

Micro-theory on knowledge transfer to foster disaster resilience: A grounded theory approach

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ABSTRACT

Although recent literature suggested that knowledge generation and dissemination in social networks influence resilience, research in knowledge transfer and social capital domains have shown a low tendency to integrate into theoretical frameworks. This paper discusses the process of building a micro-theory, which explains the dynamics of knowledge transfer in social networks of disaster responders in Sri Lanka. The proposed theory suggests the association among knowledge transfer, dimensions of social capital, and resilience in a disaster context. This study employs an interpretive case study research design, with an exploratory approach and uses grounded theory driven constant comparison method for data analysis. The transcriptions from 21 semi-structured interviews and participant observations of two disaster drill exercises used as the primary data source for the data analysis. The analysis of this study generates a coding pattern with six categories of concepts and proposes the theory of KTinSSC with the theoretical consensus from the two case studies. The proposed theory explains the knowledge transfer among responders who are focused mostly on the immediate survival and discusses the effect of knowledge transfer interactions on their normative beliefs. The study also suggests ways to attain higher levels of resilience among such survival-focused social groups.

1. Introduction

The knowledge transfer during disaster situations is ambiguous, equivocal, and complex in practice. Hence, the ability to transfer knowledge effectively and efficiently in a catastrophic environment determines the success of the disaster response measures [1–4]. Additionally, the recent scholarship on disaster resilience outlines the crucial role of employing social capital concepts to optimize the disaster knowledge transfer and build resilience [5–8]. In particular, literature advises that the knowledge generation and dissemination in social networks influence the resilience-building [9,10]. However, the researches in the three areas knowledge transfer, social capital and resilience show a low tendency to integrate into theoretical frameworks. The current body of disaster risk management literature also demonstrates an absence of research explaining the effect of knowledge transfer practices on disaster resilience. Additionally, the body of literature requires more research to examine the association between the social capital dimensions towards disaster resilience and knowledge transfer.

The motivation for the current research originates on the premise that the knowledge transfer practices among disaster responders remain

problematic in South Asian countries and there is a shortage of research to explain this impact on community resilience. On this basis, the current research sets out to explore the primary research question, "How do the knowledge transfer practices of responder groups affect disaster resilience?".

This article attempts to achieve following two objectives whilst answering the above research question. The first objective of this paper is to identify how different knowledge transfer practices followed by responders impact the resilience of social groups that are in the front line of a disaster. This article identifies a range of knowledge transfer practices employed by the first responders and assesses how these practices assists the responders to be resilient during floods. The second objective of this paper is to formulate a grounded theory to suggest the associations among the three constructs knowledge transfer, dimensions of social capital, and resilience. Based on the data that emerged from two case studies, this research explores the dynamics of knowledge transfer in a disaster context and seeks the theoretical connections to resilience. As the authors explore these constructs through the grounded theory analysis methods, the main objective is set to develop a micro theory to explain the influence of the knowledge transfer practices on resilience

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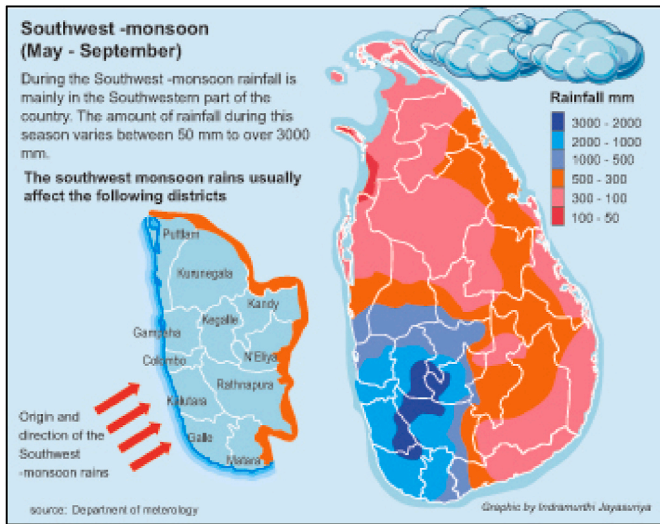


Fig. 1. Flood prone areas – Southwestern monsoon rains. Source [13]:

levels of disaster responders. Findings of this research suggests that the considered responders’ main focus is to employ short-term approaches to survive a disaster, rather than strategising long-term recovery. On this basis, the authors name the proposed theory as the micro-theory of Knowledge Transfer in Survival-Focused Social Contexts (KTinSSC). The proposed theory discusses the mobilization of knowledge transfer by two survival-focused responder groups and theorizes the association between their knowledge transfer dynamics and resilience level.

The remainder of the article proceeds as follows. The second section

presents the scope and the context of the study to elaborate on the socio-economic background of case studies chosen for this study. The third section elaborates the research design and methodological choices. The fourth and fifth sections comprise of the findings and provide discussions related to the conceptualization. The sixth section provides a synthesis between the findings of the two case studies. The seventh and eighth sections elaborate on the theory-building process and propose the proposed theory and presents a review of literature to validate the proposed theory. The ninth section discusses the generalizability of the proposed theory. The tenth section discusses limitations and future research avenues. Finally, the eleventh section elaborates on the conclusion of the study.

2. Study context

This article uses two case studies from Sri Lanka to investigate the dynamics of knowledge transfer among flood disaster responders. The scope of this study limits to the riverine inundations in the Ratnapura flood catchment between period 2016 to 2017. To ensure that participants are familiar with the knowledge transfer needs of a flood situation, first respondents of the community and administrative officers of Ratnapura who participated actively towards disaster response have chosen for this study. This section describes the context of the study under two sub-topics: floods in Sri Lanka, and the administrative structure of the study area.

2.1. Floods in Sri Lanka

Flooding in Sri Lanka follows a cyclic trend, which is mostly due to riverine inundations during the two rain periods (southwestern and northeastern monsoons) [11]. Southwestern monsoon winds flowing from the southern hemisphere, bring the heaviest rainfall to the country

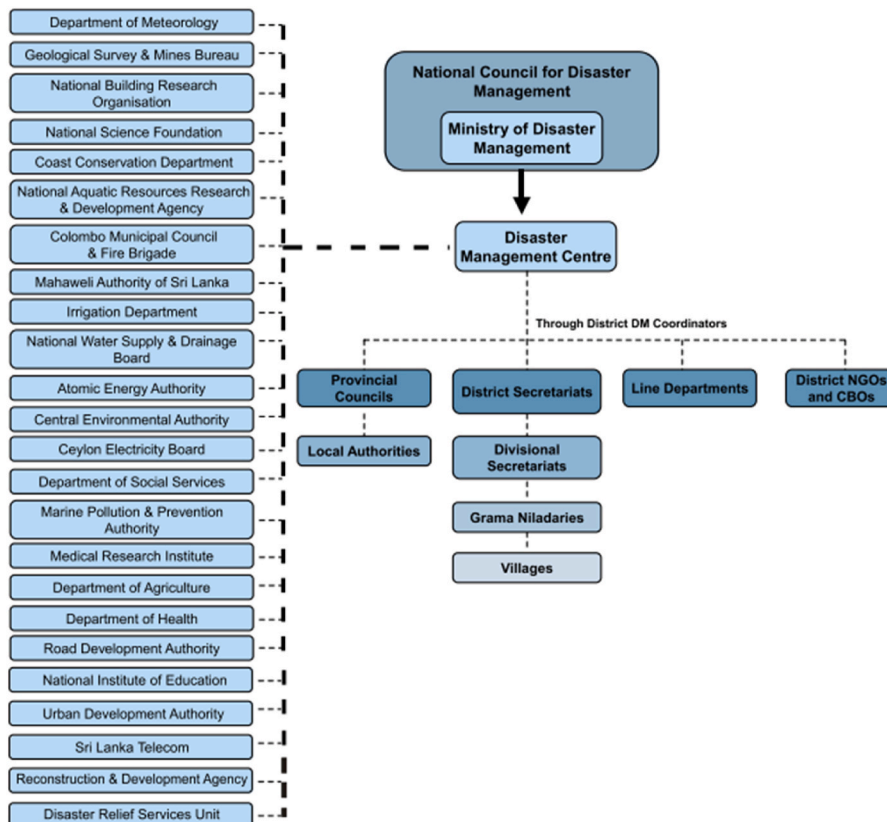


Fig. 2. Hierarchical, multi-institutional disaster management coordination structure of Sri Lanka. Source [16]:

during the period from May to August. The southwestern parts of the island receive 3000 mm of rain during this period, leading to destructive floods annually [12]. Fig. 1 represents the geographical areas affected by the southwestern monsoon rain.

Ratnapura is an area located in the southwestern flood catchment, which experiences recurrent floods during monsoon rains [14]. The lowlands of the Ratnapura consist of two main river basins (Kalu and Walawe). “Kalu” (the black river) is the second largest river basin in Sri Lanka, spanning 2766 km² of the western slope of the central hills [15], and flows right through Ratnapura city. The average annual rainfall received by the Kalu river basin is about 4000 mm and it discharges the largest amount of water to the sea, which makes the communities in Ratnapura susceptible to significant floods during southwestern monsoon [15]. The flood situation is unfortunate in this area because approximately half of the population live on the flood plain. Despite the recurrent floods, residents are reluctant to leave their traditional houses and continue to make their living through agriculture and mining around the river.

2.2. Administrative structure

This sub-section takes the reader through the disaster management administrative structure of Sri Lanka and clarifies the disaster management manoeuvre in the context of the study. Parliament of the Democratic Socialist Republic of Sri Lanka enacted the Disaster Management Act (No.13) in 2005 (SLDMA). Subsequently, the Ministry of Disaster Management (MoDM) and the Disaster Management Centre (DMC) were established in 2005 to implement the functions indicated in SLDMA to ensure the protection of the community and environment from potential disasters. The DMC leads the strategic planning process for disaster prevention, mitigation, response, and recovery. To unify the Disaster Risk Management (DRM) efforts, DMC charted a comprehensive National DRM Framework (NDRMF) to identify and coordinate multi-institutional efforts across the civil service structure via District Secretariats. The civil service structure spans from central government to civil communities through District Secretariats and Divisional Secretariats [16]. Fig. 2 depicts the hierarchical administrative structure established to manage disasters in Sri Lanka.

The multi-institutional coordination structure assigns the disaster management responsibility of each district to the District Disaster Management Coordinating Unit (DDMCU). The DDMCU operates as a disaster stakeholder network under the control of the District Secretariat which links the district, divisional and village-level respondents. The DDMCU consists of District Secretariat, Divisional Secretariats (further administrative sub-divisions of a district), Grama Niladari (village level administrative officers), Samurdhi Niladari (village welfare officers), representatives from DMC, armed forces, police, public health officers, non-government organizations, and other facilitation institutes [16]. Also, the NDRMF suggests the implementation of Community Based Disaster Management Committees (CBDMC) in villages, with the leadership of Divisional Secretariat and Grama Niladaries.

An investigation of knowledge transfer in this context requires a detailed study of knowledge creation and dissemination practices among the responders attached to DDMCU and CBDMCs. Hence, the current study employs two case studies from Ratnapura District to inquire knowledge dynamics of the flood responders. Case Study 1 covers the knowledge transfer practices of the stakeholders of DDMCU of Ratnapura district. Case Study 2 incorporates the knowledge transfer practices of the community responders of CBDMCs of the three villages (Dewalayagawa, Muwagama and Marapana) belong to Ratnapura district. Next section takes the reader through the research design and methodology for the intended study.

3. Research design

This study requires subjective interpretations of the findings as the

research questions focuses on the perceptions, experiences and opinions of the disaster respondents. Hence it is necessary to gather actual experiences and perceptions from the respondents [17,18]. Therefore, considering the need to investigate multiple realities in real-world phenomena [19], this study employs interpretivism as its research approach. The case study is one of the research methodology popularly adapted by interpretivists to use empirical evidence from real people to make an original contribution to knowledge without any preconceptions [20]. In particular, the case study methodology supports the researcher to explore multiple perspectives rooted in a specific context [21]. Klein and Myers [22] also suggested that the case study research design works as a “sensitizing device” (p. 75) for interpretivists to view the world in a certain way rather than “falsifying” theories. Therefore, this study chooses the case study methodology to explore the social reality of two case studies (Case study 1 and 2) in an exploratory approach.

Interpretive case study research focuses on the information richness and analytical capability of the selected cases rather than the representativeness of the sample [23]. Therefore, the current study chooses its cases and respondents using purposive sampling strategies. In particular, this study uses the politically important case sampling strategy to select the cases and snowballing strategy to handpick participants for each case study. A case study research provides greater flexibility for researchers to employ a combination of tools for data collection and analysis. [24]. Typically, case study research uses a variety of evidence from different sources and appreciates the triangulation of multiple methods [18,25]. Therefore, this study chooses semi-structured interviews and direct participant observation methods to gather data from case studies. To explore the considered research questions of this study, it is best to collect the data in the actual time of the disaster. However, the equivocal nature of floods makes real-time data collection impractical. Therefore, this study employs scenario-based disaster drill observations and interviews to simulate the experiences of participants [26]. Paper-based scenarios related to a past flood situation assists the data collection by connecting the memories and experiences of the participants to the current context. The data emerged from 21 semi-structured interviews (12 interviews from Case Study 1 and 9 interviews from Case Study 2), and participant observations of two disaster drill exercises used as the primary data source for the data analysis. Sections 4.2, 4.3 and 5.1 provide details of the data collection methods of this study. Appendices include details of the respondents participated in this study.

