We also need to have informal engagement that provides more room for engagement.

Q: inconsistency and instability of institutional arrangement? Change of ministries according to the new government changes

A: even whatever the ministries, the institutions are the same. I don't think the change of ministries will affect the duties of the institutions when you have established procedures and guidelines. The problem is since we don't have an established procedure or guidelines, it has become very informal. Informal means it has become more induvial preference, individual agenda. When the political stability and the institutional arrangement change, that informal arrangement doesn't work. We need to formalise. I think that's an issue to address. We have to have policies in place for collaboration and clear guidelines on how to operate like this.

Q: if we bring all institutions under one ministry, will it enhance collaboration?

A: We can take it practically. We have to have a focus. We can't have finance and the environment under one ministry. At the same time, there should also be a logical way of arranging institutions. Unfortunately, the political system in Sri Lanka has lost the scientific and logistic way of clustering and arranging ministries. We had time for higher education and road together. I think you can have it all under one ministry but can have it in a logical way.

Q: No clear governance structure for inter-organisational collaboration RSUD

A: Yes, I do agree

Q: what would be your suggestion about the required features for a suitable collaborative governance structure?

A: yes, relevant features we have discussed above. We need to focus on overcoming those issues in the suitable one.

Q: Lack of political guidance and support

A: I think the big problem is that we don't have national policies. We don't formalise these. We do not have what we need to have a national policy structure. So, whatever the ruling party or political guidance, they need to implement this. When we keep a loophole and keep little information without clear guidance, political leaders can manipulate this. So, what we need is a widely agreed national policy. Then this lack of political guidance can't affect. So currently, I agree with this.

Q: Can we consider this NDC and other policies as a national policy?

A: yes. I think not a national policy and policy implementation.

Q: So, policy, policy implantation plan must be widely accepted and legalised. Is it?

A: Yes. Exactly. For example, if you are building a road in a local authority. There should be clear guidance as to if this road is creating some other environmental impact on peripheral local authorities and the ecosystem. There should be a way, okay, this is how you need to tackle it. You need to consult this, organise a meeting, and agree; these are the documents you need to do. Something clear guidance and an operational manual should be there. Those are not available.

Q: They are currently doing local authorities consult with local UDA members for approval if required. But this UDA member's qualification or expertise/capacity is not adequately verified whether he is capable. Is it?

A: Exactly.

Q: political influence?

A: Of course. Yes, I think this is what we need to think of. Every decision goes only along with the current power, and you should also get approval from other political parties. This should be changed, and we should not do it. And, yes, No vision towards collaborative initiatives.

Q: Apolitical approach? What do you think?

A: I don't believe apolitical approach. Political should be there. I think these politics should be used to get the widely agreed national policies and operational procedures needed to be approved. I have seen that even without political guidance, the officials also made wrong decisions. I have a lot of examples. You cannot rely on politicians and officials as well. We

need to have a political process, but wider engagement of political groups is also required. Practically avoiding politics is not possible.

Q: do we have a lack of leadership barriers in Sri Lanka? And what kind of leadership is good? Please mention if you have any leadership suggestions.

A: We have leadership, but the question is, is it suitable? We need to have a leader there. But at the same time, when we have multiple institutions together and are within government state policies, we can't expect individuals to take leadership. Of course, it's a broader thing. The leadership must be there in the process of operationalising these policies, not only for constructing roads or something. I think leadership is here for true collaboration without all the grey areas in collaboration. We can bring that institutional leadership and ensure institutions provide clear guidance on how to move ahead with the implementation.

Institutions should take the leadership, not the individuals. How the institutions can take leadership, you need to provide clear guidelines and methodology to people to understand what to do next. I think it's more about institutional leadership.

Q: What is your opinion on having an external entity or council to lead?

A: It's possible. But I think too many people involved also create issues. We need to get an agreement and understand how we need to get their engagement clearly. These committees are new, then we need to people bring and understand how these are working, etc. having a steering committee is fine, but I think if certain things are well established, we should not need to bring too many leaders and committees etc.; once it's clear how to implement stuff, then we can move.

Q: competing interests and a different interest

A: yes. We need collaboration, but only focusing on their sectoral need and competing without collaboration is wrong.

Q: limited coordination and communication, and information sharing among stakeholders

A: Yes, it is a big issue. There is certain confidentiality in some information, which I do understand. But some generic data can be shared. For example, the med data in Sri Lanka. It is not sharing. We need to purchase. What's the point again about flood maps? I don't think all the local authorities have the flood map with them. I don't understand the way they do. Whether the modelling information is available with UDA. I don't know. I think the decision-

making information lacking is a big issue. It is not available to government officers to take actions and decisions.

Q: What do you think the Right to information act help to get the unshared data?

A: no right to information act is basically developed for citizens to get information to make their political choice. To check whether the government is taking the correct decision. It is applicable to the government. Imaging the inter-government coordination. That will not solve the right to information.

Q: communicating breakdown due to jargon, different official language, and scepticism?

A: Yes. That's coming with the technical aspects also.

Q: poor feedback from subordinates to the central system?

A: evaluation and problem need to be rectified. And it is important to get feedback.

Q: involvement of a large number of organisations?

A: yes

Q: what is the solution for this large number of organisations**?**

A: clear identification of stakeholders and map the roles and responsibilities of each organisation. What we are doing is we are inviting people/organisations just for a name. We have never tried to understand what they are doing in this case. What is their role? If the role is not defined and they are invited. I have seen some of the people representing RDA talking about biodiversity. When you invite people, you must define and clarify the role properly. Without clarification, you blankly invite people, and they do what to talk about and what not to talk about. I told you earlier that the collaboration process needs to be clear-cut and mention what you need from the collaborative member/ institution.

Q: NGO and Research organisations (university), to what extent can they collaborate since legally it is not specified? Are they suitable for informal collaboration and consultation?

A: exactly. Engaging them in the information gathering. That's where you need to understand why you need them. To give you theoretical background or give you certain technical aspects? If that capacity is available within the institution, there is no need for them. For example, a planner from a university is not necessary since the capacity is already available

with the institution. UDA have planners. Again, what do you expect from them? We need them, but their role needs to be cleared.

Q: Long-term and inelastic consistent collaboration processes make the stakeholders reluctant to participate

A: yes. People have the mentality that if you have more work, more problems and less work, fewer problems. That is the attitude in most of the government organisations. But in Sri Lanka still, we are working on an ad-hoc planning process with one or two meetings. So we don't have a long-term and inelastic process yet.

Q: What would be the solution for this kind of mentality?

A: I think we can have a separate collaborative team in the organisation and make it legal

Q: silo-based culture with traditional capabilities, thinking, and following old routine practices.

A: yes. Its culture is coming in a term process, including personality and leadership awareness. The knowledge also matters to that.

