

# Development Processes of Indigenous Knowledge on Tsunami Risk Reduction to Increase Community Resilience: The Case of the Smong in Simeulue Island, Aceh, Indonesia

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# Doctoral Dissertation Abstract

## Development Processes of Indigenous Knowledge on Tsunami Risk Reduction to Increase Community Resilience: The Case of the *Smong* in Simeulue Island, Aceh, Indonesia

(コミュニティ・レジリエンス向上に向けた津波リスク軽減に関する在来知の形成プロセス—インドネシア国アチェ州シミル島に伝わる「Smong」の事例研究—)

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## 1. Introduction

On Sunday morning, December 26, 2004 a 9.2 magnitude earthquake and tsunami followed by it, devastated Aceh Province, Indonesia and other countries along the coast of the Indian Ocean [1,2]. The epicentre of this earthquake was located 250 km southwest of Aceh. 1,500 km of the rupture and a slippage of up to 20 meters, resulted in a series of powerful waves that pounded coastal areas of the Indian Ocean [1,3]. The tsunami swept violently, up to 6 km inland, over the shorelines of Aceh and also the surrounding Simeulue Island [4]. More than 125,000 people were killed, and an additional 93,285 people have been missing [5]. About 500,000 survivors lost their homes, while as many as 750,000 people lost their livelihood [5,6]

Simeulue Island and small islands around it are situated in southwest Aceh Province, Indonesia; the island has been devastated from earthquakes and tsunamis many times in their history. Earthquakes and tsunamis hit frequently to Simeulue Island, and it became a notorious part of the shared history in the area. Most Simeuluean people have their own, often harrowing, stories describing their experiences with natural disasters.

The story of the *Smong* resonates within the Simeuluean people, and the story can be seen as starting from the earthquake of  $M_w$  of 7.6 that hit off Aceh on Friday, January 4, 1907. The quake developed a giant tsunami, and then more than 50% of (some estimates go up to 70%) the Simeuluean people were killed [7]. The disaster happened on Friday when most people were gathering in mosques for Friday prayers.

The worst impact of the 1907 tsunami was the pain in mind of the Simeuluean people. The survivors tried to deal with the disaster by recounting the story of the *Smong*. When the earthquake of  $M_w$  of 9.2 occurred on December 26, 2004, this

*Smong* disaster story successfully alerted the Simeuluean people who have an impending danger, and they ran away from the coastal areas to higher places.

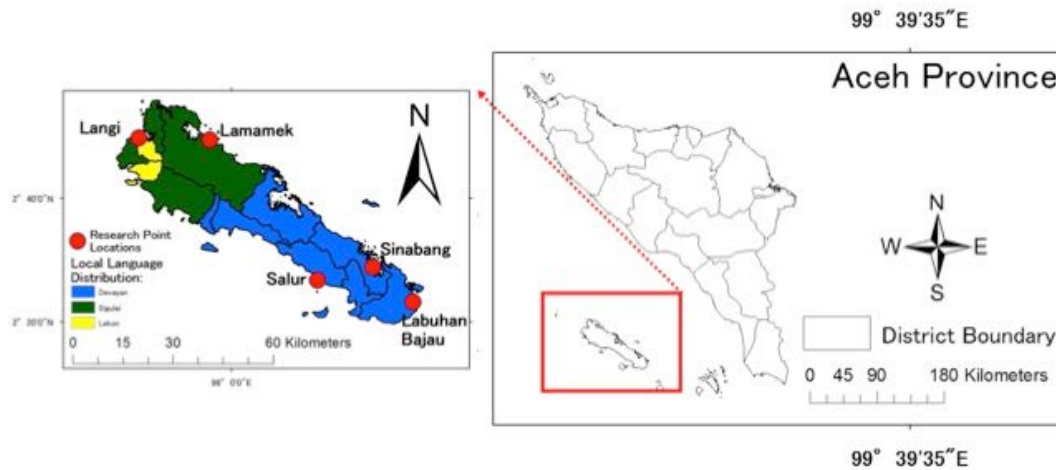
Only three people were killed in the official report, showing the impact of the *Smong* story. The success of the *Smong* story has also stimulated a new interest in the concept of indigenous knowledge (IK) for DRR: the Simeulueans' knowledge gained from living off the coast of Aceh, Indonesia.