Although the case study research design furnishes several benefits, interpretive researchers argue that the original positivist assumptions of case study design misdirect interpretive researchers when building theory [27–29]. Therefore, this study signals the need for a strong analytical tool to construct theory from primary data. Typology [30], grounded theory [31], analytic induction [32], and content analysis [33] are the most common analytical tools used for theory building. Among these analytical tools, the grounded theory method receives a significant preference among the interpretivists. Andrade [27]; Steenhuis and Bruijn [29]; and Eisenhardt [28] recommend the grounded theory data analysis method as a favourable alternative to build theory from case studies. Charmaz [34] appreciates the practical and flexible nature of grounded theory analysis method to interpret complex social phenomena. Myers [20] believes that grounded theory has an “intuitive appeal” for novel investigators since it allows researchers to get “immersed” (p. 111) deeply within the data. Therefore, this study employs the grounded theory method to analyse multiple case studies to facilitate the true emergence of theory [35]. Next subsection describes the use of grounded theory method in this study.

3.1. Grounded theory analysis

Glaser and Strauss introduced the Grounded Theory Method (GTM) in 1967 as a systematic theoretical approach to discover emerging theories from the empirical world. They defined GTM as “the discovery of theory from data, systematically obtained and analysed in social

research" [31] (p. 1). GTM evolved in two main strands due to the conceptual dispute between the two founders. First is the Glaserian version [31], which is the original GTM and second is the Straussian version [36]. The choice GTM strand is the preference of individual grounded theorists. However, pure grounded theory followers prefer the Glaserian version to the Straussian version due to two reasons. First, the Glaserian strand assumes strict inductive reasoning and the subsequent theory purely emerge from the data, without considering pre-conceived categories. Second, Glaserian strand offers a higher degree of flexibility and closer to the pure grounded theory interpretation, without limiting to one coding paradigm [27,37,38]. This study chooses the constant comparison method of the Glaserian version as the preferred analytical tool to support theory building strictly from primary data.

Urquhart [38] defines constant comparison as a method, which an analyst looks for relationships between the concepts and categories, by constantly comparing them to form the basis of an emerging theory. The constant comparison method of the Glaserian GTM is a three-stage analysis that comprises of three levels of coding: open coding, selective coding, and theoretical coding [31]. In the first stage of coding (i.e. open coding), the observation and interview transcripts are broken down analytically line-by-line with a focus to identify the emerging concepts. During open coding, the analyst interprets the meaning of each line, sentence, and paragraph and assigns a suitable code. The selective coding commences after open coding reaches the saturation. Glaser [39] defined selective coding as the stage in which coding is limited to only those categories that relate to the core category. During the selective coding stage, the analyst groups open codes into categories that are important for the research problem [34,39]. Urquhart [38] suggested that the theoretical coding covers how to relate the developed categories to each other and the nature of relationships between those codes to build theory. The next segments of this article (section 4 and 5) present the details of the two case studies and take the reader through open and selective coding procedures.

4. Case Study 1 – DDMCU of Ratnapura

This section introduces the reader to the Case Study 1 and discusses the initial stages of the data analysis. Subsection 4.1 introduces the details of the Case Study 1. Subsection 4.2 and 4.3 describe the data gathering techniques for Case Study 1 and present the details of the case and the participants. In grounded theory, rather than keeping two consequent stages for data collection and analysis, the data analysis activities consciously combined. However, for clarity of the presentation, data analysis methods presented after the discussions on data collection methods. Subsections 4.4 and 4.5 describe the data analysis process and the findings of the first two stages of constant comparison. These two sections also illuminate how the grounded theory contained therein emerged from the coding, and categorizing activities central to the methodology.

4.1. Background

Ratnapura district established its disaster management coordinating unit (DDMCU) in the year 2000. Today Ratnapura DDMCU serves as the primary state-based authority which manages the disasters within the boundary of the district. The Case Study 1 encompasses the stakeholders of DDMCU of Ratnapura district, who are the administrative officers of Sri Lanka's civil service structure. The DDMCU is led by the District Secretary (i.e. Government Agent) (GA) of Ratnapura and coordinated by the Disaster Management Unit (DMU) of Ratnapura District Secretariat. The DMU is one of the divisions controlled by the administration structure of the District Secretariat of Ratnapura. In addition to District Secretary and the staff of DMU, the DDMCU of Ratnapura encompasses of Additional District Secretary, Assistant District Secretaries, Divisional Secretaries, and staff from Administration & Establishment Division, Accounts Division, Planning Division, Engineering Division, Welfare

Division, and Media Unit of District Secretariat. Outside the Civil Service structure of Ratnapura, Public Health Inspectors (PHI), representatives from armed forces, representatives from non-governmental organizations, technical institutes, and fire brigade serve the DDMCU.

This case study selects its respondents purposively from different politically sensitive units of the District Secretariat and Divisional Secretariat of Ratnapura. The researchers choose participant observations of a simulation exercise and semi-structured interviews to gather data for this case study. A paper-based scenario which refers to the experiences of 2014 May flood assists the data gathering. The following subsections describe the methods employed for data collection. Section 4.2 discusses the first data collection method, participant observations. Section 4.3 discusses the second data collection method, semi-structured interviews.

4.2. Participant observations

Data collection opened on January 12, 2016, with a tabletop simulation exercise for DDMCU members of the Ratnapura district. DMC employed this tabletop exercise as a tool to assess existing plans, policies, and procedures. Eighty-five disaster responders participated in this exercise and thirty respondents were chosen as the study sample. Researchers observed these thirty respondents closely considering the important role they played during the exercise. The age distribution of the participants of the simulation ranged from 30 to 55 years, and most of them belonged to a similar ethnicity (Sri Lankan – Sinhalese). All participants held executive or operational positions in the civil service structure, armed forces, public health services, non-governmental organizations, and other facilitation organizations. All participants had secondary or tertiary education, and sixty-four percent of the participants were men. The organizers of the tabletop exercise created a collaborative work environment to simulate disaster management activities. To initiate the simulation, the Emergency Operation Center (EOC) of DMC sent a hypothetical emergency message depicting a flood scenario to all the participants' mobile phones. Simultaneously, the organizers of the simulation displayed different emergency message cards to the participants using an overhead projector from time to time. Once the emergency warning messages released to the participants, they took the roles and responsibilities on board and simulated actions assuming the emergency. During the tabletop exercise, the respondents carried out the pre-assigned/agreed duties nearly for 3 h. They arranged themselves into four steering committees: operations, planning, logistics and finance/admin. Representatives from DMC closely monitored and controlled the implementation of the tabletop exercise.

As the exercise progressed, response activities were simulated and data emerged from the verbal and non-verbal conversations of the respondents. Researchers contributed to this exercise as reviewers to gain a subjective experience by being a part of the phenomena of interest. Two digital cameramen assisted the researchers in video recording these observations. They used a random approach to capture video from different groups from time to time. This recording resulted in a 237 min video footage, and researchers themselves transcribed the audio verbatim and recorded the behavioural practices and emotions of the participants. Then the researchers translated the transcripts from Sinhala language to English. They managed the linguistic and culture-specific shortcoming of the translation by constant checking and clarification with participants. Though it is expensive to conduct in practice, observing this tabletop exercise enabled the researchers to view things that may usually skip from the conscious awareness and extract things that participants are unwilling or unable to express during interviews. The researchers took extra precautions to reduce observer bias by making sure the researcher's behaviours are clearly defined and avoided establishing strong relationships with participants. While observing, the observers avoided probing answers to the conversations or giving feedback yet built rapport with the participants.

Table 1
List of codes emerged from the open code analysis of Case Study 1 - Extracted from NVivo.

Open Codes	Sources	References	
1	Anti-resilient characteristics	12	20
2	Bottom-Up Knowledge flow	9	14
3	Confidence in existing stakeholder network	11	19
4	Delegation of tasks	10	39
5	Dependence on other stakeholders	1	25
6	Gaps in the knowledge flow	1	16
7	Deviation of Procedure based on flood intensity	7	19
8	Experience based Decision Making	5	19
9	Familiarity in existing stakeholder network	7	10
10	Hints of articulation	7	24
11	Lack of articulation	3	6
12	Improvisation	11	33
13	Knowledge links with other stakeholders	12	22
14	Knowledge Repetitions	3	3
15	Lack of confidence on existing procedures	8	25
16	Legal gaps	3	4
17	Location based experience	12	16
18	Middle-Top-Down Knowledge Transfer	12	150
19	Bonding knowledge links	8	14
20	Bridging knowledge links	10	53
21	Limited knowledge transfer from top to community	2	4
22	Structural holes	1	3
23	Knowledge Transfer Processes	4	7
24	Speed of knowledge transfer	6	26
25	Transition Points	9	43
26	Criteria changes over time	2	3
27	Nature of seeking others' opinion	1	9
28	Recognizable anti-relational characters	6	7
29	Recognizable Relational characters	12	59
30	Community Leaders	3	9
31	Empathy	5	12
32	Reciprocity	8	12
33	Trust	8	15
34	Resilient practices	4	11
35	Role delegation	7	9
36	Seeking for verified knowledge	9	16
37	Shared Norms and beliefs	12	97
38	Cultural factors	10	37
39	Flood prediction norms	7	10
40	Impressions of difficulty	8	12
41	Indigenous experiences	2	5
42	Relief mentality	10	21
43	Spontaneous Behavior of Stakeholders	10	39
44	Type of Knowledge transferred across	1	26
45	Innovation	4	11
46	Emotions	8	7
47	Altruism	4	9
48	Formal coding systems	10	22
49	Follow hierarchy	12	33
50	Direct involvement of other stakeholder groups	9	16
51	Top-Down knowledge halts	5	11
52	Validated knowledge	6	20
53	Improved predictions	7	8
54	Compensations	4	10
55	Personal Connections	10	24
56	Confidence	5	12

4.3. Semi-structured interviews

The second data collection method employed to gather data for Case Study 1 is a series of semi-structured interviews. Twelve administrative officers attached to DDMCU of Ratnapura were selected to interview. As discussed earlier, the respondents for these interviews were directly drawn purposively from the civil service administration structure of the District Secretariat of Ratnapura. The purpose of these semi-structured interviews was to gather real-life experiences of the disaster responders. Therefore, researchers supported each semi-structured interview with a pre-developed paper-based scenario to aid the participants to retrieve memories of a recent flood situation. Respondents were given a paper-based scenario before the interview outlining a recent flood situation. To maintain the consistency of the data collection, one pre-

developed paper-based scenario was used for all the interviews to set the background. In this study, the principal researcher herself conducted all semi-structured interviews, to gather a consistent understanding of the social world of the respondents. Researchers conducted the interviews over five days from 10th to May 14, 2016. Appendix 1 contains the details of these respondents. Appendix 3 contains a sample interview guide used for data collection.

The interviewers used a semi-structured interview guide to direct the interview process. However, interviewers allowed probing some questions to reach a deeper understanding of the subject matter when required. The interviewer also stayed open and receptive to the unexpected information from the interviewee. The interviewer raised a few open-ended questions, probed together with the support of the developed scenario to motivate the interviewees to describe their knowledge requirements and decision-making situations. Interviews were carefully handled at a neutral ground to eliminate the potential bias and reflexivity of research outcomes due to unintended influences from the researcher as well as research participants. The interviewer avoided establishing strong relationships with interviewees and avoided commenting on their feedback yet built rapport with the participants.

The interviewers used digital audio recorders to capture the conversations with permission from the respondents. Every interview lasted for 20–30 min, and the length of the complete audio record was 295 min. All interviews conducted in Sinhala language and researchers transcribed the audio to text with the help of the ExpressScribe software and then translated the transcripts to English. The lead researcher herself conducted the transcription and translation to reduce the communication gap between the transcriber and translator. Rather than a word to word translation, the researcher converted the meaning of a phrase from Sinhala to English. Next two sections take the reader through the first two stages of coding for Case Study 1, first, open coding (section 4.4), and followed by selective coding (section 4.5).

4.4. Open coding

To initiate the open coding process for Case Study 1, the translated and transcribed text in the observation and interview transcripts broken down analytically line-by-line. The objective of this initial analysis was to identify, name, categorize and describe the phenomena found in the text. Line by line coding developed a great intimacy with the data helping the analyst to become acquainted with the data [31]. Researchers employed the NVivo software to create and manage open codes by assigning segments of texts into different nodes systematically. While generating these codes, the analyst deliberately stayed open, seeing what the data might be telling, and created code labels. Analysts also spent a significant time to revisit the conceptualization by renaming, merging or deleting some codes as the open coding progressed [38]. As the analysis progressed, the rate, which new open codes created slowed down eventually. Finally, the analysts reached theoretical saturation, the point in coding, which no new codes occur [38]. Table 1 lists the 56 open codes generated from data of the Case Study 1. The second column of Table 1 introduces the emerged codes to the reader. The third and fourth columns indicate the number of data sources which each code appears, and the number of times each code referred.

4.5. Selective coding

The selective coding process locates the main focus of the study by clustering the open codes into a few core categories [34,39]. This section takes the reader through the selective coding analysis of Case Study 1. As described in the previous section, researchers commenced the selective coding after the list of open codes saturated. During this process, analysts looked out for the main concepts emerged and attempted to identify categories. The code clustering was not a linear process. Analysts eased this process by creating subcategories. They had to run the clustering in multiple iterations keeping an analytical eye to spot the core

Table 2
Two core-categories, categories, and open codes emerged from Case Study.