Q: unsupportive intra-organisational structure and organisational leadership not based on the expertise

A: yes, we have to change the structure with appointed staff to collaborate. I am again coming to my earlier point. It's all about why you are inviting the person. If you invite, somebody and the person doesn't know the thing. It's an issue. Sometimes talented people are not able to participate, and the politically nominated person representing the organisation does not have the knowledge.

Q: What are the things to be considered to revisit the organisational structure towards supporting collaborative governance structure in RSUP?

A: We need to revisit the role and responsibility of each organisation. And we need to map of responsibilities of the other organisations. Where do you have linkages, and with what stakeholders do you need to work in what capacity? Then when you understand the interlinkages, the roles are getting cleared. Based on that, you need to revise your org structure. E.g., Establishing different collaborative teams with collaboration knowledge.

Q: inadequate human resource, financial, and technical capacity.

A: yes. Even when we are saying climate change, Sri Lanka lacks climate change expertise. We need to think more about the scientific and technological background. I think we need to work on this.

Q: lack of enthusiasm and commitment.

A: agreed. It is hand in hand with attitude and personality.

Q: Competition and different interests among stakeholders.

A: it can happen; I again say this is kind of a personality-related issue.

Q: job insecurity due to the rearrangement of government, like power degradations

A: This is where institutional leadership is important. They need to understand their role in institutional collaboration. When you are in collaboration, what would be my institutional role and how to bring it? That person alone might not bring it. He or she might collaborate within the organisation and bring those aspects to the collaborative table. This is mostly a personal-related issue. I think when you understand your institutional role, it will be overcome. However, in this case, the leadership already exists, and others just collaborate if invited. Currently, the body thinks about its mandates and powers in RSUP since those are not yet well established.

Q: lack of knowledge of stakeholders regarding their sector and discipline.

A: this is a problem. Of course, we need to enhance the capacity. If the UDA does not understand climate change, CCs are responsible for providing the understanding to UDA. Is it? That is a real collaboration. Of course, the lack of knowledge among stakeholders is not new. When we are mobbing into new territory, a lot of knowledge and exposure is required. So that the process of development. We need to identify the lacking knowledge and cater to that. It's an issue and an inherent characteristic when you are going into a new one.

Q: Does the staff reluctant to learn?

A: Yes. They always need a push and not enthusiasm in the learning process.

Q: not participating with willingness or hesitation due to the lack of knowledge

A: again, if the person thinks she is representing the organisation without him or herself. Then okay. If not, there is a problem. She must discuss the matter within the organisation and

bring it to the table. The problem is that induvial represents the induvial; no, you are not. You are representing the organisation. If that awareness is created, there is no issue.

Q: what about lack of knowledge sharing

A: yes, that we need to promote. That's where these terms of reference are essential. When you are bringing organisation on boards, you are expecting some sort of knowledge around this.

Q: Next, these are enablers I found and categorise them. Please let me know whether these enablers are acceptable in the Sri Lankan context, and if you have any other enablers to propose, please state them (enablers are presented).

A: yes, I do agree with them.

Q: is there are any limitations to implementing those enablers? If so, what are the reasons and how to overcome them?

A: those enablers are implementable. As I mentioned earlier, the apolitical approach is not practically suitable. Yes, policy changes and policy implementation tools are essential for effective implementation.

Q: Do you mean policy implementation tools and procedures also need to be documented as policies?

Q: yes.

A: okay, would you like to mention anything regarding current policies and the required changes?

A: No, I think we have already discussed all the important things.

Q: Any other comments regarding barriers and enablers?

A: yes. We have to focus on access to information as well. Not only data sharing, like document repositories etc. are something hugely missing in Sri Lanka.

Q: what about nurturing a trust-based relationship

A: trust is important. I do agree. Trust must be backed up with the formal process. because with these people, civil society, and NGOs, that might be all right. But when it comes to the inter-organisational relationship among the government organisations, the trust-based

relationship becomes very informal. I don't agree. Because that creates other issues, there should be a formal and kind of close collaborated accountability process.

Q: any other suggestions regarding organisational capacity development?

A: yes. as I mentioned. What we need is how to self-organisational development. For example, CCS might not know everything about the climate change secretariat. Identifying and uplifting their organisational capacity is good.

Q: what would be your suggestion to overcome personal attributes related to issues such as lack of enthusiasm and negative attitude towards collaborative planning?

A: Establish indicators to monitor the progress and ensure participation and Offer incentives and rewards for their collaborative performance. So personal related issues can be overcome. But the incentives are not only physical incentives like finances. But other incentives such as recognition, certificates, or whatever. Those are quite important. Not a career development. Sometimes I have seen, for example, UDA invited a person from the provincial council. And once the project is completed, they send a recognition letter saying thank you for participation and blab la and copy to the head of the institute. That itself gives motivation for them. That is what I said: offering incentives or rewards should be financial or physical and other as well recognition etc.

And, once the mandate is there to collaborate with the proper monitoring, everybody should collaborate without their personal preference. I look at this issue from this angle.

Q: Okay, finally, other than what we discussed earlier, would you like to mention the features of the suitable collaborative structure, and what kind of structure will you propose?

A: I think I have mentioned all. However, the top-down rigid system of the country needs to be changed, and the alignment of the national physical plan should be ensured in all local plans. There should be an integration. We need a neutral leadership that helps provide equality among stakeholders as shown in the identified enablers to overcome the current issues.

Q: Okay, thank you. Any other suggestions?

A: I think I have mentioned all.

Appendix M: The validation process of the causal loop diagram.

Figure M-1 shows the causal loop diagram developed by the researcher based on the narratives obtained from the experts' interviews.

Figure M-1: Causal loop diagram before the expert validation

This diagram was validated by the experts (details are given in Table M-1). Changes have been made in terms of simplifying the terminology use and the complexity of the diagram. The revised diagram shown in Figure N-2.

Table M-1: Suggestions received from the experts with regard to the causal loop diagram.

Expert ID	Expertise area	Profile	Number of interviews	Suggestions
ECLV 1	RSUP	Senior scientist in NBRO	1	• Agreed on the connections formed in the diagram and proposed the following: Experience of staff in a particular field and of a particular process will determine their attributes positively in dealing with RSUP collaboration initiatives and, therefore, participation will increase; conflicts and unsupportive attributes of the same organizational staff leads to an unsupportive working environment (senior persons are not listening to younger staff (different concepts among the staff)
ECLV 2	RSUP	Planner, Former high-level officer in Town Planners of Sri Lanka, The Commonwealth Association of Planners, and UDA.	1	• Agreed on the connections formed in the diagram and proposed the following changes: political pressure on completing the plans in a required short time period makes the process ineffective. • Suggested using "Integrated" word policies and legislation rather than coherence among the policies.
ECLV 3	RSUP	Professor, University of Colombo	1	• Connections are logically correct and presented. • Asked to simplify the model to transfer knowledge to all kinds of people
ECLV 4	RSUP and systems thinking	Researcher, Systems thinking expert, University of Salford	4	• Commented on the way of enhancing the quality of the diagram by reducing its complexity with the following suggestions: usage of ghost variables; guide to identify balanced and reinforcing loops; and, finally, asked to simplify the diagram by reducing the detailed information
ECLV 5	RSUP and systems thinking	Senior lecturer, systems thinking expert, Bahauddin Zakariya University	4	

Figure M-2: Revised causal loop diagram

In summary, the connections given in the original diagram were agreed by all of the experts and appreciated. However, the following key changes were made because of the expert interviews.

