

# **An Influence of Social Network on Local Knowledge Transfer in Flood Mitigation and Preparedness: A Case Study of Waju Area, Ogaki City, Gifu Prefecture**

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## **1. Introduction**

This research was aimed at study on local knowledge transfer in flood mitigation and preparedness. Since there is no effort had been made to concern the local knowledge essential and the difficulty of its transfer, the specific objectives of this study were to find appropriate ties of social network to transfer flood mitigation and preparedness knowledge and also seek for the motivations of knowledge transfer.

## **2. Flood Mitigation and Preparedness Local Knowledge in Waju**

Ogaki City, Gifu prefecture, is located in the junction of three rivers: the Kiso, Nagara and Ibi Rivers. These rivers surround the Noubi plain, a low altitude flood plain. Flood disaster happens very often in the alluvial plain and delta area of the Gifu prefecture.

In the past, people had no measure to control the rivers; yet life and assets were protected through small scale technology and local knowledge by cooperation in communities. In earlier times, flooding from the river was considered a natural phenomenon in which people never tried to block the flood but rather developed some knowledge-based tool to reduce the damage. <sup>1)</sup>

The typical knowledge called Waju is well known among communities. Waju, from authors' opinion, is a local knowledge which at the same time is common knowledge among Waju community. Waju was built more than 600 years ago and even recently, the role of Waju has been decreased up to the declining of annual flood. However not only knowing what Waju is, but also community members deeply understand the essence of Waju.

### **(1) Waju (Ring Dike)**

To reduce the impacts of flood, traditional ring dikes have been built in the area, protecting several houses and cultivated land areas. In the time when residents started to build embankments of Waju, embankments were built to protect direct flow of river, such that they shaped like U or V against the upper of rivers. These types of

embankments were called Shirinashi-zutsumi or Tsukizute-zutsumi.

Lower place which has no embankments was called Tsukizute. This name is remained as a place name in Ogaki City. To protect backflow from the lower place, residents built embankments in the lower place as well. They were called as Kakemawashi-zutsumi. These

embankments got shaped like circles, and were started to be called as Waju. The place inside embankments like figure 1, is called as Kuruwa; it means inside circle. Waju expanded from 1660s in Edo era.

A key point of the ring dyke is its maintenance by communities. Every village maintains special committees that look after the ring dykes. This cooperation helps to develop self-esteem and strengthen local community ties.

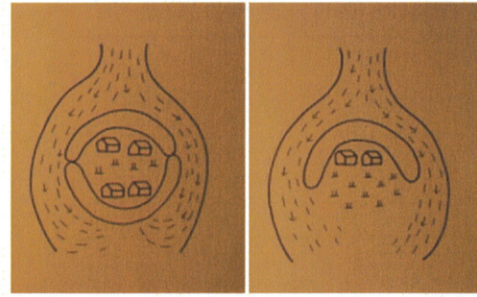


Fig. 1: The origin of Waju  
(taken by authors)

## (2) Hijiri-Ushi (Grand OX )



Fig 2: Hijiri-ushi made of concrete and Hijiri-Ushi at Nagara River<sup>1)</sup>

To minimize erosion, simple structures have been built on river banks, especially on the winding portions of the river. This structure is called **Hijiri-ushi**, meaning **Grand Ox**, possibly due to its similar form to the ox. The objective of this structure is to reduce the force of the water in the river to lessen the impact of erosion. Typically, a set of hijiri-ushi consists of 5 structures. In each winding portion of the river (depending on the length of the winding portion), 13-15 sets are usually placed.

Nowadays, concrete is used instead of wood to give the structure a longer life span<sup>1)</sup>.

## (3) Mizuya (Evacuation House)

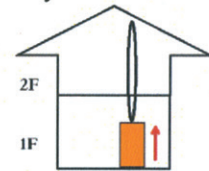
Well-off families commonly have the Mizuya (Figure 3) in addition to their main houses to use in case of flooding. Initially, the Mizuya was built as a storage room to protect household assets. Mizuya also has an emergency boat for evacuation (Figure 4). Moreover, Buddhist Family Alter is important item in this area, so that this system could be lifts up alters in order to protect them from submerging (Figure 5).



Fig 3 (Top-Left):  
Mizuya <sup>1)</sup>

Fig 4 (Bottom - Left):  
Emergency Boat <sup>1)</sup>

Fig 5 (Bottom-Right):  
Lift up Buddhist  
Family Alter <sup>1)</sup>



### 3. Conceptual Framework

This research states on 2 main concepts which are: Knowledge Transfer and Social Network. This part will briefly review and introduce those concepts mentioned above. Finally, it tries to link both concepts and shows how those concepts are related.

#### (1) Knowledge Transferring

University of Toronto study defines Knowledge Transferring as the process of transferring nearly 100% of a subject's essential knowledge into long-term memory. Knowledge transfer is complete when the individual is able to apply this knowledge to appropriate situations. In addition, knowledge transfer is theorized by distinguishing between situational, source, transfer, relational, recipient, utilization and organizational context<sup>4)</sup>.

As well as Malhotra who gives the short definition of Knowledge Transfer as “Movement of knowledge from one location to another.” He also introduced 4 different modes of knowledge conversion which are mentioned as **Socialization, Externalization, Combination and Internalization**. He argued that **Socialization** is the process of sharing experiences and thereby creating tacit knowledge, such as shared mental models and technical skills. The key to acquire tacit knowledge is experience. Without some shared experience, it is extremely difficult for one person to project her/himself into another individual's thinking process<sup>5)</sup>. His argument supports that the tacit knowledge

as Waju is suitable for transferring modes as Socialization modes. Here, Social Network has automatically been involved with this mode of transferring.