Core Category	Refined Categories	Open Codes
<i>Interactions</i>	Brokerage	Follow hierarchy, Top-Down Knowledge flows, Bottom-Up Knowledge flow, Knowledge links with other stakeholders, Middle-Top-Down Knowledge Transfer, Bridging knowledge links, Limited knowledge transfer from top to community, Structural holes, Direct involvement of other stakeholder groups, Type of knowledge passes across, Top-Down knowledge halts, Validated knowledge, Improved predictions, Compensations
	Closure	Bonding knowledge links, Experience based decision making, Familiarity, Instinctive sharing habit, Nature of seeking opinion from others, Personal connections, Confidence, Knowledge repetitions.
	Knowledge Dynamics	Delegation of tasks, Dependence on other stakeholders, Gaps in the knowledge flow, Experience based Decision Making, Familiarity in existing stakeholder network, Hints of articulation, Lack of articulation, Limited knowledge transfer from top to community, Knowledge Transfer Processes, Speed of knowledge transfer, Transition Points, Role delegation, Type of Knowledge that is being transferred, Legal gaps, Criteria changes over time, Deviation of Procedure based on flood intensity, Resilient practices, Seeking for verified knowledge, Impressions of difficulty
<i>Ambience</i>	Norms	Anti-resilient characteristics, Confidence in existing stakeholder network, Lack of confidence on existing procedures, Nature of seeking others' opinion, Recognizable anti-relational characters, Community Leaders, Resilient practices, Seeking for verified knowledge, Shared Norms and beliefs, Cultural factors, Flood prediction norms, Impressions of difficulty, Indigenous experiences, Relief mentality, Formal coding systems
	Values	Recognizable Relational characters, Empathy, Reciprocity, Trust, Cultural factors, Emotions, Altruism
	Perseverance	Deviation of Procedure based on flood intensity, Improvisation, Knowledge Repetitions, Location based experience, Criteria changes over time, Nature of seeking others' opinion, Community Leaders, Resilient practices, Role delegation, Seeking for verified knowledge, Impressions of difficulty, Indigenous experiences, Relief mentality, Spontaneous Behavior of Stakeholders, Legal gaps, Innovation

categories.

The selective coding analysis revealed that, the 56 -open codes emerged from this case study showed a tendency to categorize around two main core categories: *Interactions* and *Ambience*. These two core categories identify the main dimensions of the research problem. The *Interactions* category presents various collaborations of the stakeholders amidst disaster situations. The contextual impact and the social practices associated with *Interactions* represent the *Ambience* category. After a thorough analysis and refinement of the concepts emerged from data, analysts proposed 6 selective codes depicting dimensions of the core categories. Analysts recognized three dimensions of the *Interactions* category: *Brokerage*, *Closure* and *Knowledge Dynamics*. The *Ambience* category composed by *Norms*, *Values* and *Perseverance* categories. [Table 2](#) lists these six categories that purely originated from the data of Case Study 1 along with the classifications.

The constant comparison method requires the comparison of code patterns of Case Study 1 and Case Study 2 to take the analysis to the next level. Therefore, the next section takes the reader through the details of

Case Study 2 and the process of open and selective coding.

5. Case Study 2 – Community groups of Ratnapura

This section presents the findings from the Case Study 2, the inquiry of community groups vulnerable to floods in villages of Dewalayagawa, Muwagama, and Marapana of Ratnapura district. The first section (5.1) describes how data is gathered from Case Study 2 and presents the details of the case study, participants and the methods employed for data collection and analysis. Second (5.2) and third (5.3) sections describe the findings of the first two stages of the constant comparison (open and selective coding) and explain the theory-building process.

5.1. Background and methods

Based on the recommendations of NDRMF, the DDMCU of Ratnapura district have initiated and supported the development of Community Based Disaster Management Committees (CBDMC) in the disaster-prone villages of Ratnapura district. Researchers gathered data for Case Study 2 from the CBDMCs belong to three community groups who live in the high flood vulnerable areas of the Kalu River. To maintain the consistency of the analysis, the researchers followed the same methodological approach as Case Study 1. Also, the same paper-based scenario was used for Case Study 1 and 2.

As same as Case Study 1, researchers started data gathering for Case Study 2 through observations of a simulation exercise. The researchers chose a flood map development exercise of community responders of Marapana village to observe the verbal and non-verbal communications and associated activities. This exercise conducted on July 12, 2016 in the Marapana temple with the participation of 32 community members who volunteered to serve the village CBDMC. The participants of this simulation exercise were Sinhala Buddhists in the age range of 35–70 years. About 80% of the participants were women. The DDMCU of Ratnapura used this simulation exercise as a tool to assess the community knowledge, perceptions, local plans and practices for response and mitigation.

Two members from the DDMCU, Grama Niladari and a representative from a non-governmental organization organized this exercise. Organizers created a hypothetical disaster context by sharing the paper-based scenario with the participants. The Grama Niladiri classified the participants into three groups and requested the team to sketch flood maps for their village. Once the exercise began, the participants assumed their duties as first responders. They discussed how they should respond to the flood, documented response plans, and hand-drawn flood map posters indicating evacuation routes and safe locations. The organizing team closely monitored and controlled the implementation of this exercise. Researchers contributed to this exercise as reviewers while closely observing the verbal and non-verbal communications of the participants. Following a similar approach as Case Study 1's tabletop exercise, two cameramen captured this exercise using two digital cameras. This exercise held for about 3 h, and the video footage was 132-min long.

The second data collection method employed to gather data for Case Study 2 is a series of semi-structured interviews focused to, gather experiences of disaster responders. Researchers used a pre-developed paper-based scenario to aid the participants to retrieve memories of a recent flood situation to assist the data gathering process. Researchers purposively selected nine community responders from the Muwagama and Dewalayagawa villages for these interviews. [Appendix 2](#) contains the details of these respondents. Researchers followed the same methodological approach as Case Study 1 to maintain consistency and the lead researcher herself conducted all semi-structured interviews to gain a clear understanding of the data. Researchers conducted interviews over three days between 11 and February 13, 2017 following the same practices employed in Case study 1. The recorded series of interviews produced 232 min long digital audio. The lead researcher transcribed

Table 3
List of codes emerged from the open code analysis of Case Study 2 - Extracted from NVivo.

	Open Code	Sources	References
1	Spontaneity	6	21
2	Conceptual knowledge on resilience	3	6
3	Showing initiative	6	11
4	Trust	4	7
5	Sense of belonging	4	7
6	Relief-dependent mentality	5	12
7	Reciprocity	4	4
8	Procedural difficulties	5	15
9	Inconsistent procedures	7	11
10	Practices	6	17
11	Personal connections	6	11
12	Overestimation	3	4
13	Network practices	7	22
14	Leadership	5	7
15	Mediums for knowledge transfer	8	16
16	Knowledge discovery thru closure	9	23
17	Knowledge Discovery thru brokerage	7	22
18	Inter-cultural harmony	2	3
19	Indigenous knowledge	10	34
20	Improvisation	10	22
21	Hardships	11	32
22	Experience	10	24
23	Expected knowledge	11	26
24	Distribution of responsibility	3	5
25	Discrimination	3	11
26	Disappointment	1	5
27	Dedication to serve community	2	3
28	Decline of indigenous practices	5	7
29	Consistency	2	3
30	Consciousness	5	9
31	Confidence	4	9
32	Community norms	10	29
33	Community involvement	6	10
34	Community interpretations	7	20
35	Being a knowledge broker	9	29
36	Attitudes	4	8
37	Altruism	8	19
38	Adaptive capacity	11	52

and translated the interviews from Sinhala to English with the help from the ExpressScribe software. Next two sections take the reader through the process of analysing these transcripts for Case Study 2, first, open coding (section 5.2), and second, selective coding (section 5.3).

5.2. Open coding

Similar to the process followed in Case Study 1, the analysts examined the observation and interview transcripts analytically line-by-line to identify emerging concepts. During the open code analysis of Case Study 2, the researchers deliberately stayed open, without restricting the conceptualization to open codes of Case Study 1. As the open coding progressed through, the researchers noticed the theoretical saturation after generating 38 open-codes. Table 3 provides this list of open-codes.

5.3. Selective coding

The theoretical saturation of open codes marked the commencement of selective coding for Case Study 2. Case Study 1 suggested two core categories from the emerged data: *Interactions* and *Ambience*. At this point in the analysis, the constant comparison method required to be extended to Case Study 2 to look out for the main focus of this study and arrive at suitable core categories common for both case studies. A comparison between the set of open codes that emerged from Case Study 1 and 2 stipulated a resemblance of the code patterns. Both case studies demonstrated a focus on the knowledge transfer interactions, social conditions, and community practices to transfer knowledge during floods. Hence, following the same names used in Case Study 1,

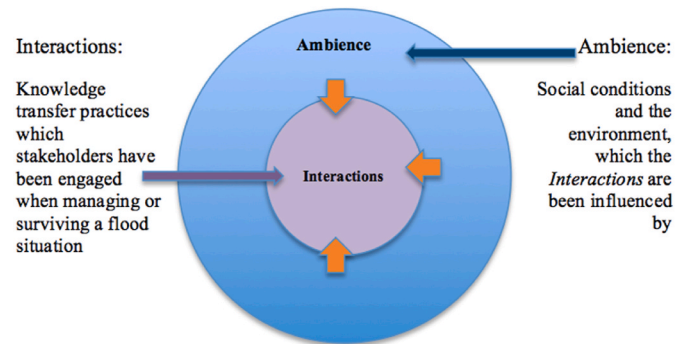


Fig. 3. Core categories recognized and synthesized from Case Study 1 and Case Study 2.

Interactions and *Ambience* are suggested as the core categories for Case Study 2. Fig. 3 depicts the core categories that emerged from Case Study 1 and Case Study 2.

After recognizing the core categories for Case Study 2, researchers carried out selective coding in two steps. First, researchers attempted to spot the selective-codes of Case Study 2 without limiting the conceptualization to the preconceived categories. Analysts reviewed the emerged coding pattern of Case Study 2 through constant comparison method. The initial workout of categorizing and refining open-codes resulted in 5 selective codes for Case study 2: *Knowledge Transfer Behaviour*, *Cognition*, *Relationships*, *Vulnerability*, and *Adoptive Potential*.

Second, analysts compared these five categories generated from Case Study 2 with the selective codes that emerged from Case Study 1. Urquhart [38] further explained, “consciously comparing the instances of each concept allows for a fuller and more nuanced understanding of what that category might consist of” (p. 17). By the first appearance, the open codes that emerged from Case Study 1 and Case Study 2 seemed to categorize into different coding systems with distinct code labels. Further analysis on the differences suggested that these differences were due to semantic differences of the category labels rather than conceptual discrepancies. Though the themes engendered in these two case studies were named different, it became clear that both coding categories revolve around the same core categories (*Interactions* and *Ambience*). As the research objectives are the same for both case studies, having common core categories will be the ideal situation, signalling the integrity of the data analysis. However, the individual themes (i.e. selective codes) and the captions given to the selective codes are different in Case Study 1 and Case Study 2. Hence, analysts conducted further synthesis to compare and contrast the two coding patterns for each selective code.

The analysis suggested that the difference between the two coding systems were fundamentally due to the difference between the patterns of the grouping of two coding systems of Case Study 1 and Case Study 2. For example, the coding system of Case Study 1 has categorized knowledge transfer interactions into three selective codes (*Brokerage*, *Closure*, and *Knowledge Dynamics*), but the coding system of Case Study 2 presents all the open codes related to knowledge transfer interactions in a single selective code (*Knowledge Transfer Behaviour*). The constant comparison further suggests that the *Brokerage*, *Closure*, and *Knowledge Dynamics* are the dimensions of the selective code *Knowledge Transfer Behaviour*. The *Knowledge Transfer Behaviour* selective code of Case Study 2 includes open codes relevant to *Knowledge Discovery thru brokerage*, and *Knowledge Discovery thru closure*. Therefore it is evident that themes *Brokerage* and *Closure* are inclusive within the *Knowledge Transfer Behavior* selective code. As another example, in Case Study 1 the *Norms* category is defined as shared representations, systems, and interpretations of stakeholders. These systems of meanings represent the cognitive social capital of stakeholders. These systems of meanings are recognized through the common vocabulary and narratives in terms of

their perceptions, beliefs, opinions, shared language, and codes. In Case Study 2 the open codes, which describe perceptual actions such as acquiring knowledge, experiences, and interpretation are categorized as the *Cognition* category. Since the categories *Norms* (in Case Study 1) and *Cognition* (in Case Study 2) both include open codes relevant to shared representations, systems, and interpretations, the refinement of the *Cognition* category to *Norms* was found deemed necessary. As such, the analysts compared the two coding patterns thoroughly to see if the two coding patterns coincide. The efforts to refine the categories of Case Study 2 provided a clear indication that the coding systems that emerged from Case Study 1 and 2 are fundamentally similar and fit well into the two core categories *Interactions* and *Ambience*. Hence, to keep the conceptualization intact, the six codes that emerged from Case Study 1 will be used as the fundamental coding pattern for both the case studies. These six refined categories will be discussed in the next section, with the aid of theoretical memos to bring out reflections of the findings of the two case studies.