- The original diagram was simplified as much as possible. The variables' names were shortened to reduce the complexity.

- The "political interference" variable was converted into two variables which are political interference in appointment and political pressure on plans as advised by an expert.

- Furthermore, a "previous working experience" variable that determines personal attributes and a "unsupportive organisational staff" variable that determines the working environment were added into the original diagram.

Appendix N: Validation process of the framework

Six experts who are experienced in the RSUP field in Sri Lanka were selected for the validation process. Table N-1 shows the profiles of the experts. The framework and the five documents based on the outcomes were explained in detail to the experts.

Table N-1: Profile of experts

Expert ID	Description
VE1	Professor with research experience in a similar area
VE2	Senior scientist in NBRO
VE3	A high-level officer who has working experience in government and non-government organisations relating to climate change
VE4	Disaster risk reduction specialist and also has experience as an urban planner.
VE5	A high-level officer in the UDA
VE6	A high-level officer in the DMC

As an outcome of the validation process, all the experts fundamentally agreed with the outcomes and the developed framework with some suggestions, as discussed below. All the experts saw the framework and outcomes as being synthesised and constructed logically as well as helpful for the current context.

VE2 suggested that since the proposed collaborative structural arrangement required significant legislative changes, the UDA could be a collaborative leader and hire any planning agency to design urban plans with the collaboration of other agencies to ensure neutral leadership. However, the study regards this proposal as a temporary solution since a balanced top-down approach and bottom-up approach cannot be reached to integrate the national physical plan and local plans if leadership is not given to the Department of national physical planning. Furthermore, the UDA contains town planners as the majority of their staff (for planning activities) being a technical agency for planning.

VE3 suggested having a two-way or multidirectional relationship among the steps given in the framework since the previous step can also be understood satisfactorily while focusing on the next step as the system is dynamic. VE3 observed that bringing legal draftsmen or policymakers (such as policy studies' institutes) as stakeholders is essential since the proposed collaborative governance requires significant policy and legislative changes.

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Further, policy research feedback coming into the entire system is quite essential since the collaboration structures must be dynamic. Therefore, VE3 highlighted that the engagement of policy research organisations is essential to get external feedback to change policies that align with the dynamic system. VE3 suggested that sustainable development council needs to be given the role of coordinating and revising policies at the national level. VE3 supported the provincial council's involvement in the proposed structure as a member of the regional planning committee that has already been mentioned in the "regional committee" arrangement at the provincial level. VE3 suggested considering the transformation of the rural areas to urban areas in Sri Lanka and proposed the required development of the Predesiya Sabas and looking at how the transformation is considered in planning these non-urban areas which are showing urbanisation characteristics. This proposal is out of the scope of this study; therefore, the transformation procedure is proposed as a further research area. However, urbanisation and urban definition issues in Sri Lanka have been discussed in the study. Furthermore, to bring urban area planning and non-urban area planning activities under an one umbrella, the study proposes the Department of National Physical Planning, through regional physical planning, as the leader for collaborative RSUP. This common leadership among urban and non-urban areas will help to integrate plans across boundaries and ensure alignment with regional plans.

The overall study was appreciated by VE3, especially the maturity grid development. VE3 proposed documenting collaboration practices and conducting induction programmes on the collaborative roles and responsibilities of new relevant staff. Such induction programmes will help to continue collaboration practices after existing staff leave.

VE4 appreciated the policy and legislative changes proposed in the study since they are essential for making relevant stakeholders collaborate in planning. Furthermore, VE4 suggested having a proper monitoring system to implement the developed plan effectively. Since this area is out of the scope of the study, the study proposes this as further research. However, the study found that the implementation mechanism is weak and indicated that national planning department does not contain the alignment of urban planning as one of the points on their checklist to release funding for projects. Furthermore, VE4 suggested improving the local authorities' control regarding planning and their sustainable development approach. However, this area is not under the study area and is proposed for future research.

VE6 observed that the findings included significant policy changes within the existing system are essential to create the change. VE6 appreciated the proposed maturity grid. Furthermore, VE6 suggested that the stakeholders' roles (such as the terms of responsibilities or the job descriptions) need to be verified.

N-1: The second stage of validation

According to a comment received from the VE6, the study conducted another set of expert interviews to validate the findings, particularly looking at identifying stakeholders' roles and responsibilities and the proposed network.

Table N-2: Experts profile and key suggestion

Expert ID	Description	Key suggestion
V2E1	Professor and highest-level officer in the UDA	The DMC can be classified as a mandated agency for providing risk information. The Sri Lankan Tourism Development Authority is a planner and approval agency in the declared tourism areas. CCD is a planner and its plans for coastal areas are reviewed and revised every four years. CEB is an approved agency for large-scale energy-related projects. BOI is not an approval agency, and they need to get permission from the UDA if they want to implement any development activity under the purview of UDA. District Secretariats and Divisional Secretariats are the approval agencies for state land. The Sustainable Energy Authority is an approval agency for minor energy or renewable energy projects. GSMB is an approved agency for mines and mineral extraction. Appreciated the collaborative governance proposal.

Expert ID	Description	Key suggestion
V2E2	Local governance expert	Agreed and proposed the DMC as a responsible party for providing risk information and maps.
V2E3	Highest-level officer in the DMC	The DMC need to provide risk mapping and collaborate with other organisations with respect to DRR.
V2E4	Local-level planning committee member from the UDA.	The Sustainable Energy Authority is an approved agency for minor energy or renewable energy projects. GSMB is an approved agency for mines and mineral extraction. Even though the UDA collaborates with RDA and RDD during planning, their approval is also essential in the implementation stage.
V2E5	Higher level officer, District Secretariat office	The Divisional Secretariat is an approval party for the commencement of any development activities on state land.

After the second validation stage, the following outcomes were revised as presented below.

N-2. Revised framework

Figure N-1 shows the framework before the expert validation and Figure N-2 shows the framework after expert validation.

Figure N-1: Framework developed before validation.

Figure N-2: Revised framework

N-3: Revised step 02

Table N-3 shows the stakeholder mapping before the expert validation and Table N-4 shows the stakeholder mapping after the expert validation.