The story of the *Smong*, which translates as 'tsunami' or 'tidal waves', is IK of the Simeuluean people, Aceh Indonesia. The *Smong* story has been embedded in the community through social interaction since 1907. Knowledge of the *Smong* story has been passed down through the generations, and successfully alerted the Simeuluean people when the 2004 Indian Ocean tsunami occurred. It is important to know the *Smong* story development processes in hoping to work well again for the future disaster.

## **2. Purposes and Method**

The purpose of the current study was to analyze the development process of the *Smong* story: how it was received, perceived, and transmitted among the Simeuluean people between the 1907 and 2004 Indian Ocean tsunamis; and, how the *Smong* story can still contribute to strengthen the community's resilience.

The study used qualitative research methods and started with an extensive literature review on the relation of IK as knowledge and community resilience on managing risk. The steps taken in this study, are collecting data, developing and modifying theory, elaborating or refocusing the research questions, analysing data and identifying and dealing with validity threats take place more or less simultaneously, with each influencing all of the others [8,9].



**Fig. 1.** Map of Aceh Province and the island of Simeulue showing the research locations of the interview and the distribution of local languages

A series of field surveys were conducted to examine the development of the *Smong* story in a community in the Simeulue Island using ethnographic approaches. The field study was conducted from September 9, 2016 to August 18, 2017. Face-to-face interviews were conducted, and each interview took around 1–2 hours.

Twenty-five local people participated in the interview, and a hundred respondents participated in the questionnaire survey. The participants were divided into three categories based on the way they took over the *Smong* story.

The research interviews were conducted in different villages in the Simeulue Island, namely Sinabang, Salur, Lamamek, Labuhan Bajau, and Langi, where each represents a local language as well as the oldest villages affected by both the 1907 and 2004 tsunamis (see Fig. 1).

Four Schools were participated in questionnaire survey. The sample size for the questionnaire-based was twenty-five respondents from each school. The questionnaire survey was constructed based on the interview results to confirm the recognition of the *Smong* story contents.

The narrative analysis and the situational analysis provide a comprehensive understanding of the development process of the *Smong* story from its origin until now. The reason why a narrative analysis was used that it is a practical approach to understanding the complexity of society [10]. The narrative analysis can help understand and comprehend the process of previous events up to the present and give insights into the current situation [11]. Narrative analysis can describe and explain the story from beginning, middle, and end [12].

A situational analysis allows a researcher to draw on studies of discourse and structure, image, text and context, history, and the present moment [13–15]. In the current study, the situational analysis helped in seeing the history, situation, and environmental changes that contributed to the influence of the *Smong* story.

The narrative data from the interviews was partially transcribed and clustered to the essential and related information. The data were identified and then coded [16–18] such as the narrative consistency of the interviewees when they described their experiences of the 2004 earthquake and tsunami and their knowledge of the 1907 tsunami, the information in the way the Simeuluean people transmitted and stored the *Smong* story. Coherence and thematic content were considered as core elements when looking for the similarities in the data [19]. Some incomplete transcription was then sent to the interviewee to let them know whether something should be added, changed and modified.

The situational analysis was used in this study in order to capture the conditions before the 2004 tsunami and the improvement of their life condition, people's appreciation on traditional values during and after the 2004 tsunami. In getting the

objectivity of research, the narrative and situational analysis in this study were approached to another researcher.