6. Emerged categories

As discussed in the previous section, the two case studies 1 and 2 generated a unique selective coding pattern (*Brokerage, Closure, Knowledge Dynamics, Values, Norms, and Perseverance*). Identifying a unique coding pattern for this study provided a clear theoretical basis to take the conceptualization forward. Although the two case studies agree on one coding pattern, the recognized core categories, open codes and selective codes appear differently in the two case studies. Hence, this study requires further analysis and a synthesis of the findings between the two case studies. Following subsections take the reader through different sub-concepts of the emerged themes and the intensities of the code patterns of the two case studies.

6.1. Brokerage

The *Brokerage* category represents the way which stakeholders use formal and informal connections to pass and receive knowledge from stakeholders outside their close groups. Hence, the expressions found in transcripts that relate to knowledge transfer between different teams considered when forming this category. *Brokerage* category demonstrates a significant behavioural difference between Case study 1 and 2.

Findings from Case Study 1 highlighted that the administrative officers use a well-defined top-down hierarchical functional structure (from central government to community) to transfer knowledge during disaster management operations. Case Study 1 provided clear evidence that the knowledge that is required to implement the mandated disaster

management activities have passed from DDMCU to the community in the descending order of the Functional Hierarchy. The respondents of Case Study 1 have a highly strategic position in the local administrative control. Hence, they could easily connect to other functional groups during a disaster. On the contrary, respondents of Case Study 2 stand an insignificant strategic position. Findings of the study highlighted that the respondents of Case Study 1 and 2 linked through the Grama Niladari officers by the district disaster management mandate. Despite the knowledge brokering role of the Grama Niladari, findings suggested that the brokering connections between these two groups remain low. Therefore, these two respondent groups remain disconnected and disrupt the healthy knowledge flow between the groups.

Findings of both case studies highlighted that the knowledge exchanges between these two groups were not transparent. In particular, the knowledge that resides in one group did not pass to the other group effectively during disaster situations due to the tacitness of knowledge flow. Although Case Study 1 demonstrated the use of a few methods to articulate knowledge such as official memos, circulars, and SMS (short messaging service), most knowledge transfers occurred in tacit formats. Findings showed that respondents prominently used face-to-face verbal communication, phone calls, and physical meetings to transfer knowledge among stakeholder groups but used very few articulation practices.

Case Study 1 also suggested the difficulty of acquiring knowledge from the community level because the established functional structure didn't have knowledge control beyond the Grama Niladari. Findings of the Case Study 2 verified that messages received from Grama Niladari reach only a few community members and community used their own networks to transfer knowledge without referring to instructions coming from DDMCU. Although respondents of Case Study 2 had the established CBDMCs, the findings indicated that communities were making use of the personal networks to connect to other functional groups rather than employing connections through CBDMC. Table 4 summarizes a comparison between the findings of Case Study 1 and 2. Table 6 also discusses and the degree of the presence of *Brokerage* category in the two case studies.

6.2. Closure

Closure category describes opportunities available for a group of individuals to access and transfer knowledge within a social group that is characterized by high levels of similarity through strong bonding relationships. In this study, researchers investigated the *Closure* category through the connections among the members of a functional workgroup.

Both Case Study 1 and 2 equally postulated that bonding relationships get stronger if respondents are known to each other and shared

Table 4
Comparison of the sub concepts emerged from theme *Brokerage*.

Sub concepts emerged	Case Study 1	Case Study 2
KnowledgeTransfer control	<u>Hierarchical control</u> : Functional hierarchy of the local administration units controlled the knowledge transfer between different stakeholder groups.	<u>Autonomous control</u> : There was no central control towards the knowledge transfer between stakeholder groups. Individuals autonomously decided the knowledge transfer based on their intentions.
Participation for Knowledge Transfer	<u>Obligatory Participation</u> : Knowledge dissemination tasks were assigned to the respondents by the mandate. Hence they were obliged to participate in knowledge transfer with other stakeholder groups.	<u>Voluntary participation</u> : Transferring knowledge to different stakeholder groups was not an assigned responsibility. Instead, respondents pursued voluntary interest to get involved in knowledge transfer.
Knowledge content	<u>Standardized content</u> : The transferred knowledge covered specific stereotypical operational instructions and statistics.	<u>Individualized content</u> : The transferred knowledge was tailored and adapted according to the situation and targeted to the specific needs of individuals.
Type of knowledge	<u>Tacitness</u> : To transfer knowledge between different stakeholder groups some articulation practices used. But most knowledge exchanges remained tacit.	<u>Tacitness</u> : No evidence of articulation. Transferred knowledge between different stakeholder groups was dominantly in tacit form.
Degree of the presence of Brokerage category	<u>Higher presence of Brokerage category</u> : The strategic position of the DDMCU members enabled strong brokering connections with other stakeholder groups.	<u>Lower presence of Brokerage category</u> : The weak strategic position of community members resulted in a few brokering opportunities.
Knowledge brokers	<u>Professional and personalized connections</u> : The respondents used professional and personal connections to transfer knowledge between different stakeholder groups.	<u>Personalized connections</u> : The respondents used personal connections to transfer knowledge between different stakeholder groups.

Table 5
Comparison of the sub concepts emerged from theme *Closure*.

Sub concepts emerged	Case Study 1	Case Study 2
Mechanisms of adhesion	<u>Task based relationships</u> : The DDMCU members have developed work-related relationships among the peers based on the disaster management tasks assigned to the group.	<u>Emotional relationships</u> : Relationships among individuals in a group are developed based on the emotional attachment between the group members.
Degree of the presence of Closure category	<u>Moderate presence of Closure category</u> : Respondents developed some bonding relationships among the group members.	<u>Very high presence of Closure category</u> : Respondents developed many bonding relationships among the group members to respond and survive a flood.
Instinctiveness	<u>Moderate</u> : Knowledge transfer among individuals in a close group is encouraged by the instincts of sharing and collaboration.	<u>Very high</u> : Knowledge transfer among individuals in a close group is highly stimulated by the instincts of sharing and collaboration.
Knowledge duplications	<u>Moderate</u> : Some knowledge areas circulated among the group duplicating the knowledge transfer efforts until new knowledge enters the group through <i>Brokerage</i> .	<u>Very high</u> : Since the degree of brokering connections in a group is low, most of the knowledge areas circulated among the group members duplicating the knowledge transfer efforts over and over again.
Knowledge transfer strategies	<u>Regulatory methods</u> : Individuals used regulatory methods to create and transfer knowledge among the group.	<u>Indigenous methods</u> : Individuals used indigenous methods to create and transfer knowledge among the group.
Team formation	<u>Pre-developed teams</u> : Most of the times teams are developed before the disaster and task are assigned and responders were trained.	<u>Dynamic team formation</u> : Most of the times teams are developed as and when needed and task are assigned dynamically. Fewer efforts were taken to train the respondents before the disaster.

experiences. In addition to that, respondents of both case studies showed that respondents developed strong coherence with their peers if they have prior experience of working with the same team. In particular, respondents of Case Study 1 showed strong solidarity in their work-groups and promoted instinct knowledge transfer if the respondents have developed personal connections. However, compared to Case Study 1, Case Study 2 showed a higher degree of presence of *Closure*. Respondents of Case Study 2 exhibited instinctive practices to share knowledge quickly among close groups through strong emotional bonds. Respondents of Case Study 2 depended on the *Closure* connections to transfer knowledge to their peers significantly. In contrast, the respondents of the Case Study 1 used a mixture of formal and informal methods to transfer knowledge to their peers. The transcripts of Case Study 1 showed a significant presence of *Brokerage* category. However, Case Study 1 showed just a moderate presence of *Closure* category. In contrast, the transcripts of Case Study 2 demonstrated a stronger presence of *Closure* category.

Case Study 2 showed that the same knowledge circulates among the group in multiple iterations, sanctioning a deeper understanding of the situation. But the respondents of Case Study 2 were less probable to receive new knowledge from other stakeholder groups. The respondents of Case Study 2 demonstrated indigenous ways to handle flood situations by making connections with their neighbours. On the contrary, respondents of Case Study 1 frequently received updated knowledge from other stakeholder groups. Table 5 summarizes a comparison between the findings of Case Study 1 and 2 and the degree of the presence of the *Closure* category in the two case studies.

6.3. Knowledge dynamics

The *Knowledge Dynamics* category describes current and prospective practices associated with accessing, absorbing and transferring knowledge to achieve disaster management objectives. In this study, researchers investigated the *Knowledge Dynamics* category through the knowledge transfer practices carried out by the responder groups. The transcripts of the case studies repetitively discussed the responsibility and task generation practices of the respondents. In particular, participants of both case studies showed the interest to distribute responsibilities of disaster response between different individuals and the groups.

Case Study 1 demonstrated the distribution of responsibilities among different stakeholder levels following the functional hierarchy. Some respondents of Case Study 1 interpreted their duties as a set of tasks to perform to achieve disaster management goals. In contrary, some respondents believed that achieving disaster management goals is a part of their role. Findings of Case Study 1 indicated that many DDMCU members initiated to show the acquisition of responsibility to

individuals and self-assign role-based practices. However, all the respondents in Case Study 2 believed that achieving disaster management goals is a part of the community role. In both case studies, the respondents who believed in role-based disaster management have developed the tendency to take over disaster management responsibility voluntarily. These respondents who followed role-based practices have voluntarily acquired the ownership of some disaster management tasks, even if those duties were not pre-assigned to them.

The two case studies suggested that both the responder groups engaged in intuitive decision making. However, the degree of intuitiveness was different in the two case studies. Respondents of Case Study 1 followed specific standard operating procedures (SOP) to a great extent when deciding what tasks to be done, by whom and what time. However, these SOPs did not contain precise details on the proceedings to follow during the flood response. Therefore, respondents of Case Study 1 made many procedural decisions intuitively based on their past experiences, skills, knowledge, and training if procedures are not clear. On the contrary, most of the respondents of Case Study 2 made intuitive decisions rather than adhering to pre-defined procedures. Rather than following the agreed disaster management practices, these respondents made response decisions intuitively based on their experiences, indigenous knowledge, and emotions.

Interestingly, both case studies provided strong evidence of improvising to achieve disaster response objectives. The respondents of Case Study 1 demonstrated utilizing improvisation as a strategy to acquire resources to access, absorb and transfer knowledge. Respondents of Case Study 2 exhibited their ability to improvise community relationships to acquire knowledge. In particular, respondents of Case Study 2 grasped most of the functional-knowledge spontaneously from their peers without referring to pre-decided plans. Although the respondents of Case Study 1 showed a high dependency on the pre-decided task and responsibility allocations, they also employed many improvisation practices during flood response.

Both the two case studies demonstrated a lack of intention to articulate knowledge. In particular, Case Study 2 showed no solid articulation practices at the community level. These respondents transferred tacit knowledge from person to person and generation to generation. Similarly, the administrative officers of Case Study 1 revealed their interest to transfer knowledge in tacit forms. Although some respondents of Case Study 1 attempted to convert tacit knowledge into articulated knowledge during the pre-disaster time, knowledge transfer confined to tacit forms during disaster response. Table 6 summarizes a comparison between the findings of Case Study 1 and 2 and the degree of the presence of *Knowledge Dynamics* category in the two case studies.

Table 6
Comparison of the sub concepts emerged from theme *Knowledge Dynamics*.

Sub concepts emerged	Case Study 1	Case Study 2
Responsibilisation	<u>Respondents handled disaster management responsibility based on their role:</u> Respondents indicated a transfer from task-based methods to role-based methods, where individuals acquire a holistic responsibility of managing a disaster.	<u>Acquisition of responsibility to individual responders:</u> Respondents voluntarily took over the ownership of disaster management activities.
Adherence to SOPs/procedures	<u>To a greater extent:</u> Most of the respondents thoroughly followed SOPs (if declared). If SOPs/procedure is not clearly defined the task sequence, respondents engaged in intuitive decision-making.	<u>Minimum:</u> Most of the respondents made intuitive decisions rather than adhering to pre-defined procedures.
Intuitive decision making	<u>Experiences and cognitive-based decisions:</u> Respondents made disaster management decisions intuitively based on their past experiences, skills, knowledge and training.	<u>Experiences and affect-based decisions:</u> Respondents made disaster management decisions intuitively based on the experience, indigenous knowledge, and emotions.
Tendency for Improvisation	<u>High:</u> Respondents made use of several improvisation strategies to deal with resource limitations.	<u>High:</u> Respondents made use of several improvisation strategies to deal with resource limitations.
Dependency to the pre-decided task/responsibility allocations	<u>High:</u> Respondents were highly dependent on the task sequence and they did not show initiatives to change the pre-decided task allocations.	<u>Low:</u> Community members were very active in taking the initiative to discover knowledge from their peers and act generously without concerning the pre-decided task allocations.
Articulation effort	<u>Little:</u> Few articulation practices recorded.	<u>None:</u> No articulation efforts recorded.
Tacitness	<u>High:</u> Most of knowledge kept in tacit forms.	<u>Very high:</u> All knowledge kept in tacit forms.

6.4. Values

The *Values* category describes relational characteristics possessed by stakeholders that are mutually beneficial for individuals or social groups. In this study, researchers examined the *Values* category through relational-characteristics of the responders such as empathy, reciprocity, trust, and obligations.