Table N-3: Mapped stakeholders' roles and responsibilities before expert validation

No	Key stakeholders	Key role	Proposed roles in RSUP
Planning agencies			
1	National Physical Planning Department	Decision makers (national, regional, local non-urban area planning)	Decision makers at the national level, collaborative leader
2	Urban Development Authority	Planners and decision-makers for implement-ations (leading planning agency)	Decision makers (technical agency as urban planners)
3	Department of Land Use Policy Planning	Planners	Mandated collaborative member in RSUP
4	Local authorities	Implementation decision-makers	Mandated collaborative members in RSUP, representatives of the community through a citizen charter
5	District Secretariats / Divisional Secretariats	Implementation decision-makers	Mandated collaborative members in RSUP
6	CIDA	Regulatory planners for building codes and construction guidelines	Decision makers (collaborative regulations, construction guidelines' developers, and building codes' developers)
DRR and CC agencies			
7	Disaster Management Centre (DMC)	Coordinating agency in terms of DM	Advisor
8	Department of Irrigation (DI)	Technical agency – floods	The decision maker (accountable technical agency for flood disaster risks)
9	Geological Survey and Mines Bureau (GSMB)	Technical agency - earthquakes	The decision maker (accountable technical agency for earthquake related disaster risks, and the mines)

10	National Building Research Organization (NBRO)	Technical agency - landslides and research organization	The decision maker (accountable technical agency for landslide-related disaster risks, and advisors for others involved in disaster-related research areas)
11	Department of Meteorology (DoM)	Technical agency - cyclones, heavy rain, lightning, high wind forecasts and tsunami warnings	The decision maker (accountable technical agency for cyclones, heavy rain, lightning, high wind forecasts and tsunami related disaster risks)
12	Ministry of the Environment (Climate Change Secretariat (CCS))	Technical agency as a key agency dedicated to climate change	The decision maker (accountable technical agency for climate change)
Decision-making agencies for the development			
13	Central Environmental Authority (CEA)	Decision makers in the implementation	Mandated collaborative members in RSUP
14	Sri Lanka Land Reclamation & Development Corporation (SLLRDC)	Decision makers for implementation in low marshy lands.	Decision makers (as a key approval agency for implementation and as a responsible agency for landfilling)
15	Coast Conservation Department (CCD)	Decision makers for implementation for coastal areas	Decision makers (as a key approval technical agency for implementation)
16	Board of Investment (BOI)	Decision makers for implementation	Mandated collaborative members in RSUP
17	Mahaweli Authority (MA)	Decision makers for implementation within their purview	Mandated collaborative members in RSUP
18	Department of Wildlife (DWL)	Decision makers for implementation	Mandated collaborative members in RSUP
19	Department of Agriculture (AD) (Soil Conservation Department)	Decision makers for implementation in the soil erosion area	Decision makers (as a key approval technical agency for implementation)
20	Department of the Forest (FD)	Decision makers for implementation	Mandated collaborative members in RSUP

No	Key stakeholders	Key role	Proposed roles in RSUP
21	Road Development Authority (RDA)	Implementation decision-makers	Mandated collaborative members in RSUP
Advisors / Supporters			
22	NGOs	Advisors	Create formal or informal collaborations for advice and funding, conduct training and development activities, and engage and represent the community.
23	Universities	Advisors	Create informal collaborations as an advisor or formal collaborations by providing decision making accountability if they are providing technical input.
24	Research organisations	Advisors	Create informal collaborations according to need as an advisor, or formal collaborations by providing decision making accountability if they are providing technical input.
Community			
25	Community	Key contributors and suggestion makers	Create formal and informal collaborations in RSUP process with community and community-based organisations.

Table N-4: Proposed mapped stakeholders' roles and responsibilities after expert validation.

No	Key stakeholders	Key role	Proposed roles in RSUP
Planning agencies			
1	National Physical Planning Department	Decision makers (national, regional, local non-urban area planning)	Decision makers at the national level, collaborative leader
2	Urban Development Authority	Planners and decision-makers for implementation (leading planning agency)	Decision makers (technical agency as urban planners)
3	Department of Land Use Policy Planning	Planners	Mandated collaborative member in RSUP
4	Local authorities	Implementation decision-makers	Mandated collaborative members in RSUP, representatives of the community through a citizen charter
5	District Secretariats /	Implementation decision-makers	Mandated collaborative members in RSUP

No	Key stakeholders	Key role	Proposed roles in RSUP
	Divisional Secretariat		
6	CIDA	Regulatory Planners for building codes and construction guidelines	Decision makers (collaborative regulations, construction guidelines' developers, and building codes' developers)
DRR and CC agencies			
7	Disaster Management Centre (DMC)	Coordinating agency in terms of DM	The decision maker (accountable agency for providing accurate risk maps)
8	Department of Irrigation (DI)	Technical agency – floods	The decision maker (accountable technical agency for flood disaster risks)
9	Geological Survey and Mines Bureau (GSMB)	Technical agency - earthquakes	The decision maker (accountable technical agency for earthquake related disaster risks, and the mines)
10	National Building Research Organization (NBRO)	Technical agency - landslides and research organization	The decision maker (accountable technical agency for landslide-related disaster risks and advisors for others involved disaster-related research areas)
11	Department of Meteorology (DoM)	Technical agency - cyclones, heavy rain, lightning, high wind forecasts and tsunami warnings	The decision maker (accountable technical agency for cyclones, heavy rain, lightning, high wind forecasts and tsunami related disaster risks)
12	Ministry of the Environment (Climate Change Secretariat (CCS))	Technical agency as a key agency dedicated to climate change	The decision maker (accountable technical agency for climate change)
Decision-making agencies for the development			
13	Central Environmental Authority (CEA)	Decision makers in the implementation	Mandated collaborative members in RSUP
14	Sri Lanka Land Reclamation & Development Corporation (SLLRDC)	Decision makers for implementation in low marshy lands.	Decision makers (as a key approval agency for implementation and as a responsible agency for landfilling)
15	Department of Coast Conservation and Coastal	Planners and decision-makers for	Decision makers (as a key approval technical agency for implementation)

No	Key stakeholders	Key role	Proposed roles in RSUP
	Resource Management (CCD)	implementation in coastal areas	
16	Mahaweli Authority (MA)	Decision makers for implementation within their purview	Mandated collaborative members in RSUP
17	Department of Wildlife (DWL)	Decision makers for implementation	Mandated collaborative members in RSUP
18	Department of Agriculture (DoA) (Soil Conservation Department)	Decision makers for implementation in the soil erosion area	Decision makers (as a key approval technical agency for implementation)
19	Department of the Forest (FD)	Decision makers for implementation	Mandated collaborative members in RSUP
20	RDA (Road Development Authority)	Implementation decision-makers	Mandated collaborative members in RSUP
21	RDD (Road Development Department)	Implementation decision-makers	Mandated collaborative members in RSUP
22	Sri Lanka Tourism Authority (SLTA)	Implementation decision-makers	Mandated collaborative members in RSUP
23	SEA (Sustainable Energy Authority)	Implementation decision-makers	Mandated collaborative members in RSUP
24	CEB (Ceylon Electricity Board)	Implementation decision-makers	Mandated collaborative members in RSUP
25	Agrarian Department (AD)	Implementation decision-makers	Mandated collaborative members in RSUP
Advisors / Supporters			
21	NGOs	Advisors	Create formal or informal collaborations for advice and funding, conduct training and development activities, and engage and represent the community.
22	Universities	Advisors	Create informal or formal collaborations as an advisor by providing decision-making accountability if they provide technical input.