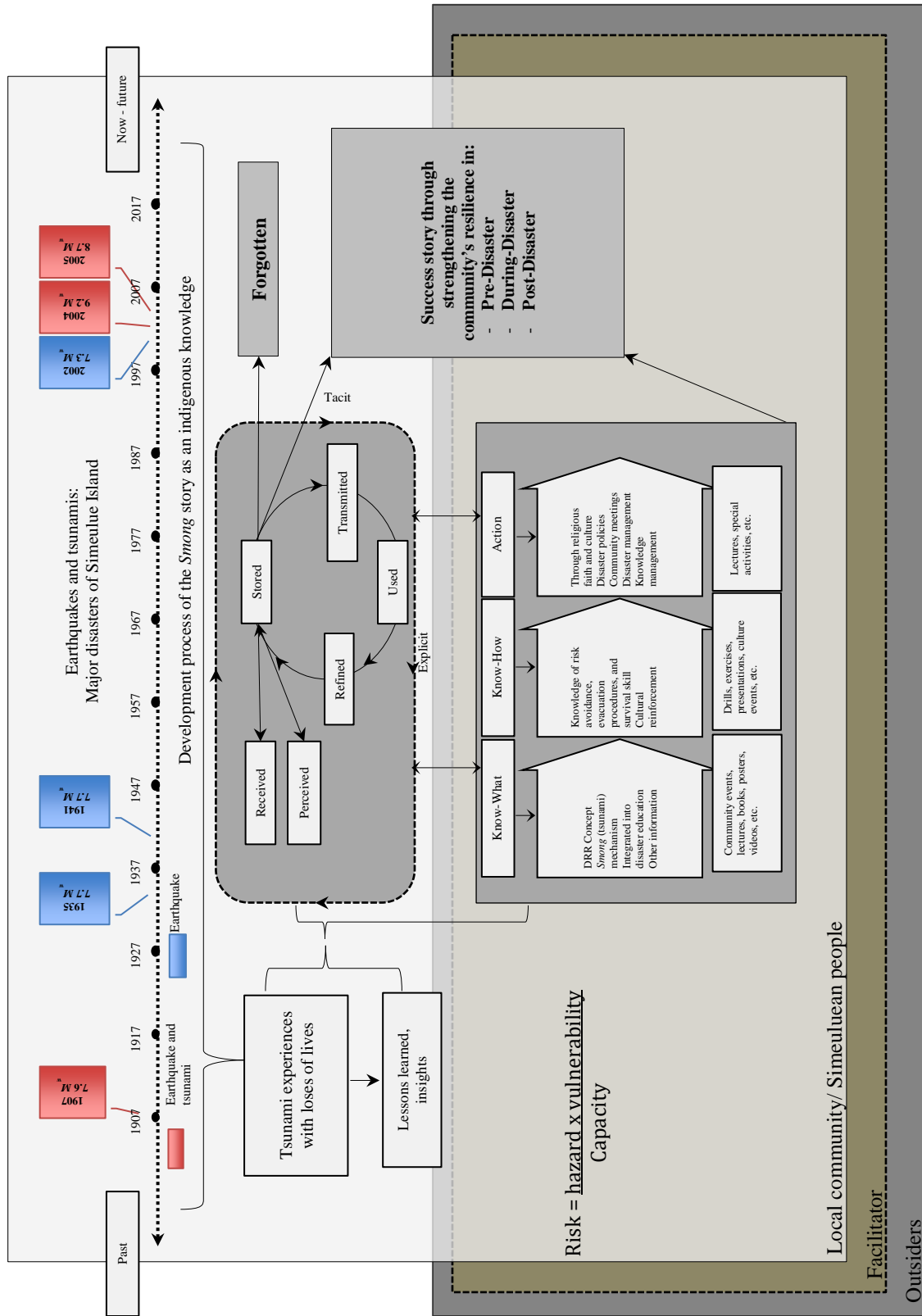


Fig. 2 The analytical framework of the development process of the Smong story toward community's tsunami resilience

The narrative analysis and situational analysis were put together to analyze the results as the lived experience of the interviewees on the *Smong* story.

This study constructed an analytical framework to help understand the developmental process of the *Smong* story through community action. The processes of the *Smong* story based on the analytical framework, shown in Fig. 2, include the following: received, perceived, stored, transmitted, used and refined which is then filtered through the appropriate action, or simply forgotten.