Both respondent groups considered trust as an inevitable social characteristic required for disaster management operations. However, respondents exhibited different types of trust during disaster operations. The respondents of Case Study 1 trusted the officers who they have worked closely during previous disasters. The researchers named this form of trust as cognition-based trust. The cognition-based trust describes the reliance, among the individuals that were developed based on their profound assessment of experiences with each other. Case Study 2 revealed that affect-based trust exists among the community members who belong to close social circles. The affect-based trust describes the confidence among individuals, that were developed based on the feelings of attachment.

The findings showed that community members and administrative officers trust each other only if they are known at a personal level. Researchers named this as disposition-based trust, which means that trust between two groups depends on the propensity of individuals rather than the influence of the authority. Some respondents of Case Study 2 claimed that they trust some administrative-officers, but they do not trust the administrative system. Likewise, some administrative-officers have developed disposition-based trust towards community

responders. Respondents of Case Study 1 have developed a moderate level of trust towards the reliability and accuracy of the technical knowledge transfers during disasters. In contrast, respondents of Case Study 2 showed the inability to trust the technical disaster knowledge sources.

Both case studies frequently coded the open code reciprocity. Respondents of Case Study 2 showed a high degree of generalized reciprocity towards their immediate acquaintances, in which the respondents did not expect anything in return from assisting another person during a disaster. In contrast, respondents from Case Study 1 showed moderate levels of balanced reciprocity towards the fellow administrative officers. These administrative officers reciprocated the support to the work peers only if they have assisted in return. Case Study 1 identified that administrative officers showed a high degree of generalized reciprocity towards the community, but the community members expected more benefits from the administrative officers. Researchers named this as negative reciprocity between the two respondent groups.

Altruism is another mutually appeared open code in both case studies. Case Study 1 and 2 demonstrated that respondents possessed high altruism levels during the initial response period. However, the findings suggested that the altruism diminished as time passed the critical disaster period. Findings further claimed that respondents of Case Study 2 possess a high degree of altruism than Case Study 1. [Table 7](#) summarizes a comparison between the findings of Case Study 1 and 2 and the degree of the presence of *Values* category in the two case studies.

Table 7
Comparison of the sub concepts emerged from theme *Values*.

Sub concepts emerged	Case Study 1	Case Study 2
Trust between peers in closed groups	<u>Cognition-based trust:</u> Individuals have developed trust in others based on experiences and the justifiable assessment of the actions of the trustee. Case Study 1 showed cognition-based trust to a moderate degree.	<u>Affect-based trust:</u> Individuals have developed trust in others without any justifiable assessment but considering the feeling of attachment. Case Study 2 showed affect-based trust to a high degree.
Trust between respondents of Case Study 1 & 2	<u>Disposition-based trust:</u> Case Study 1 showed that community members and administrative officers trust each other only if they are known to each other regardless of the administrative authority.	<u>Disposition-based trust:</u> Case Study 2 showed that community members and administrative officers trust each other only if they are known to each other regardless of the administrative authority.
Reciprocity between peers in closed groups	<u>Balanced reciprocity:</u> The exchange of support made with expectations that individuals assist in return. Respondents showed a moderate degree of balanced reciprocity.	<u>Generalized reciprocity:</u> The exchange of support made with no expectations in return. Respondents showed a high degree of generalized reciprocity.
Reciprocity between respondents of Case Study 1 & 2	<u>Generalized reciprocity:</u> Administrative officers did not expect anything in return for the support they were offering community members. Respondents of Case Study 1 showed a high degree of generalized reciprocity.	<u>Negative reciprocity:</u> Community members showed a high degree of negative reciprocity. Respondents of Case Study 2 did not satisfied with the benefits they received after supporting the disaster operations.
Degree of altruism during early response stage	<u>Moderate:</u> Respondents showed average generosity levels. They provided support if someone requested for help.	<u>Very high:</u> Respondents showed very high generosity levels. They provided support whenever an individual is in the need.
Degree of altruism during recovery	<u>Low:</u> Respondents showed low levels of generosity to others (especially towards community).	<u>Moderate:</u> Respondents showed average generosity levels by providing support when someone requested for help.

Table 8
Comparison of the sub concepts emerged from theme *Norms*.

Sub concepts emerged	Case Study 1	Case Study 2
Injunctive norms	<u>Formal coding system</u> : Respondents expected to follow the duly assigned formal disaster management protocols during disaster situations (standard operating procedures and other administrative protocols).	<u>Village-level disaster management plans</u> : Injunctive norms of the respondents included the expectations to follow local disaster management plan and distribute the disaster management tasks among the peers.
Descriptive norms	<u>Modified formal coding system with some spontaneous changes</u> : Respondents applied changes to the formal coding system to accommodate improvisation strategies to manage resources.	<u>Indigenous/local customs</u> : Community members were accustomed to following indigenous/local customs when responding to a disaster rather than following established community disaster management plans.
Relief dependency	<u>Relief-centred mindset</u> : Respondents believed that the main objective of their disaster management procedures is to acquire and distribute flood aids to the community.	<u>Donation-dependent mindset</u> : Respondents possessed a significant donations-dependent mindset, and they believed that they have an exemplary right to acquire flood reliefs from the local government.
Impressions of hardships and perceptions towards improvisation	<u>Improvisation to overcome resources limitations to carry out disaster management procedures</u> : Respondents declared that they have only a little amount of physical, technological and knowledge resources to deal with disaster management operations. Therefore, they have actively sought the benefit of improvising for external support and devised innovative ways to overcome the difficulties.	<u>Improvisation to overcome difficult life conditions</u> : Respondents declared that they have only a little amount of physical, technological and knowledge resources to deal with disaster management operations. Therefore, they have actively sought the benefit of improvising from external support and devised innovative ways to manage difficult life conditions.
Perceptions towards leadership	<u>Pre-appointed static leadership</u> : Respondents believed that leadership is an appointed condition and leadership should be static where the leaders and the followers must remain the same during the disaster operations.	<u>Dynamic leadership</u> : Respondents considered that leadership is a dynamic condition where the leaders and the followers can be changed time-to-time based on the circumstance they are in.
Risk perception	<u>Short time disaster response and recovery perception</u> : Respondents concerned about the immediate safety and recovery of the community members, but very little attention was given to the long term mitigation attempts.	<u>Short time survival perception</u> : Respondents pre-dominantly occupied by the short-term survival methods during flood response and did not reported any perceptions on long term flood mitigation for their community.

6.5. Norms

The *Norms* category represents the formal and informal systems of meanings, shared representations, and interpretations of a social group. In this study, researchers investigated the *Norms* category by the cognitive characteristics of respondents. The findings suggested that respondents demonstrated two types of norms when dealing with flood response: injunctive and descriptive norms. Injunctive norms are socially acceptable ways or behaviours of responding during a particular circumstance. Case Study 1 reported that its respondents expected to follow the duly assigned formal disaster management protocols during disaster situations. These standard operating procedures and other administrative protocols, which local government officers must adhere to are the most common injunctive norms found in Case Study 1. On the other hand, injunctive norms of the community members of Case Study 2 included the expectations to follow local disaster management plan and distribute the disaster management tasks among the peers. The descriptive norms explain the actual behaviour during a particular circumstance, which could be different from the injunctive norms. Although the respondents of Case Study 1 must adhere to SOPs and other administrative protocols during floods, their actual practices were different from the injunctive norms. Case Study 2 also reported that community members followed various indigenous/local customs when responding to a flood rather than obeying to the local disaster management plans.

One of the prominent *Norm* observed in the two case studies is the relief dependent mentality. Respondents of Case Study 1 believed that the main objective of their disaster management procedures is to distribute flood aids to the community. Most of their disaster management objectives were centred on the tasks to acquire and distribute flood aids to the community. On the other hand, respondents of the Case Study 2 demanded and competed for the flood aids. These community members argued that they have a right to acquire flood reliefs. The findings of this study highlighted that both respondent groups possessed the donation dependent mentality.

Another *Norm* frequently observed in the transcripts is hardships or impressions of difficulty. Both case studies suggested that respondents have developed perceptions to improvise innovatively. The respondents of both case studies also discussed the leadership of DRM activities. The researchers identified a significant perceptual difference in the

leadership norms of the two case studies. Respondents of Case Study 1 believed that leadership is an appointed position. On the contrary, respondents of Case Study 2 believed that disaster response leadership is a highly dynamic role, which transferred from person to person based on the circumstance. The findings of the Case Study 2 indicated that the respondents dynamically adapted situational leadership when required.

The next prominent *Norm* reported in the two case studies is the risk perception of the respondents. Findings of this study illustrated that both responder groups possessed short-term risk perception. Respondents of Case Study 1 concerned about the immediate safety and recovery of the community members than their long-term resilience building. Similarly, the respondents of Case Study 2 also pre-dominantly occupied by the short-term survival methods during flood response and did not report any perceptions on long-term flood mitigation for their community. Table 8 summarizes a comparison between the findings of Case Study 1 and 2 and the appearance of the presence of the *Norms* category in the two case studies.

6.6. Perseverance

The *Perseverance* category describes, a characteristic possessed by a person (or a group) who could continue performing a specified DRM task despite the problems encountered, showing the agility to react/adapt to a challenging situation within a short period. In this study, *Perseverance* investigated through the respondents' statements and observations that depict the endurance of respondents.

Spontaneity and Improvisation open codes frequently appeared in the transcripts of the two case studies. Both respondent groups demonstrated taking impulsive decisions and actions when responding to a flood. This behaviour is highly observed among the administrative officers even while they were attempting to adhere to the standard operating procedures and local government protocols. Since most of SOPs do not instruct the exact task sequence, respondents of Case Study 1 have used the liberty to take spontaneous task sequence based on the individual or group judgment when dealing with flood response. Respondents of Case Study 2 showed spontaneity in their actions to a much higher degree as they are not bound to follow specific disaster management protocols. These community members followed impulses when they were responding to a flood. They also showed agility to adapt according to changing plans. The respondents of these case studies also

Table 9
Comparison of the sub concepts emerged from theme *Perseverance*.

Sub concepts emerged	Case Study 1	Case Study 2
Spontaneity	<u>High</u> : Respondents have used the liberty to take spontaneous task sequence based on the individual or group judgment when dealing with flood response.	<u>Very High</u> : Respondents reported to behave according to impulses they acquire from the environment without premeditation when dealing with flood response.
Improvisation	<u>High</u> : Respondents have improvised ways to continue disaster management operations when they run out of resources during flood response.	<u>Very high</u> : Respondents have innovated several ways to coexist with floods, and improvised means to survive with the available resources.
Resilience focus	<u>Absorbing capacity</u> : Respondents showed high levels of absorbing capacity and provided efficient support to carry out search and rescue missions and establish basic human needs after disaster struck.	<u>Adaptive capacity</u> : Respondents reported higher degrees of absorbing capacity and adaptive capacity. These respondents demonstrated an inherent capacity to apply their knowledge, and use existing resources to survive a flood, and adapt to challenging circumstances.
Initiative focus	<u>Issue-focused initiatives</u> : Respondents demonstrated discrete spontaneous initiatives as and when issues are triggering when dealing with flood response and recovery.	<u>Survival-focused initiatives</u> : Respondents demonstrated holistic initiatives to extend multiple activities that are correlated to keep the community safe when dealing with flood response and recovery.

have developed ways to continue disaster management operations despite resource limitations. In comparison to Case Study 1, respondents of Case Study 2 showed a higher tendency for improvisation. The findings of this study also reported many instances where local administration officers use the resources of the community to improvise resources for flood response.

This study identifies three levels of resilience: Absorbing capacity, Adaptive capacity, and Transformational capacity. Findings of the two case studies demonstrated different resilience levels. Respondents of Case Study 1 showed high levels of absorbing capacity and provided efficient support to carry out search and rescue missions and establish basic human needs after disaster struck. However, their focus on the adaptation (or adjust) to the different circumstances triggered during a flood, and recovery (or bounce back) remains at a modest level. Respondents of Case Study 1 demonstrated a low transformational capacity, and their focus to change the conditions, systems, and practices remained at an insignificant level. Hence, the resilience focus of Case Study 1 was dominated by the attempts to promote absorbing capacity, rather than adaptive capacity and the transformational capacity. In contrast, respondents of Case Study 2 reported higher degrees of absorbing capacity and adaptive capacity. These respondents demonstrated an inherent capacity to apply their knowledge, and use existing resources to survive a flood, and adapt to challenging circumstances. However, their focus on the recovery (or bounce back) prevailed and they took a longer period to return to normal living conditions. Respondents of Case Study 2 also demonstrated a very low transformational capacity. They showed the inability to change the conditions, systems, and practices to build better. Hence, the resilience focus of Case Study 2 was stronger than Case Study 1 but limited to adaptive capacity.

Initiative focus is the interest of a particular respondent to be involved in self-devised disaster management initiatives regardless of the obstacles. Respondents of Case Study 1 demonstrated several issue-focused initiatives to overcome the obstacles. In other words, respondents demonstrated discrete spontaneous initiatives when issues were triggering. Respondents of Case Study 2 demonstrated holistic initiatives to extend multiple activities that are correlated to keep the community safe when dealing with flood response and recovery. Table 9 summarizes a comparison between the findings of Case Study 1 and 2 and the appearance of the presence of the *Perseverance* category in the two case studies.