No	Key stakeholders	Key role	Proposed roles in RSUP
23	Research organisations	Advisors	Create informal collaborations according to need as an advisor, or formal collaborations by providing decision-making accountability if they provide technical input.
Community			
24	Community	Key contributors and suggestion makers	Create formal and informal collaborations in the RSUP process with community and community-based organisations.

N-4: Revised step 04

Figure N-3 shows a collaborative governance arrangement before the expert validation and Figure N-4 shows a collaborative governance arrangement after expert validation.

Figure N-3: Collaborative governance arrangement after expert validation.

Figure N-4: Collaborative governance arrangement before expert validation.

In addition to the framework the following stakeholder roles mapping and the power and interest analysis (See section 4.12.1 and section 4.12.2) was revised as given below.

N-5: Revised stakeholder roles and responsibilities mapping

The Figure N-5 shows the stakeholder roles and responsibilities after expert validation.

Figure N-5: Revised stakeholder roles and responsibility mapping

N-6. Power and interest-based analysis of the Stakeholders

This section provides the stakeholders' power and interest analysis after the validation with experts as follows: Table N-6 power and interest matrix in RSUP decision-making, and Table N-7 power and interest matrix in RSUP implementation decision-making.

Table N-6 Stakeholder analysis based on their decision-making power in RSUP.

Power/Interest	Low	High
High		UDA
Low	DS/DVS MA RDA RDD	DNPP NPPC DLUPP CIDA LA SLLRDC CCS DMC ID GSMB NBRO DoM CCD CEA FD DWL DoA AD SEA CEB SLTDA Academics Research organisations NGOs Community

Table N-7: Stakeholder analysis based on their decision-making power in project approval and implementation.

Power/Interest	Low	High
High	RDA RDD MA DS/DVS	UDA LA SLLRDC ID NBRO SLTDA CEB CCD CEA FD DWL DoA AD SEA GSMB
Low		DNPP NPPC CCS DMC DLUPP CIDA DoM Academics Research organisations NGOs Community

Appendix O: List of publication

1. Ganeshu, P.; Fernando, T.; Keraminiyage, K. Barriers to, and Enablers for, Stakeholder
   Collaboration in Risk-Sensitive Urban Planning: A Systematised Literature
   Review. *Sustainability* 2023, *15*, 4600. https://doi.org/10.3390/su15054600

Appendix P: Framework for enhancing stakeholder

collaboration in RSUP.

Type of cooperation : Unilateral action / Coordination

Step 01: Understanding the stakeholder collaboration context in RSUP

External barriers	Inter organizational level barriers	Intra organizational level barriers	Personal level barriers

External barriers
- Lack of supports from policies and laws for informal collaboration
- Inadequate enforcement of policies and laws
- Lack of policy implementation tools
- Lack of integration and coherence in government policies and laws
- Lack of legislative support for collaboration
- Lack of policy evaluation and update
- lack of funding guidance in policies
- No mandates and procedure for information and knowledge sharing

(1+4/A+B+C)

- Lack of political guidance and vision
- Political interference
- Frequent changes in national development policies

(1+2+3)

Inter organizational level barriers
- Ad hoc collaboration process
- No mandated defined collaboration process with correct stakeholder identification, feedback, monitoring and incentive mechanism
- Involvement of large number of organisations
- No equality and power sharing
- Lack of clarity in responsibility
- Data selling for money
- Lack of information and knowledge sharing
- Ccomplex and unsuitable governance arrangement *(1+4/C)*
- Lack of understanding among stakeholders *(1+6+7/D+E+F+G)*

Intra organizational level barriers
- Silo based working culture and pattern
- Lack of participation and representation in collaboration process **(11)**
- No same representative at all stage of collaboration process
- Lack of data
- Unreliability of the given data
- Data not available in required format
- Information are not available with relevant agency
- Inadequate funding (A+F)
- Lack of technical capacity
- Unsuitable organizational structure
- In adequate and ineffective management of staff
- Lack of knowledge of staff
- Not adopting modern digital technologies

Personal level barriers *(1+5+6+7+8+9+10+D+E)*
- Lack of accountability and responsibility
- No collaborative task allocation with official job description
- Lack of motivation
- Personal judgement in collaboration practice
- Reluctant to share data
- Language barriers
- Unsupportive personal attributes of collaborative members **(11)**

Legend themes: Administrative environment theme; Information and knowledge sharing; Collaboration process; Organizational capacity; Working culture

Strategies : (1) strengthening policies and laws and develop policy implementation tools through collaborative review; (2) collective stand against politicians; (3) Establish criteria for political appointment; (4) Establish collaborative governance with shared powers for identified stakeholders that leads required intra organizational structural changes; (5) include collaborative attributes in education system; (6) Capacity development of the organisations; (7) Adopt suitable recruitment system and appointment of suitable organizational leadership (8) Monitoring and evaluation (9) Motivation and top management influence towards collaborative culture; (10) Ensure common language usage; (11) Create trust

Opportunities : (A) International collaboration and commitments; (B) Existing policies and laws ; (C) Existing coordinating councils and committees; (D) Existing technical committees; (E) National plans and strategies; (F) NGOs; (G) Existing knowledge platform