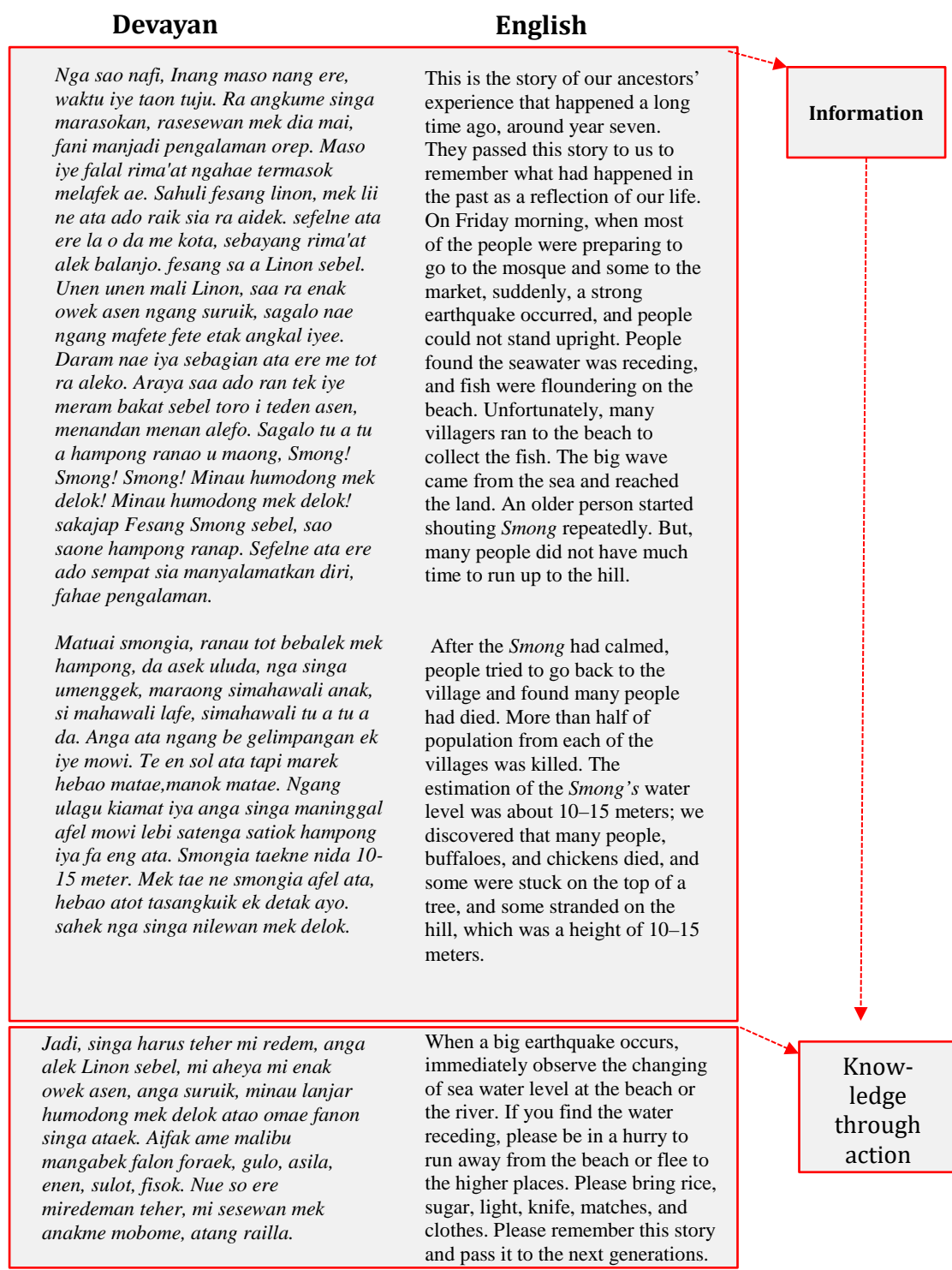
### **3. Results and Conclusion**

The *Nafi-nafi* is the main media in communicating the *Smong* story within the community. The *Nafi-nafi* is Simeuluean traditional storytelling about events that happened in the past. The *Nafi-nafi* is delivered in a non-particular time and context.