7. Theory building

The previous sections provided an analytical comparison of the emergent themes of the two case studies. The degree of presence of each selective code and the diverse forms of the concepts emerged helped the researchers to acquire a preliminary sense of the foreseeable theory. The next level of analysis focuses on the theoretical coding, which conceptualizes how selective codes may relate to each other [39]. As described

earlier, the selective codes emerged in this study are centred on the two core concepts *Interactions* and *Ambience* (Fig. 3) and serve as the foundation of the emerging theory. This section focuses on the patterns and the underlying meanings of the conceptual relationships between the six categories and proposes theoretical suggestions.

This study first signals a theoretical relationship between *Brokerage* and *Knowledge Dynamics* categories. The findings of this study suggest that the brokering associations among different stakeholder groups determine the quality and pace of knowledge transfer during disaster response. In particular, having strong brokering associations among different responder groups empowered the instinct and extrinsic task delegations and associated knowledge transfer practices. The knowledge transfer efficacy of a group of responders possesses a clear association with their ability to send and receive knowledge through distinct cohesive networks. Hence, a relationship “enables” can be suggested between the categories *Brokerage* and *Knowledge Dynamics* categories (i.e. *Brokerage* enables *Knowledge Dynamics*).

Secondly, the findings of this study suggested a relationship between selective codes *Closure* and *Knowledge Dynamics*. This study demonstrated that strong internal bonding interactions among disaster responders were essential for the implementation of knowledge transfer practices. The two case studies ascertained that strong associations to transfer knowledge through the bonding connections (*Closure*), made the knowledge transfer practices a reality (*Knowledge Dynamics*) during flood response. Hence, a relationship “enables” exists between *Closure* and *Knowledge Dynamics* categories.

Findings of this study also suggested an association between the categories *Closure* and *Brokerage*. Having few knowledge brokers and many strong bonding relationships among members of a work/social group provided more opportunities for stakeholders to access and transfer knowledge to other functional groups. Therefore, the bonding relationships, which a group possessed, helped the responders to circulate new knowledge instantly with other functional groups. Also, the findings demonstrated that strong bonding relationships among the companions of a group triggered their propensity to develop brokering connections by introducing individuals to new knowledge brokers. Therefore, a relationship “enables” can be suggested between the categories *Closure* and *Brokerage* (i.e. *Closure* enables *Brokerage*).

The fourth relationship emerged from the findings of this study is the relationship between the selective codes *Norms* and *Values*. This study revealed that the norms of the respondents influenced their *Values*. For example, the five Buddhist precepts, and noble principals, which these stakeholders follow, encouraged them to develop *Values* such as altruism and empathy. Administrative officers of Case Study 1 shared shreds of evidence of high degrees of altruism and empathy emerged from the community-driven norms. Findings also highlighted that, when respondents develop adverse *Norms* about the community and the system, the effectiveness of *Values* deteriorates. For example, when stakeholders develop negative beliefs about the community’s donation-dependent mentality and political influences, stakeholders have reduced their

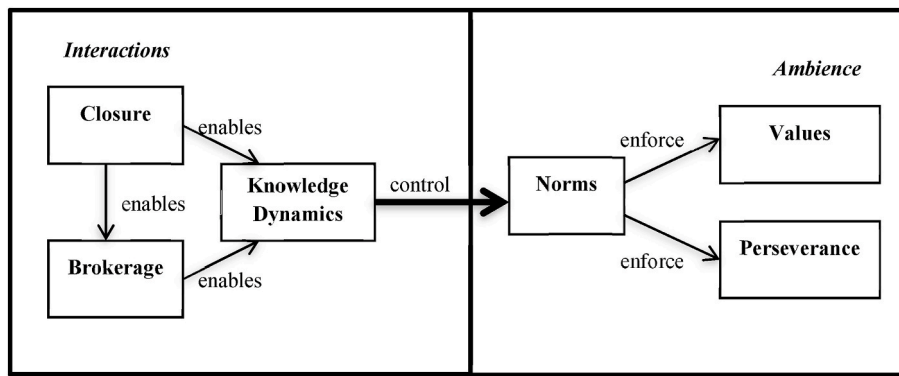


Fig. 4. Theory of Knowledge Transfer in a Survival-Focused Social Contexts (KTinSSC) - Integrative diagram reflecting the relationships among the categories emerged from data.

intentions to trust others. Therefore, altruistic and reciprocal behaviours to transfer knowledge was reduced when negative beliefs emerged among responders and vice versa. Hence, a relationship “enforce” can be suggested between the categories *Norms* and *Values* (i.e. *Norms* enforce *Values*).

Fifth, the findings suggested that the *Norms* category has a direct association with the *Perseverance* category. For example, this research defines solidarity norms as, a pattern of perceptions established by a group of interest, formed by their belongingness to that group. Being a part of a particular group has demonstrated a positive effect on the perseverance of those individuals. The respondents contributed to the disaster knowledge transfer despite the difficulties when they believe in solidarity. Therefore, the findings of this study suggest that solidarity norms of a social group enforce their perseverance characteristic. Thus, a relationship “enforce” can be suggested between the categories *Norms* and *Perseverance* (i.e. *Norms* enforce *Perseverance*).

After recognizing the entwined relationships between the categories, analysts should identify the relationship between the two core categories. The relationship between *Interactions* and *Ambience* explains the connection between the main dimensions of the research problem. The findings of this study have demonstrated that the knowledge transfer practices (Knowledge Dynamics) of different social groups significantly influenced how these responders interpret the knowledge that is being received (Norms). For example, the established hierarchical knowledge transfer practices of the DDMCU and CBDMCU control the formal coding systems used by the disaster responders. The instructional information passed through the telephone or fax from a responder group to another controlled how the disaster management stakeholders interpreted SOPs and procedures. The findings of the study have demonstrated that the delayed (or/and inaccurate) knowledge transferred from the poorly managed knowledge transfer practices (Knowledge Dynamics) has let the stakeholders interpret the formal systems of meanings of SOPs and procedures faultily (Norms). For example, having connected to different knowledge brokers from the political associations (Knowledge Dynamics) to acquire response related knowledge has developed the donation dependent mentality (Norms) among the stakeholders. On the other hand, the spontaneous knowledge transfer practices of responders have developed short-time survival perception among the community members. Hence, the findings of this study suggest that Knowledge Dynamics in a social/workgroup control their Norms. The quality, speed, accuracy, and transparency of the knowledge transfer practices (Knowledge Dynamics) control how the stakeholders interpret the meanings, or shared representations of the formal and informal disaster management systems (i.e. Knowledge Dynamics control Norms).

The above mentioned six theoretical relationships between core themes and the categories that emerged from this study propose the constituents of the evolving theory. The next section integrates these relationships and explains the theoretical concepts emerged.

8. Theory of Knowledge Transfer in a Survival-focused Social Contexts (KTinSSC)

A parsimonious theory provides the simplest possible explanation for a phenomenon [38]. The proposed relationship between the emerged two core categories helps to lay a theoretical foundation for the evolving theory. Strauss [36] and Urquhart [38] suggested the use of integrative diagrams as a visual device to explain the integration of the concepts of an emerging theory. Fig. 4 presents an integrative diagram, which portrays the associations between the emerged categories of this study. The integrative diagram depicts that *Closure* and *Brokerage* enable *Knowledge Dynamics* and, *Knowledge Dynamics* category controls the *Norms* of the disaster responders. Fig. 4 also illustrates that the *Norms* category enforces the *Values* and *Perseverance* categories. As depicted in the following integrative diagram, the *Closure*, and *Brokerage* categories enable (i.e. provides the means for) the *Knowledge Dynamics*, which makes knowledge transfer feasible in disaster situations. One of the key findings of this study highlights that stakeholders utilize *Closure*, and *Brokerage* associations as their main strategies to transfer disaster knowledge (*Knowledge Dynamics*) by expanding social networks. The parsimonious theory emerging from the data suggest a three-fold relationship between the categories *Closure*, *Brokerage* and *Knowledge Dynamics*:

- First, having strong bonding associations among close groups of stakeholders enable stakeholders’ opportunity to connect with different brokering associations (i.e. *Closure* enables *Brokerage*)
- Second, having strong bonding associations among close groups of stakeholders enable stakeholders’ ability to create, acquire, and transfer knowledge within their groups to manage disaster situations (i.e. *Closure* enables *Knowledge Dynamics*)
- Third, having multiple brokering associations with other external stakeholder groups enable stakeholders’ ability to create, acquire, and transfer knowledge to manage disaster situations (i.e. *Closure* enables *Knowledge Dynamics*)

The findings indicated that each responder group consists of few knowledge brokers who have developed brokering connections with external functional groups. Most of these responder groups had only a few brokering links with external groups. Brokering connections provided means for these groups to acquire new knowledge. The findings of this study suggested that new knowledge received to a group will be disseminated to others only if that group consists of strong-bonding relationships (i.e. strong closure). Having strong closure in a group helps the respondents to acquire new connections from their peers. The findings of this study confirmed that new knowledge captured from close contacts circulates rapidly to other functional groups if the peers of a group have strong bonding relationships. Such novel knowledge

received through close contacts expands the brokering connections of the responders significantly. Hence, the emergent theory suggests that when a group has strong bonding relationships among the members and few knowledge brokers within that group, the bonding associations enable the stakeholders to expand brokering knowledge to non-knowledge brokers autonomously (i.e. *Closure* enables *Brokerage*).

The emergent theory also suggests that disaster situations are better managed when both bonding and brokering associations are well fused (i.e. *Closure* and *Brokerage* enable *Knowledge Dynamics*). First, the findings of this study suggested that strong bonding interactions among the responders were essential to carry out knowledge transfer tasks. Respondents argued that healthy bonding relationships (*Closure*) expedited knowledge transfer during floods (*Knowledge dynamics*). Hence, a relationship “enables” exists between *Closure* and *Knowledge dynamics* categories. The following examples further justified the existence of this relationship. For example, many respondents from Case Study 1 generously shared situation updates they receive through personal connections with peer workers instantly and directly (through verbal conversations, phone calls, SMS or group chats). These practices allowed them to understand and respond to the flood situation quickly. Hence, a relationship “enables” can be suggested between the categories *Closure* and *Knowledge dynamics* (i.e. *Closure* enables *Knowledge dynamics*).

Secondly, when considering the relationship between *Brokerage* and *Knowledge dynamics*, specific attention is drawn to the fact that respondents of the two case studies heavily relied on the brokering interactions with other stakeholder groups to manage the knowledge transfer practices. When responders perform disaster management tasks, stakeholders who live at the edges of the distinct cohesive networks must pass the required knowledge through the interphases instantly. The two case studies ascertained that respondents from different stakeholder groups engaged in instinctive and extrinsic task delegations to transfer knowledge between groups. For example, some respondents from Case Study 2 received flood alerts and situation updates from external responder groups from the upper catchment area. Receiving such alerts from external groups, helped the community members to send evacuation messages to their fellow community members promptly. Due to these collaborations with other villages, community responders received flood alerts even before technical organizations send formal alerts. Therefore community responders were able to initiate flood response activities quickly. Hence, a relationship “enables” can be suggested between *Brokerage* and *Knowledge dynamics* categories (i.e. *Brokerage* enables *Knowledge dynamics*). If a particular social group has strong bonding associations but no brokering associations, stakeholders have only a little potential to create, acquire, and transfer knowledge to external groups. Therefore, the proposed theory suggests the importance of both *Closure* and *Brokerage* to enable *Knowledge dynamics* collectively.

The parsimonious theory emerging from the data suggests another important relationship between the two categories *Knowledge Dynamics* and *Norms*. The findings suggest that the quality, speed, accuracy, and transparency of the knowledge transfer practices (*Knowledge Dynamics*) control how the stakeholders interpret the received knowledge (i.e. *Knowledge Dynamics* control *Norms*). The emergent theory suggests that practices employed for knowledge transfer have a significant effect on how the stakeholders concede the knowledge in disaster situations and interpret the knowledge they acquired. For instance, if the responsibility practices have not clearly defined from local government to community, community members would develop norms of ownership for the response activities rather than sharing the responsibility with the state agents. Such beliefs have further resulted in developing relief dependent mentality among stakeholders. The ill-defined responsibility practices have led the community to believe that they could survive floods on their own. Further community members consider that and local government must support their survival efforts by providing monetary and physical flood aids. These ill-defined responsibility practices have further developed *Norms* of detachment to state agents

and enforced survival-focused norms among the community. Therefore the proposed theory suggests that the quality, speed, accuracy, and transparency of the knowledge transfer practices (*Knowledge Dynamics*) control how the stakeholders interpret the meanings, or shared representations of the formal and informal disaster management systems (i.e. *Knowledge Dynamics* control *Norms*).

As depicted in the integrative diagram, the *Norms* category enforces the two categories *Values* and *Perseverance*. Findings indicated that the normative principals, which stakeholders followed greatly influenced them to develop *Values* to the benefit of society. This study has recognized that *Values* operate as a protective shield for the stakeholders. It's also evident that *Values* rooted in the social context help the stakeholders to manage the physiological stress and accumulate the resources for response activities. In particular, *Values* such as mutual trust, altruism, reciprocity and empathy towards others have supported the individuals to face, endure and survive a flood situation. Hence, the proposed theory suggests a relationship “enforce” from category *Norms* to category *Values* (i.e. *Norms* enforce *Values*). *Norms* and *Perseverance* categories show a similar theoretical relationship. Findings indicated that normative principals (*Norms*) which stakeholders followed greatly influenced them to contribute to the disaster knowledge transfer and associated disaster management activities despite the difficulties they come across (*Perseverance*). The findings of this study recognized that the *Perseverance* characteristic kept the stakeholders going ahead if the normative beliefs (*Norms*) are in favour of surviving a flood. The findings of this study confirmed the influence of *Perseverance* characteristic of the stakeholders for their survival during floods. Hence, the parsimonious theory emerged from the data suggests a relationship between the categories *Norms* and *Perseverance*, which also explains the theoretical connection to the resilience level in this social context. Normative principals (*Norms*) which stakeholders possessed greatly influenced them to develop *Perseverance* characteristic to face, endure and survive a flood situation and continue to carry out disaster management activities despite difficulties, failures, or challenges. Thus, a relationship “enforce” is proposed from category *Norms* to category *Perseverance* (i.e. *Norms* enforce *Perseverance*).