Step 02: Identify and mapping the stakeholders' roles and responsibilities

No	Key stakeholders	Key role	Proposed roles in RSUP
Planning agencies			
1	National Physical Planning Department	Decision makers (national, regional, local non-urban area planning)	Decision makers at the national level, collaborative leader.
2	Urban Development Authority	Planners and decision-makers for implementation (leading planning agency)	Decision makers (technical agency as urban planners).
3	Department of Land Use Policy Planning	Planners	Mandated collaborative member in RSUP
4	Local authorities	Implementation decision-makers	Mandated collaborative members in RSUP, representatives of the community through the citizen charter
5	District Secretariats / Divisional Secretariats	Implementation decision-makers	Mandated collaborative members in RSUP
6	CIDA	Regulatory planners for building codes and construction guidelines	Decision makers (collaborative regulations, construction guidelines' developers, and building codes' developers)
DRR and CC agencies			
7	Disaster Management Centre (DMC)	Coordinating agency in terms of DM	The decision maker (accountable agency for providing accurate risk maps)
8	Department of Irrigation (DI)	Technical agency – floods	The decision maker (accountable technical agency for flood disaster risks)
9	Geological Survey and Mines Bureau (GSMB)	Technical agency - earthquakes	The decision maker (accountable technical agency for earthquake related disaster risks and the mines)
10	National Building Research Organization (NBRO)	Technical agency - landslide and research organization	The decision maker (accountable technical agency for landslide-related disaster risks and advisors for others involved in disaster-related research areas)
11	Department of Meteorology (DoM)	Technical agency -cyclones, heavy rain, lightning, high wind forecasts and tsunami warnings	The decision maker (accountable technical agency for cyclones, heavy rain, lightning, high wind forecasts and tsunami related disaster risks)
12	Ministry of the Environment (Climate Change Secretariat (CCS))	Technical agency as a key agency dedicated to climate change	The decision maker (accountable technical agency for climate change)
Decision-making agencies for the development			
13	Central Environmental Authority (CEA)	Decision makers in the implementation	Mandated collaborative members in RSUP
14	Sri Lanka Land Reclamation & Development Corporation (SLLRDC)	Decision makers for implementation in low marshy lands	Decision makers (as a key approval agency for implementation and as a responsible agency for landfilling)
15	Department of Coast Conservation and Coastal Resource Management (CCD)	Planners and decision-makers for implementation for the coastal areas	Decision makers (as a key approval technical agency for implementation)
16	Mahaweli Authority (MA)	Decision makers for implementation in their purview	Mandated collaborative members in RSUP
17	Department of Wildlife (DWL)	Decision makers for implementation	Mandated collaborative members in RSUP
18	Department of Agriculture (DoA) (Soil Conservation Department)	Decision makers for implementation in the soil erosion area	Decision makers (as a key approval technical agency for implementation)
19	Department of the Forest (FD)	Decision makers for implementation	Mandated collaborative members in RSUP
20	RDA (Road Development Authority)	Implementation decision-makers	Mandated collaborative members in RSUP
21	RDD (Road Development Department)	Implementation decision-makers	Mandated collaborative members in RSUP
22	Sri Lanka Tourism Authority (SLTA)	Implementation decision-makers	Mandated collaborative members in RSUP
23	SEA (Sustainable Energy Authority)	Implementation decision-makers	Mandated collaborative members in RSUP
24	CEB (Ceylon Electricity Board)	Implementation decision-makers	Mandated collaborative members in RSUP
25	AD (Agrarian department)	Implementation decision-makers	Mandated collaborative members in RSUP
Advisors / Supporters			
21	NGOs	Advisors	Create formal or informal collaborations for advice and funding, conduct training and development activities, and engage and represent the community.
22	Universities	Advisors	Create informal or formal collaborations as an advisor by providing decision-making accountability if they provide technical input.
23	Research organisations	Advisors	Create informal collaborations according to the need of an advisor or formal collaborations by providing decision-making accountability if they provide technical input.
Community			
24	Community	Key contributors and suggestion makers	Create formal and informal collaborations in the RSUP process with community and community-based organisations.

Step 03: Strengthening policies and legislation through collaborative review and update

Nine key policy and legislative changes to strengthen existing policies and law.

(1) Stakeholders should collaboratively review policies and legislation at regular intervals for effective stakeholder collaboration in risk-sensitive urban planning (the stakeholders' list is provided in step 02)

(2) Policies and legislation should define mandated collaboration procedures with an indication of stakeholders' roles and responsibilities (stakeholders' identification and roles are provided in step 02)

(3) Policies and legislation should determine the collaborative institutional framework for risk-sensitive urban planning with required decentralised and neutral leadership features (that will support the collaborative governance arrangements proposed in step 04).

(4) Policies and legislation should delegate shared powers to key stakeholders with decision-making authority in urban planning (the decision-making stakeholders' list is provided in step 02)

(5) Policies and legislation should provide guidance for funding for these collaboration processes (e.g. guidelines for receiving funds from the national budget)

(6) Policies should provide criteria to revise the national common planning policy and plans without them being influenced by governmental changes and political manifestoes.

(7) Policies should allow informal collaboration in risk-sensitive urban planning and permit formalised collaboration with private organisations such as NGOs as required, which can lead to receiving several benefits from private organisations (for example, allowing the creation of formal collaboration with required agencies such as NGOs in order to receive funds and receive support for organisational capacity development; creating an international collaboration that provides funds).

(8) Policies and legislation should encourage staff development activities such as research and training sessions to enhance subject and technical knowledge.

Step 04: Establish collaborative governance structure

National level

Existing members : Chairman (secretary of the ministry in charge of the national physical planning- Ministry of urban development, 2022); Secretariats of the ministries in charge for the following subjects: physical planning, economic planning, finance, land, agriculture, industry, housing, transport, highways, ports, civil aviation, coast conservation, environment, forestry, tourism, irrigation, power, home affairs, provincial councils, plan implementation, culture, fisheries, Mahaweli development, plantation, construction; Chief secretaries of all provinces ; Director general national physical planning; Director general of UDA; Director general of BOI; Director general of national planning .
Proposed members : other relevant ministers from the ministries responsible for listed agencies (document 02)

National Physical planning council → Inter- ministerial coordination committee → Department of national physical plan → Regional planning Committee

Existing members : Chairman (president); Vice chairman (minister in charge of the national physical planning- Ministry of urban development, 2022); Secretary (secretary of the ministry in charge of the national physical planning- Ministry of urban development, 2022);Ministers in charge for the following subjects: economic planning, financial, land, agriculture, industry, housing, urban development, transports, highway, ports, civil aviation, coast conservation, environment, forestry, tourism, irrigation, power, culture, provincial councils, plan implementation, health.; Chief ministers of all provinces .
Proposed members : other relevant ministers from the ministries responsible for listed agencies (document 02)

Regional / provincial level

Chief secretary of the provincial council – Chairman; A representative from local Authority; The district secretaries of the province; A representative of the UDA and RDA; A officer does not belong to the rank of assistant superintendentof the survey from the survey department; not more than three persons nominated by the minister who have knowledge in economics, environment, physical planning, administration, or any other field related to physical planning.