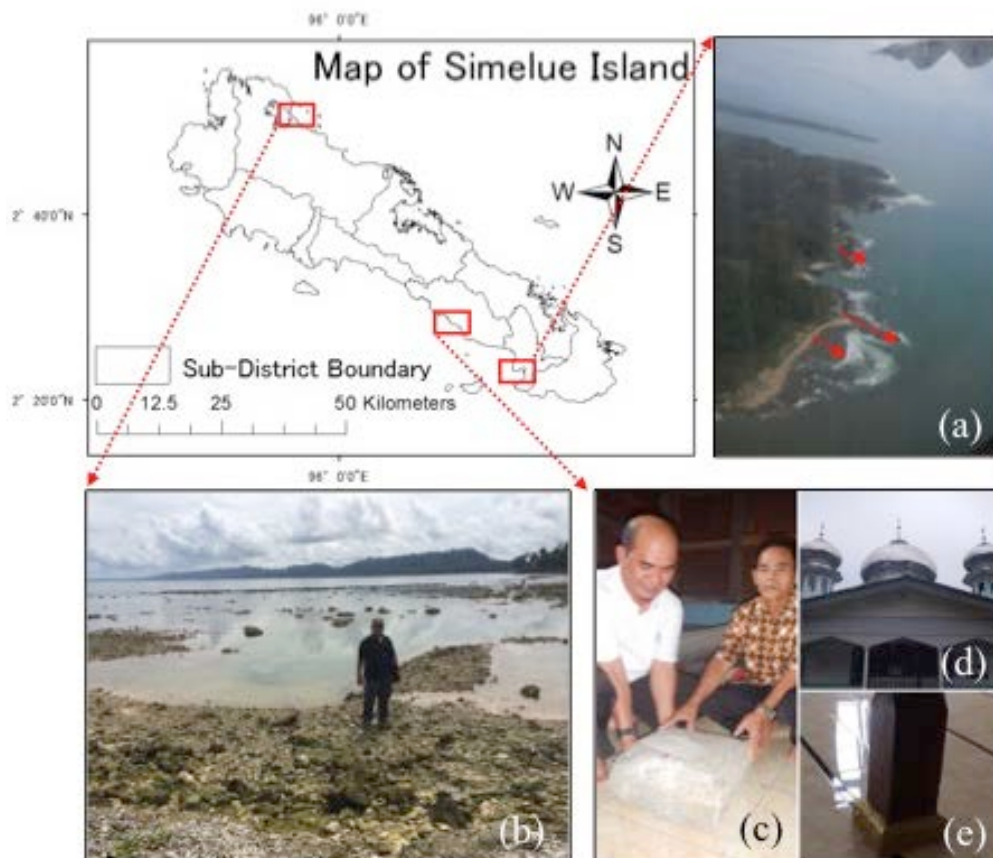
There are many kinds of story could be found in the *Nafi-nafi* and the *Smong* story is one of it (see Fig. 3). The story delivers in many ways for instance, after the children finish reciting the Quran, the oldest person will take a time to address the *Nafi-nafi*.

From a disaster risk reduction (DRR) point of view, the development of the *Smong* story is a bridge to strengthen the community's resilience in managing tsunami risk by increasing awareness and understanding. For example, although the *Nafi-nafi* was used for the *Smong* story exists, innovation is still needed to spread and ensure that knowledge could reach the community.





**Fig. 3.** An example of the *Smong* story of tsunami risk from the *Nafi-nafi*  
 Source: Constructed and reformatted from the interviewee's story in January 2017



**Fig. 4.** The physical evidence of the 1907, 2004, and 2005 earthquakes and tsunamis on Simeulue Island. (a) The uplift associated with the March 28, 2005 earthquake in the south of the island (the photo was taken on October 29, 2016); (b) The uplift associated with the December 26, 2004 earthquake in the north of island (the photo was taken on January 15, 2017); (c) One of eight pillars (*Sandi Salapan*) of the Babussalihin mosque that survived the 1907 and 2004 tsunamis (the photo was taken on October 31, 2016); (d) The Babussalihin Mosque in Salur village affected by the 1907 and 2004 earthquake and tsunamis (the photo was taken on October 31, 2016); (e) One of the *Sandi Salapan* inside Babussalihin Mosque that was reconstructed after the 2004 tsunami (the photo was taken on October 31, 2016)

From the situational analysis, the remaining physical evidence from the 1907, 2004, and 2005 earthquakes and tsunamis (see Fig. 4) indicate the potential for application for disaster education.

The research showed that knowledge of the *Smong* story was perceived at different levels according to whom the participants learned from. The recognition of the *Smong* story for the Simeuluean people who received the *Smong* story from the person who experienced the 1907 tsunami played the main role in keeping the *Smong*

story contents. However, the recognition of the *Smong* story content for the Simeuluean people who did not experience the 2004 Indian Ocean tsunami is partially recognized.

The study also found that the *Smong* story is stored and transmitted through traditional oral channels, and has further developed in various cultural channels after the 2004 tsunami.

The community's resilience could be strengthened when the local people integrate lessons learned from the *Smong* story into their current efforts of managing tsunami disaster risk.