As knowledge transfer practices (i.e. *Knowledge Dynamics*) control the formal and informal systems of meanings, shared representations, and interpretations, which a particular social group possessed of (i.e. *Norms*), the emergent theory makes a remarkable connection with the resilient norms of the community. Different individual beliefs (*Norms*) of stakeholders such as risk perception, environment awareness, donation dependency, indigenous/local customs, and opinions towards improvisation collectively define the level of resilience of a social group. Hence, the emergent theory suggests that the social *Norms* determine the resilience level, which a particular social group would reach. In other words, the degree of resilient norms held by a social group determines the level of resilience of the group.

This study uses five phases of the resilience cycle (normal conditions, deteriorating phase, adapting phase, recovering phase, and Growing phase) proposed by Patterson, Goens, and Reed [40] to describe the level of resilience of a community. The normal condition explains the routine functioning of a social context and resilience level drops to the dysfunctional stage when a community goes through the deteriorating phase after the adversity strikes [40]. Higher the resilience level of a social group, the time they would spend in the deteriorating phase will be lesser. The adapting phase begins when stakeholders start to assume the responsibility of their safety and conditions and take necessary actions to avoid trapped in the dysfunctional stage. After the adapting phase, a community reaches the survival stage. If a community continue further on the recovering phase, they will reach the stability stage, which Patterson and the group [40] termed as level 1 resilience. Level 1 resilience means that a community reaches the same level of stability as it was before the disaster [40]. A community reaches level 2 resilience only if its members apply strategies to outgrow their capacity, skills, and actions to learn lessons from the adversity and thrive to grow.

The findings of case study 1 and 2 demonstrate that the stakeholders could reach a higher level of the “survival” level of the resilience life cycle after spending some time in the deteriorating phase. Findings also highlighted that strong Closure connections resulted in survival norms of the stakeholders, which enforced the survival-focused perseverance characteristics helping the community move to the recovering phase. The survival-focused perseverance characteristics further assisted the community reaching the stability stage in slower speeds. Patterson et al. [40] named this resilience level 1. These case studies also showed that stakeholders are unable to reach resilience level 2 because their *Values* degrade after passing the survival stage. In particular, these social groups have developed hostility during the times of flood aids distribution. These case studies did not demonstrate evidence of improving capacity even after provided with monetary funds. Authors named such social contexts as “Survival-Focused Social Contexts”, where the social groups are concerned just about the immediate survival after a disaster, rather than building back the capacity. Therefore, the authors name the parsimonious theory derived from the data as the “Theory of Knowledge Transfer in Survival-Focused Social Contexts”, abbreviated as KTinSSC theory. The next section discusses the generalizability of the proposed theory.

9. Theory generalizability

Most of the studies that use grounded methods to build theory are famous for their explanatory power than the generalizability [36]. Urquhart [38] argued that the generalizability of a grounded theory remains an issue with many users of GTM. Therefore, Urquhart [38] suggested the importance of scaling up the emergent theory to a greater level of abstraction, which goes beyond micro-phenomena. Urquhart [38] and Andrade [27] suggested the use of Walsham’s [41] analytic generalizations to explain the theoretical contribution of an interpretive case study. The four types of analytical generalizations, 1) development of the concepts, 2) generation of theory, 3) drawing of specific implications, and 4) contribution to rich insight, describe the potential theoretical contribution of a grounded theory study.

The first generalization, “development of the concept” indicates that grounded theory studies build theory, and often discover new concepts [41]. This study proposed a few new concepts and derived extensions to the exiting. For example knowledge brokers, and knowledge dynamics are new concepts that emerged from this study. Further, this study suggests extensions for existing concepts such as brokerage, closure and norms. The second generalization, “generation of theory” indicates that a grounded theory should build a full-theory [41]. This study conforms to the second generalization through the newly developed KTinSSC theory. The six categories contributing to the KTinSSC explain the survival from adversity in survival-focused social contexts, and the effect of knowledge transfer interactions on normative beliefs. The third generalization, “drawing of specific implications” indicates that a grounded theory should prove its usefulness for other relevant contexts [41]. In particular, this study demonstrates its fit into both Case Study 1 and 2. Therefore the KTinSSC theory shows the ability to apply in similar “survival-focused social contexts” such as DDMCUs and CBDMCs in other districts of Sri Lanka. Following are the attributes of a survival-focused social group:

- The individuals in a survival-focused social group do not have adequate access to both bonding (*Closure*) and brokering (*Brokerage*) knowledge associations when responding to a flood.
- The knowledge transfer practices used by such social groups are spontaneous. Most of their knowledge transfer practices rely on tacit knowledge dissemination and accumulation.
- A survival-focused social group practices inherent social values and demonstrates high perseverance characteristics.
- A survival-focused social group spends a relatively little time in the adapting phase (i.e. quickly move from dysfunctional stage to

Table 10

Table of relevant factors from existing literature.

Factors from emergent theory	Related Factors from Literature
Brokerage	Group membership [42] Compassion venturing [43] Bridging social capital [44–48] Interdependence between community and governing authority [49] Brokerage [9,50]
Closure	Informal socializing and social participation [51] Social Relations [52] Bonding social capital [44,45,48,53] Network closure [50,54,55]
Knowledge dynamics	Resource bundling, Resource search [43] Misappropriation of disaster relief [45] Maintaining social capital [46] Network processes and mechanisms [47] Formulation and implementation of flood policies [48] Transparency and perceived inequity [56] Disaster operations and strategies [57] Interorganizational Communication [58] Collective action [49] Task Performance [55,59–61] Knowledge transfer among internal and external firms [62, 63] Responsibilisation [64–66]
Norms	Perceptions of community social cohesion, Cognitive resilience, cognitive decline [51] Identity, Place [52] Perceptions of local government [44] Ritual events [67] Pervasive rhetoric of resilience [56] Attachment to the place [68] Donor dependency [69] Culture [70–72]
Values	Trust, Perceived reciprocity [42] Emotional support from the group, collective action, and trust [73] Social cohesion and trust, Reciprocated exchange, Perceived community services, Volunteering activity [44] Discernment on minority [74] Mutual support [75] Trust [55,71,76] Norms of Reciprocity [77,78] Odds to regain social and material well-being [56] Self-reliance [79] Over embeddedness within social relationships [80] Persistence of ‘Asian family values’ [75] Capacity to adapt or adjust [81] Self-monitoring [82]
Perseverance	

survival stage) and arrive at survival resilience level, but takes time to reach normal conditions.

- A survival-focused social group spends a relatively long time in the recovering phase (i.e. slow movement from survival stage to stability (resilience-level 1) and may or may not arrive the stable or normal conditions.
- A survival-focused social group do not reach the growth stage (resilience-level 2) of the resilience life cycle and do not demonstrate growth practices.

Theory of Knowledge Transfer in Survival-Focused Social Contexts should be applied only for social groups with the above attributes. The fourth generalization, “contribution to rich insight” indicates that a grounded theory itself should provide broad insights [41]. This study contributes to the body of disaster resilience literature with rich insights for disaster knowledge transfer and proposes an association between knowledge transfer and social capital, which are otherwise often disconnected research areas. This study positions the knowledge transfer practices related concepts within the social capital literature. This study also recognizes the mediating role of cognitive capital (normative beliefs), between the structural social capital (closure and brokerage

associations), and relational social capital (values). Additionally, this study explains different resilience levels of communities and the provision to change from one resilience level to another.

As the core of the grounded theory approach relies on inductive reasoning, authors did not consult literature before arriving at theoretical propositions. Each category and concept discussed in the proposed theory emerged naturally from data without referring to existing literature. Therefore, a literature review is required to check the consistency of the proposed theory with the existing literature. The following section brings out the rationale of the emergent theory by taking the reader through a review of the theoretical and empirical literature, examining the fit of the emerged KTinSSC theory by relating the emergent theory to the literature. Urquhart [38] suggests starting the theoretical integration by producing a table of relevant literature and cross-references the elements of the emergent theory to it. Hence as a starting point to theoretical integration, the following table of relevant literature (Table 10) illustrates which factors are already present in the literature, but also shows the factors that are new to the literature, to demonstrate how the KTinSSC theory verifies and/or extend the literature.

Table 10 demonstrates that most of the categories that emerged from the grounded data of this study have been grappled by scholars before and have an existing presence in the literature. A glance at the above table confirms that these factors (categories of the KTinSSC theory) endorse the literature. However, it is important to discuss how the emergent theory extends the literature critically. Hence, as the second step towards theoretical integration, Strauss [36] and Urquhart [38] suggested the importance of discussing the emergent theory critically and relate it to existing theories and empirical findings. The following subsections serve the aforesaid objective by relating the theoretical propositions of the emergent KTinSSC theory to the existing literature.

9.1. Brokerage on knowledge dynamics

The emergent theory proposed that associations among different stakeholder groups (*Brokerage*) enable the knowledge transfer practices and make the disaster response methods feasible during a flood (*Knowledge dynamics*) in a survival-focused social setting. This relationship between *Brokerage* and *Knowledge dynamics* confirms empirical findings of Williams and Shepherd [43]; Masud-All-Kamal and Hassan [45] and Chan and the group [48]. Williams and Shepherd [43] suggested that having stronger brokering connections between authorities and community allows the stakeholders to pursue new resources, to handle large response operations. Masud-All-Kamal and Hassan [45] argued that bridging social capital significantly helped disaster management efforts to effectively manage disaster relief and rehabilitation resources. Chan and the group [48] suggested that the role of brokering collaborations and partnerships among disaster organizations assist to mobilize the volunteering practices to manage disasters. Adger [49] argued that interdependence between the community and governing authority is essential to manage resources effectively through unique strategies for adaptation. Literature also suggested the existence of the inverse relationship, where the absence of bonding associations reduces the efficiency of practices employed by disaster management stakeholders. For example, Masud-All-Kamal and Hassan [45] argued that the lack of bridging associations leads to the misappropriation of disaster relief and rehabilitation resources. Hence, the literature confirms the enabling relationship between *Brokerage* and *Knowledge dynamics*, which also endorses that the absence of *Brokerage* leads to restricting the efficiency of knowledge transfer practices during floods. It is also important to mention that this proposition extends the theoretical views between *Brokerage* and disaster management practices to knowledge management expectations, which can be considered as a unique contribution of this research. The findings of this study extend the social capital scholarship towards identifying knowledge transferring practices (such as hierarchical knowledge transfer structure, responsabilisation practices, spontaneous/intuitive actions, and individualized knowledge transfer)

among distinct social groups when dealing with disaster situations.

9.2. Closure on knowledge dynamics

The emergent theory suggests a relationship “enables” between *Closure* and *Knowledge dynamics* categories (i.e. *Closure* enables *Knowledge dynamics*). This proposed relationship confirms the empirical findings of Adger [49]; Aldrich and Meyer [83]; Rockenbauch and Sakdapolrak [84]; Guarnacci [85]; Hawkins and the group [53]; Williams and Shepherd [43] related to the positive impact of brokering associations on disaster knowledge management practices. For example, Williams and Shepherd [53] suggested that ventures with stronger ties to the local community support acquiring resources through speedy and customized practices to deal with wider response activities. Rockenbauch and Sakdapolrak [84] proposed the need of embedding rural communities in bonding associations to connect people and facilitate the flow of resources, information, and knowledge. Guarnacci [85] pointed out that key opinion leaders in the community, bonding networks, and the channels of resources/information considered to be crucial to face a disaster. Similarly, Masud-All-Kamal and Hassan [45] also verified that bonding social capital significantly helped the villagers to produce useful emergency management practices to achieve long-term recovery. On a contrary note, few scholars also found the inverse and the insignificance of this relationship. For example, Norris and the group [68] argued that strong bonding associations that generate attachment to the place would create a negative impact on disaster based relocation. Aldrich [74] also suggested both positive and negative externalities of bonding relationships on disaster management outcomes. Reininger and the group [42] argued that the group membership was insignificant when determining the ability of a community to acquire resources to manage the disaster. The KTinSSC theory recognizes the dual way relationship between these two categories (i.e. strong *Closure* enables *Knowledge dynamics* and poor *Closure* hinders *Knowledge dynamics*). Hence, findings of this research expand the theoretical views between these two categories, which can be considered as a unique contribution of this research. The findings of this study extend the social capital scholarship to identify knowledge-transferring practices within social groups (such as intrinsic associations between members of close groups, intuitive and affectionate decision making, and indigenous knowledge transfer methods) to manage disaster situations.