District/ Local level

Proposed network at local level with decentralized powers:

UDA; NBRO; CEA; Department of Irrigation (DI); Geological Survey and Mines Bureau (GSMB); Department of meteorology (DoM); Climate Change Secretariat (CCS) *; CCD; DoA; SLLRDC; CIDA; Local authorities (LA) *; DLUPP; RDA; BOI; Department of wildlife; MA (only their purview); Forest department; District secretariat and divisional secretariat office *; Research organisations; Universities; Community based organisations *; NGOs *; District coordination unit (DMC) *

Legend
- Agencies need to be collaborated with mandated powers
- Decision makers with decentralised powers
- Collaborative leaders
- Can be formal contracts or informal according to the requirements
- * - Organisations that can represent community

See next page

Continuation form previous page

Step 05: Measure organisational collaboration maturity and uplift organizational capacity towards collaboration

Dimension	Indicators	Level 0: Isolated	Level 1: Initial	Level 2: Linked	Level 3: Integrated	Level 4: Extended
Administrative environment	1. Laws and policies related to collaboration	No policies and legislation to create mandates to collaborate.	There are no policies and legislation to create mandates to collaborate, but they may be influenced to inform or disseminate their decisions among other stakeholders or else create enough interest to request information about the decisions of RSUP.	Organisations have policies, mandates, or laws to participate in consultations and discussion meetings with other stakeholders in respect of RSUP.	Organisations have supportive policies, policy implementation tools, mandates, laws, or contracts to contribute to risk-sensitive urban planning. However, signing authority is not given in their mandates.	Organisations have policies, policy implementation tools, mandates, or laws to undertake risk-sensitive urban planning with decision-making authority and accountability (signing authority). Therefore, the organisations' representative has signing authority in decision-making. These policies are continually reviewed and improved based on the lessons learnt.
	2. Laws and policies related to data sharing and knowledge sharing	No policies and legislation to create mandates regarding communication and data sharing	Policies and legislation create the need or interest to communicate and share information relating to RSUP decisions with other organisations.	Organisations have policies, mandates, or laws regarding data sharing and communication systems, including an information request process with other organisations during consultations and discussions.	Organisations have policies, mandates, laws, or contracts to determine their information standards, information-sharing systems, and communication systems in collaborative planning.	Organisations have policies, mandates, or laws for communication and information-sharing systems to indicate the accountability of the provided information. These policies are continually reviewed and improved based on the lessons learned.
	3. Degree of the supportive governance mechanism	No governance mechanism towards collaboration, such as strategic governance (strategic planning, investment planning, reporting structures); IT governance (which addresses not only technical aspects but also information system-related issues such as compliance with standards/taxonomies in policies and procedures); and process management governance (which addresses how the organisation is guided and supported towards a process-centric organisation, formalisation in decision-making and supporting improvement in collaboration processes.	Some governance mechanisms exist for communicating and sharing or receiving information with other organisations related to their RSUP decisions.	Organisations have strategies, IT, process management governance mechanisms for data sharing and communication procedures, including a request process with other organisations in the consultation and discussion of risk-sensitive urban planning. The strategies are not adequately connected to the implementation stage.	Similar features as those on level 02 prevail. In addition, these governance mechanisms are connected to the implementation level.	Similar features as those on level 03 prevail. In addition, these mechanisms are continually reviewed and improved based on lessons learned.
	4. Governance structure and Collaborative task assignments	Organisations have a top-down approach with a hierarchical structure and no collaborative task is assigned to staff. No consideration of the availability of the sub-unit or representative to perform the collaborative requirements.	Organisations have a top-down approach with a hierarchical structure, and there may be a collaborative task allocation to staff. A sub-unit or representative may be available to support RSUP.	A sub-unit or representative is available to participate in the consultation/discussion process with task allocation alongside a appropriate job description with the resources and limited authority to provide the necessary data without depending on the top management or head office. The organisation relies on top-down approach to decision-making.	A dedicated sub-unit or representative is available to participate in the risk-sensitive urban planning process with a appropriate job description and task allocation with the resources and the required authority to be involved in the planning process without top management interference. The organisation has a balanced top-down and bottom-up approach to decision-making.	A dedicated sub-unit or representative is available to participate in the risk-sensitive urban planning process alongside a appropriate job description and task allocation with decentralised decision-making authority on behalf of the organisation. The organisation has a balanced top-down and bottom-up approach to decision-making. The structure is continually revisited and improved based on the lessons learned
Process	5. Business process management	Collaboration in, or contribution to, risk-sensitive urban planning as an organisational main business process does not exist.	Risk-sensitive urban planning is considered in the main organisational business processes. Collaboration with, or contribution to, risk-sensitive urban planning is ignored in the organisational main business processes.	Collaboration with, or contribution to, risk-sensitive urban planning is not aligned with the organisational main business processes. The degree of quality of outcome/performance of the collaborative business process is low.	Collaboration with, or contribution to, risk-sensitive urban planning is aligned with the organisational main business processes. The quality outcome/performance of the collaborative business process can be seen.	Collaboration with, or contribution to, risk-sensitive urban planning is integrated with the organisational main business processes. The quality of the outcome/performance of the collaborative business process is high. The integration of the collaborative process into the main business processes are continually revisited and improved based on the lessons learned.
	6. Cost management process	Cost management of the collaborative process is non-existent.	Awareness regarding cost management of the collaborative process exists but is ignored.	Cost management of the collaborative process is established regarding resource allocation for consultancy/discussion purposes. Sufficient fund allocation and financial support from top management can be seen.	Cost management of the collaborative process is well established. Fund allocation and financial support from the top management are available and may be incorporated at the policy level. Cost-benefit analysis can be seen. A clear cost-sharing agreement may be available.	Cost management of the collaborative process is well established. Fund allocation and financial support from the top management are prominent and incorporated in the policies. An explicit cost-sharing mechanism agreement and a cost-benefit analysis can be seen. The cost management process is reviewed and continuously improved.
	7. Collaboration process management / collaborative work plan and process management	Collaboration work plan and management do not exist.	Collaboration work plans and management are ignored. Organisations may be aware of the collaboration opportunities relating to risk-sensitive urban planning.	The collaborative work plan is defined (formally or informally) in terms of consultations and discussions that includes the defined number of collaborative meetings, the list of stakeholders, the communication path, and the required resource allocation and technology requirements. Participation in collaboration meetings is mandatory. The organisation is open and aware of the collaboration opportunities relating to risk-sensitive urban planning with the connection of relevant bodies and committees. The influence of the top management in the process is absent. Monitoring and evaluation of the collaboration process and the digital communication system may be available.	The collaborative work plan is well defined in formal written specifications, including communication paths, required resource sharing and technology requirements. The organisation is connected with risk-sensitive urban planning bodies and committees for collaborative design. The influence of the top management in the process is medium. Conflict resolution agreements may be available, and monitoring and evaluation of the collaboration process are available. The digital communication system is available for efficient and quick responses and collaborative planning.	A collaborative work plan is well defined in formal written specifications, including communication paths, required resource sharing and technology requirements. The organisation is connected with risk-sensitive urban planning bodies and committees for collaborative design and decision-making. The influence of the top management in the process is high. Conflict resolution agreements are available. Monitoring and evaluation of the collaborative contributions are available. A digital communication system is available for efficient and quick responses and collaborative planning. Collaborative work plans and processes will be reviewed and continuously improved based on lessons learned.