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## 論文審査の結果の要旨

学位の種類	博士（学術）	氏名	Alfi Rahman Bin Rusli Bawaihi
学位論文の 題名	<p>Development Processes of Indigenous Knowledge on Tsunami Risk Reduction to Increase Community Resilience: The Case of the <i>Smong</i> in Simeulue Island, Aceh, Indonesia</p> <p>(コミュニティ・レジリエンス向上に向けた津波リスク軽減に関する在来知の形成プロセス-インドネシア国アチェ州シミル島に伝わる「Smong」の事例研究-)</p>		
論文審査担当者氏名			
(主査) 青木俊明, 劉庭秀, 佐藤正弘, 葉剛, 桜井愛子			
論文審査の結果の要旨 (1,000字内外)			
<p>2004年、巨大津波がインドネシアを襲った際、12万5千人以上が命を落とした一方で、インドネシア Aceh 州南西部に位置する Simeulue 島とその周辺の島々では、土地や家屋は壊滅的被害を受けたが、犠牲者はわずか3名であった。人的被害が極めて少数に留まった背景には、Smong と呼ばれる民謡が多大な減災効果を示した可能性がある。そこで本研究では、Smong が創作された過程、Smong の構成、Smong に対する現地住民の認知、Smong が持つ防災・減災効果の限界について検討を行っている。</p> <p>第一章では、Smong が創作された背景について述べられている。インドネシア南西部は、これまで、たびたび、巨大津波による災害が発生してきた。1907年に巨大津波がインドネシアを襲った際にも、甚大な被害が発生した。そこで、Simeulue 島の人々は、巨大津波による被害を繰り返さないために、Smong を創造したことが述べられている。また、本論文では、Smong を、「防災インフラへの投資が難しい発展途上国においては、経済的負担が小さく、災害リスクの軽減効果（DRR 効果）が大きな対策」として捉え、その構造や効果発現のメカニズムを検討することは、大きな社会的意義を持つことが述べられている。</p> <p>第二章では、文献レビューが行われ、先住民族の知恵が DRR 効果を持つ事例や DRR 研究について紹介されている。また、ここでは、Dekens(2007)や Raymond ら(2010)といった先行研究を例に、津波、洪水、地震といった局所的な自然災害のみならず、戦争や気候変動といったグローバルなリスク要因に対しても、先住民の知恵が効果を示しうることが報告されている。さらに、先行研究を踏まえて、先住民の知恵がリスク軽減効果を発揮するプロセスについても整理されている。</p> <p>第三章では、Simeulue 島の Smong を題材にする場合の具体的な分析フレームとその手順について述べられている。本論文では、Smong の構造や Smong に対する住民の認知、現地住民の避難行動と Smong の関係を検討するために、現地住民に対するインタビュー調査と質問紙調査を用いることも述べられている。</p> <p>第四章では、Simeulue 島の政治的歴史や災害史、地理的情報などについて述べられている。さらに、Smong の由来について検討し、その語源が Devayan 語の“水はね”と“高潮”を意味する言葉にあることも報告されている。また、Simeulue 島の人々は Smong を“巨大地震後に発生する潮位後退と沿岸を一掃する巨大な波”と関連づけるかたちで認知していることも報告されている。</p>			

第五章では、1907年以降の Smong の発展過程に関する調査結果が述べられている。まず、Simeulue 島の住民 125 名に対して構造化インタビューが行われた。一部の住民に対しては、インタビューは質問紙形式で行われた。Simeulue 島の人々の言語は、Devayan 語、Lekon 語、Siglai 語など、多様であるため、インタビュー調査には、論文提出者に加え、現地の言語が話せる助手も同行した。インタビューの結果、Smong は Devayan 語で構成され、Nafi-Nafi と呼ばれる語り部によって口承されてきたことが見いだされている。さらに、Devayan 語で構成されている Smong を英語に翻訳し、それが“過去の災害被害の描写”と“発災現象の紹介と避難行動の奨励”からなることも見いだされている。

第六章では、考察として、Smong が DRR 効果を発揮した理由と、将来、DRR 効果が低減する可能性について述べられている。特に、都市化されていなかったために、現地住民による Smong の口承が可能であったことを指摘している点は、口承による DRR 対策の脆弱性を示唆しており、高く評価できる。さらに、インドネシア経済の発展に伴い、現地語を話せる若年層が減少しており、Smong の DRR 効果の大幅低下を予測している点も評価できる。これらの考察は、いずれもハード面での対策に力点を置いてきた防災研究において、社会科学的視点の重要性を訴えるものであり、防災研究の今後の発展に大きく寄与するものと考えられる。

審査委員会では、①理論的検討がやや弱いこと、②定量的分析の拡充が望ましいこと、③論文構成に改善の余地があること、などが指摘された。しかし、総じて評価すれば、本研究の成果は、論文提出者が自立して研究活動を行うに必要な高度な研究能力と学識を有することを示していると判断した。よって、本論文は、博士（学術）の学位論文として合格と認める。