9.3. Knowledge dynamics on norms

The emergent theory proposed that the practices associated with accessing, absorbing and transferring knowledge to achieve disaster management objectives (*Knowledge dynamics*) control the systems of meanings, shared representations, or interpretations, which a particular social group is possessed of (*Norms*) in survival-focused social settings. This relationship between *Knowledge dynamics* and *Norms* confirms empirical findings of Hikichi and the group [51]; Cox and Perry [52]; Chan and group [48]; Lourdes and group [57] and Adler and Kwon [80]. Hikichi and group [51] suggested that community-level informal socializing and social participation reduces the cognitive decline after a natural disaster. Cox and Perry [52] recognized that reconfiguration of disaster recovery affects the social-psychological processes hence more reflective and intentional consideration should be paid to the psychological, social and emotional responses of the affected community. Chan and the group [48] suggested that the formulation and implementation of policies and strategies should consider maximizing social capital, building self-reliance, enhancing coping norms of the community. Lourdes and the group [57] suggested that disaster managers use social capital generated through personal interactions as a strategy to control socio-cultural norms. Adler and Kwon [80] also recognized that social capital based practices that improve the quality and relevance of information enhance solidarity norms among stakeholders and encourage compliance with local rules and customs. Literature also provided

evidence for the inverse relationship between these two categories, suggesting that unclear knowledge establishes perverse norms among stakeholders (i.e. ambiguous *Knowledge dynamics* develops perverse *Norms*). For example, Eadie and Su [56] argued that haphazard or inequitable distribution of relief goods and services generated norms of discontent within communities. The KTinSSC theory recognizes the two-way relationship *Knowledge dynamics* control *Norms* (i.e. well-established, transparent *Knowledge dynamics* encourage stakeholders to develop resilient norms, and haphazard *Knowledge dynamics* encourage stakeholders to develop perverse norms). Hence, the findings of this research expand the theoretical views between these two categories, which can be considered as a unique contribution of this research. The findings of this study extend the social capital scholarship to identify a relationship between knowledge transferring practices on the norms of the stakeholders.

9.4. Norms on values

The emergent theory proposed that the survival-focused systems of meanings, shared representations, and interpretations of a social group (*Norms*) enforce the relational characteristics (*Values*). This relationship between *Norms* and *Values* confirms the empirical findings of Reininger and the group [42]; Story and the group [73]; Bhandari [86]; and Bankoff [75]. Reininger and group [42] argued that individuals who have higher norms of the prevalence of preparedness report the highest perceptions of trust. Story and group [73] suggested that emotional and perceived preparedness norms are mediated by values such as social network support, emotional support from the group, collective action, and trust. Bhandari [86] found that cultural norms such as beliefs on rituals supported the enhancement of relational characteristics such as trust. Bankoff [75] suggested that faith and religious norms supported the community to develop values such as mutual support, empathy, and altruism. Literature also provided evidence for the inverse relationship direction, where the perverse *Norms* reduce the *Values* among stakeholders. For example, Wickes and the group [44] argued that normative beliefs on the structural conditions of the vulnerable groups result in hostile conditions. Eadie and the group [56] also suggested that the inequitable distribution of relief goods develops perverse norms among stakeholders which will result in undermining the social cohesion values. Aldrich [74] also revealed that some of the normative beliefs of the stakeholders resulted in the reduction of values of the disaster-affected communities. The proposed KTinSSC theory recognizes the two-way relationship between *Norms* enforce *Values* (i.e. having survival-focused norms encourage the stakeholders to develop values, and absence of survival-focused norms encourage stakeholders to reduce values). This proposition extends the theoretical views between *Norms* of individuals to the *Values* they possess, which can be considered as a unique contribution of this research. The findings of this study also extend the resilience scholarship towards identifying the impact of *Norms* on the *Values* of the stakeholders.

9.5. Norms on perseverance

The emergent theory proposed that the survival focused systems of meanings, shared representations, and interpretations of a social group (*Norms*) enforce the persistent characteristics possessed by the individuals, who could continue performing DRM tasks despite the problems encountered (*Perseverance*). This relationship between *Norms* and *Perseverance* confirms the empirical findings of Chamlee-Wright and Storr [79]; Bankoff [75]; and Paton and Johnston [81]. Chamlee-Wright and Storr [79] suggested that the shared norms of a family-oriented community enforced the community to adapt self-reliance strategies. Bankoff [75] also recognized that normative beliefs on civic engagement helped the community go through the hardships posed by natural disasters. Paton and Johnston [81] argued that normative beliefs have developed the stakeholders' capacity to sustain societal processes.

Literature also provided evidence for the inverse relationship direction, where the perverse *Norms* reduce the *Perseverance* characteristics among stakeholders. For example, Eadie and the group [56] suggested that negative coping norms show difficulties to regain the social and material well-being of survivors. Adler and Kwon [80] also recognized that having a strong sense of solidarity norms may "backfire for the focal actor in several ways" (p. 2002). This indicates that strong solidarity beliefs among close social groups may create over embeddedness among social actors pushing resilience away. The proposed KTinSSC theory recognizes the two-way relationship, *Norms* enforce *Perseverance* (i.e. having survival-focused norms encourage the stakeholders to develop *Perseverance*, and the absence of survival-focused norms encourage stakeholders to reduce *Perseverance*). This proposition extends the theoretical views between two categories *Norms* and *Perseverance*, and presents a unique contribution to the body of literature. The findings of this study specifically extend the resilience scholarship to identifying the impact of *Norms* on the *Perseverance* of the stakeholders.

The next section discusses the limitations and future research avenues for this research.

10. Limitations and future research

First, this study gathered data from a relatively small number of case studies to represent flood situations. Authors envisaged that by adding more case studies, would improve the generalizability of the emerged theory by providing a better representative view of the context. However, within the given time and the available resources, two stakeholder levels (local administrative authorities and the communities) were investigated through different data collection methods to arrive at the findings. Authors suggest future research to gauge the views from more case studies to build up a more robust understanding of complex disaster situations. Second, this study employed semi-structured interviews and participant observations of disaster drills/simulation exercises to gather data. The complex nature of floods made it difficult to collect real-time data by observing the actual disaster. Authors acknowledge that some observations would have affected by the Hawthorne effect. Therefore, these research objectives show its potential to be included in future ethnographic research to study knowledge transfer in real-time disaster situations. Third, the informants for this study represent only two levels of responders in Sri Lanka's disaster management framework, community members, and local administrative officers. This research did not collect data from other responder groups such as representatives of the ministry of disaster management, other line ministries, technical organizations, and non-governmental organizations. Community members, and district and divisional administrative officers were included in this study considering their role in practical disaster management. However, having recognized the importance of all stakeholders for holistic disaster management, future research needs to gauge the views of all the stakeholders of the disaster management framework to improve the theory. Fourth, the case study based interpretive approach to conduct the investigations involves a reasonable degree of subjectivity. Although the authors tried to reduce the subjectivity, a complete elimination was not possible. Hence, the authors suggest future positivist research to balance the philosophical views of the subject matter. Fifth, the fact that the scope of this study is confined to a particular region in a single country in South Asia, offers its limitations. Hence, the authors suggest future research to apply KTinSSC theory in other contextual settings to develop wider theoretical generalizations.

11. Conclusions

This article has aimed to provide a substantive theory to explain for knowledge transferring activity of disaster responders and explained the implications on community resilience. The developed KTinSSC theory demonstrates its rigour and relevance and shows a possible uptake in social science, disaster management, and information system

scholarship. The contributions of the proposed theory are highly useful in the current contexts due to the intensity of global weather change patterns and the consequent high exposure of communities to natural disasters. As governments are required to accelerate the measures to manage the impact of such risks, this theory recommends policy changes and practice implications for disaster knowledge transfer in survival-focused social contexts.

The proposed KTinSSC theory suggests that the strength of closure and brokerage associations of a particular social group decides the competence of the knowledge transfer practices used during disaster response and recovery. Strong associations lead a social group to acquire responsabilisation, adhere to SOPs/procedures, make intuitive decisions, improvise, and articulate knowledge to attain higher resilience levels. When the strength of the associations is weak, disaster responders develop spontaneous knowledge transfer practices, leaving a social group to struggle to survive a disaster. The findings of this study suggest that the strength of the knowledge transfer practices employed by a social group directly influence the normative beliefs of the disaster responders, which also controls the groups' relational values and perseverance characteristic. If the knowledge that passes through the social group is not transparent and held ambiguously, individuals create short-term survival-focused norms reducing their values and perseverance. A social group that can maintain a transparent, clear knowledge flow develops the values and perseverance characteristic to achieve a higher resilience level. Hence, the strength of closure and brokerage

associations operates as a key decision point of a social group's ability to attain higher resilience to survive, recover and grow after a disaster.

The proposed theory elucidates the importance of building associations between the community and government authorities. Also, the theory postulates that resilience could be developed solely by changing responder's perceptions, values, and beliefs, which has a direct association with the knowledge transfer practices of the disaster responders. The findings of this study suggest that the government efforts to develop stakeholder associations such as DDMCU and CBDMC will achieve long-term flood resilience goals, only if the gap between government agencies and community members is bridged. Therefore, this study recommends policy suggestions to facilitate the transfer of response and recovery related knowledge between the two stakeholder levels. The findings also suggest important policy implications for Sri Lanka's DRM authorities, signalling the urgent need to shift the institutional framework (NDRMF) to enhance the engagement between public and district-level DDMCUs through brokering knowledge connections to build community resilience.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendices.

The following appendices describe details of the 21 interview respondents of this study. [Appendix 1](#) provides details of the respondents who participated in semi-structured interviews from Case Study 1 (12 district level responders), and [Appendix 2](#) provides the details from Case Study 2 (9 community responders). [Appendix 3](#) includes the interview guide used for semi-structured interviews.

Appendix 1. Details of semi-structured interview respondents – Case Study 1

#	Participant	Job Role to DDMCU	Gender	Age	Education level
1	Sanath	Additional District Secretariat	Male	49	Post graduate
2	Nimal	Assistant Director – Disaster Management Unit	Male	48	Graduate
3	Malini	Divisional Secretary – Ratnapura Division	Female	44	Graduate
4	Chandana	Assistant Director – Planning Division	Male	47	Graduate
5	Hemal	District Engineer	Male	36	Post Graduate
6	Suresh	District Divi Naguma Director	Male	34	Graduate
7	Hasitha	District Disaster Management Assistant	Male	34	Advanced Level
8	Sumali	Additional District Secretariat	Female	36	Post graduate
9	Piyal	Additional Director - Operations	Male	53	Graduate
10	Chathura	Assistant District Disaster management officer	Male	37	Advanced Level
11	Dayapala	Chief Accountant	Male	51	Graduate
12	Lasantha	District Disaster Management Assistant	Male	35	Advanced Level

Appendix 2. Details of semi-structured interview respondents – Case Study 2

#	Participant	Occupation and Location	Gender	Age	Education level
1	Shyamali	Small retail business owner - Muwagama	Female	34	GCE O/L
2	Saman	Occupied in a gem mine - Muwagama	Male	35	GCE O/L
3	Niranjala	House wife – Muwagama	Female	44	Secondary school attended
4	Lakshman	Grama Niladari - Muagama	Male	47	GCE O/L
5	Asela	Grama Niladari - Dewalayagawa	Male	34	GCE A/L
6	Kamaladasa	Farmer - Dewalayagawa	Male	63	Primary school attended
7	Premasiri	Occupied in a gem mine - Dewalayagawa	Male	53	Primary school attended
8	Sunil	Farmer - Dewalayagawa	Male	45	GCE O/L
9	Wimalawathi	House wife - Dewalayagawa	Female	50	Primary school attended

Date: May 30, 2016.

Time: 2:05 p.m.

Department of irrigation and DMC issues a green alert at the national level and yellow alert on the Ratnapura and Colombo districts on flood threat. During last 24 h 330 mm rainfall has been recorded in upper catchment areas. People are advised to prepare emergency packs and be prepared to evacuate to safe locations.

Appendix 3. Interview guide used

Approximate Duration: Maximum 45 min. On average 30 min.

Type of Interview: Semi-structured - guided with pre identified scenario probes.

Scenario to be used:

Process:

Step 1: Discuss the scenarios with the respondent and arrange a verbal walkthrough with the participant regarding the scenario. Request any further clarification to be made. If there are any gray areas or misinterpretations, discuss and clarify such issues so that interviewee would finally have a clear mental picture of the situations being elaborated in the scenarios.

Step 2: Explain the respondent the objective of the interview. In this particular phase of the interviews in relation to the flood response scope described in the scenario, it is primarily to capture the operational tasks expected to achieve by the interviewee driven by their job role responsibilities.

Step 3: Thereafter, ask the interviewee to describe and list possible tasks he/she may have to carry out to overcome the situations described in the scenarios.

The central question to be raised:

During the above-mentioned scenario, how do you transfer knowledge with stakeholders to manage the jobs or tasks you may have to carry out in order to the flood response and recovery it a successful operation?

Step 4: Additional interview prompts should be raised to understand the perceptions of the interviewees to look into the situation from the practical perspective.

Few sample questions that would be raised:

- 1) How will be informed about a flood situation?
- 2) Who you will be contacting if you require more details? How?
- 3) What type of information is needed to carryout your job or tasks?
- 4) What mechanisms are used to communicate with higher authorities and community level?
- 5) How do you rate the your access of information during flood response?
- 6) How the relationships between stakeholders comes into the picture when toy deal with a flood?
- 7) How does the trust between stakeholders impact response and recovery operations?
- 8) What types of interpretation systems are useful for your job or task?

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