	8. Collaboration process management/ awareness and allocation of suitable representation	Awareness of collaboration does not exist. No suitable collaborative task distribution can be seen.	Awareness of collaboration does exist. However, awareness creation regarding the collaboration requirements and suitable collaborative tasks' distribution is ignored.	Awareness of the collaboration requirements and process exists. A suitable dedicated representative with capabilities with relevant collaborative task allocation and with appropriate job description including the consultation/discussion process is available. The same representation from the organisation in all consultation/discussion meetings/ processes is ensured. Training and development programmes may be available for the collaborative staff.	Awareness of the collaboration requirements and process exists. A dedicated, suitable representative with the required capabilities, relevant collaborative task allocation, and with appropriate job description including risk-sensitive urban planning is available. The same representation throughout the process is ensured. Training and development programmes are available for the collaborative staff.	Awareness of the collaboration requirements and process exists. A dedicated, suitable representative with the required capability, relevant collaborative task allocation, and with appropriate job description including risk-sensitive urban planning is available. The same representation throughout the process is ensured with the dedicated accountability and authority to make decisions and signing authority is also assured. Training and development programmes are mandatory for the collaborative staff.
	9. Knowledge-sharing process	There is no knowledge sharing and management process relating to RSUP.	An awareness of knowledge sharing and management relating to RSUP does exist but is, however, ignored.	Knowledge sharing can be seen, but the level of knowledge that gets validated and reused in the organisation is low. A knowledge management system or usage of various knowledge channels are not available.	Efficient knowledge sharing is available. The level of knowledge that gets validated and reused in the organisation can be seen. Knowledge management systems or usage of various knowledge channels may be available. .	Efficient knowledge sharing is available. The level of knowledge that gets validated and reused in the organisation is high. The organisation has a well-established knowledge management system and ongoing plans for continuous improvement utilising various channels.
	10. Information management process	No information sharing and management relating to RSUP.	Information sharing and management relating to RSUP are ignored. Data can be sold according to the requirements of other organisations.	Information sharing can be seen, but all relevant information may not be shared. A straightforward information sharing system is available with data sharing regulations. Data may not be shared in the format required for planning purposes. A data selling culture may be seen. format for the planning process.	Information sharing is substantial. An information-sharing system is available with data-sharing regulations' data in the required format. A digital data storage system is available for easy sharing. There is an availability of information that the collaborative members/ partners can access. Most of the available information is used in collaborative planning.	All relevant information is carefully shared with reliability. There is an availability of information that the collaborative members/partners can access. An information sharing system is available with data sharing regulations' data in the required format. A digital data storage system is available for easy sharing. Continuous improvement in the information-sharing system is available.
Organisational system	11. Culture	A collaborative culture does not exist. Traditional silo-based working culture prevails. There is no awareness of collaborative needs.	An awareness of collaboration needs, and collaboration culture does exist. Unwillingness to collaborate and an unsupportive nature for collaboration can be seen. Traditional thinking and old routines and practices prevail.	Willingness and commitment to collaborate may be available. Competitive views on other organisations may exist. Organisations may be practicing common language usage. Collaborative culture begins to appear.	Collaborative culture can be seen. Organisational top management supports collaboration. Stakeholders may stand up against political interference. Willingness and commitment to collaboration can be seen. Organisations practice common language usage.	Similar features to those of level 3 exist. A well-defined collaboration culture is formed. In addition, a high level of trust in collaborative organisations and high commitment can be seen. Organisations practice common language usage. Continuous improvement in the collaborative culture can be seen.
	12. strategy	No interest towards collaboration is recognised. No collaborative vision, collaborative objectives, and collaboration strategy exist.	Collaborative interest is recognised. Collaborative strategy is ignored and not included in the vision or objectives of the organisation.	Organisations initially evolve by establishing a common vision, shared objectives, and collaboration strategy developments. Research and development activities may be included in the organisation's strategy. Clear funding strategies and employee development strategies with regard to collaboration (such as research and development, and collaboration incentives) may not be available.	Organisations begin to launch and implement collaborative strategic decisions with well-formed contracts distributed among all the members. The organisational business strategy is not aligned with the collaboration strategy. Capable collaborative staff selection criteria and recruitment processes can be seen. Funding strategies with regard to collaborative actions are determined. Research and development activities may be included in the organisation's strategy.	Collaborative actions are part of the mission and vision. Organisations have continuous improvement in strategic decisions and long-term organisational strategic changes, linking to collaboration actions with short-, mid-, and long-term objectives. The main organisational business strategy is aligned with the collaboration strategy. Appropriate collaborative staff selection criteria and recruitment processes can be seen. Funding strategies with regard to collaborative actions are determined.
Technology	13. Information and communication technology	Information and communication technology is not developed to support collaboration. No ICT platforms are capable of communicating with other organisations.	Awareness of the use of information and communication technology with regard to collaboration exists. Information and communication technology is not developed to support collaboration, or ICT use in collaboration is ignored. ICT platforms may not be capable of communicating with other organisations. Digital data storage may be available.	Organisations have systems that could connect with others with some ICT capacities to support collaborative requirements. Digital data storage is available. There are improvement plans to satisfy collaboration needs. The organisation is not connected with a collaborative common digital platform to support collaborative activities.	The organisation is connected with, and uses, appropriate user-friendly common digital platforms for collaborative design and communication. Digital data storage is available, and technology may support knowledge sharing, such as maintaining a collaborative knowledge platform.	Similar features to those of level 3 exist. In addition, continued improvement in the ICT system to maintain effective collaboration can be seen.
People	14. Collaborative representatives from an organisation	No awareness of any collaboration needs amongst the staff. Unavailability of dedicated collaborative staff in the organisation.	An awareness of collaboration needs among the staff can be seen. Unavailability of dedicated collaborative staff in the organisation. The available existing staff have no understanding of collaborative roles and no intention to collaborate.	Allocated collaborative staff may understand collaborative roles and have relevant knowledge, but preparation for any contribution may not be seen. Staff are involved in sufficient training and development, but reluctance to undertaken exploratory learning can be seen. Willingness, commitment, and interaction with other collaborative members may be low, and motivation through incentives and management support is low.	Dedicative collaborative staff understand collaborative roles with relevant knowledge. Staff are involved in training and development programmes for knowledge development. Commitment and interaction with other collaborative staff can be seen. Motivation through incentives and organisational management support with regard to collaboration are available.	Similar features as those in level 3 are available. Actions are taken to continuously improve staff attributes and knowledge in respect of collaborative work and decision-making.

Type of Cooperation : Joint action