## (2) Social Network

David Lazer (2000) raises the measurement of the concept of tie strength. He argued that “a measure of closeness intensity is the best indicator of strength<sup>3)</sup>”. Hence this research prioritizes the strange of the ties according to the closeness as a kinship as following:

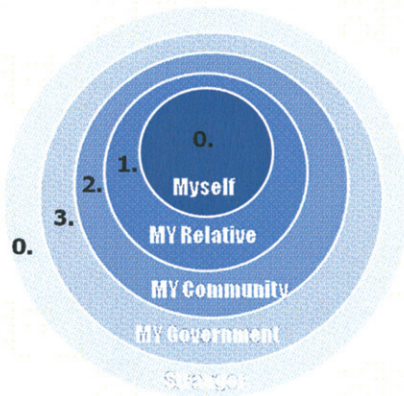


Fig 6: The strange of ties in this research (by authors)

- a) **Myself:** Your direct experience, Book, Newspaper, etc.
- b) **My Relative:** as parents, grandparents, children, etc.
- c) **My Community:** as Friends, Co-Worker, Community, Neighborhood or one who you are not stranger and used to have any activity together but your relative.
- d) **My Government:** as Government Official, Staff, etc.
- e) **Stranger:** Person that you never known or interacted to.

The strange of the ties also mention **Myself** which in this paper **will not conclude** it to analyze the effectiveness of transfer, because transferring concept in this paper is transfer knowledge, from someone to someone. Hence **Myself**, it will be excluded from analysis (0 Level of Network tie). In the same way as “**Stranger**”, which show here to created the limitation of the tie. For Stranger, its call “An absent-tie” and this paper **will not include** it in the analysis. That is why this level is also 0 as the same as **Myself**.

The important point for this paper is “**Which ties of Social Network is the best network to transfer flood mitigation and preparedness local knowledge in Waju case?**” The question mentioned earlier finally has becomes this paper’s **Research Question**.

## (3) The Conceptual of Social Network and Knowledge Transferring

David Lazer (2000) Agued that Social Network has an influence on Information Transferring and in the way that Strong- Tie Network has trend to good at transfer

information which is not complex and trend to be experience knowledge rather than theoretical knowledge. Meanwhile Weak- Tie Network is workable with complex and technical Knowledge. Considering Waju knowledge, it is obvious that Waju trends to be classify as experience knowledge not as theoretical one. Therefore, this paper has suspicious to it and set the **Research Hypothesis** as “**Stronger- Tie Social Network has influence to Knowledge Transferring Effectiveness as Waju rather than the Weaker- Tie Social Network.**” To make the statistic prove, this paper set the **Statistic Hypothesis** as follows:

$$\text{Null Hypotheses (H}_0\text{): } \mu_1 = \mu_2 = \mu_3 \quad (1)$$

$$\text{Alternative (H}_1\text{): } \mu_1 > \mu_2 > \mu_3 \quad (2)$$

\* There is at least one pair is correct

H<sub>0</sub> : Null Hypothesis : Strong- Tie has effectiveness to transfer knowledge in the same level as Weak- Tie

H<sub>1</sub> : Alternative Hypothesis : Strongest- Tie has effectiveness to transfer knowledge rather than Weakest- Tie

μ<sub>1</sub> : Variable 1: The knowledge transfer effectiveness of “**My Relative**” Group

μ<sub>2</sub> : Variable 2: The knowledge transfer effectiveness of “**My Community**” Group

μ<sub>3</sub> : Variable 3: The knowledge transfer effectiveness of “**My Government**” Group

#### 4. The Influence of Social Network to Knowledge Transferring in Waju

Total Distribute	Received	Valid	Missing
60	47	28	19

Table 1: The organization of questionnaire

This research has distributed 60 copies of questionnaire to community of Waju no. 16, which are familiar with local traditional knowledge and which

may clearly show how the knowledge is transferred, for collecting the data with kind cooperation of the Ogaki City Hall. Questionnaires contain open-end questions, rather than checklist questionnaires, the no. of respondents were small but still reflecting many movements and opinions from the small data.

##### (1) Social Network in Knowledge Transferring

From the observation and questionnaire interview found that Respondents trended to had received local knowledge the most from “**My Community**”- Tie (13 respondent: 46.43%) and “**My Relative**” - Tie (11 respondent: 39.29%), “**Myself**” (3 respondent:

10.71%) and “**My Government**”- Tie (1 respondent: 3.57%) in ordering. In the same way as the one who Respondents claimed that they would like to transfer local knowledge in the future is “**My Relative**” - Tie (5 respondent: 17.86%) and “**My Community**” - Tie (23 respondent: 82.14%).

From questionnaire and observation, this research could be concluded that respondents from Waju community have the capacity to manage the knowledge in the level that they understand and believe the effectiveness of local knowledge they have. Also they are now using their knowledge and in advance they already have planned to adjust or improved their local knowledge in the future.

Another finding is that the most effectiveness source of the knowledge (the one that respondents received or learn local knowledge from ) is the person from **My Community - Tie**. Next is the person from **My Relative - Tie** then from **My Government - Tie**. The result could be draw as  $\mu_2 > \mu_1 > \mu_3$  in the statistical way.

Therefore, this paper’s **alternative hypotheses ( $H_1 : \mu_1 > \mu_2 > \mu_3$  ) is Accepted**. According to the condition mentioned that at least one pair is correct ( $\mu_2 > \mu_3$ ), this hypothesis will be accepted, which could implied that **Strongest- Tie has different influence** on effectiveness to transfer knowledge with **Weakest- Tie** in the way that **Strongest - Tie has more effectiveness** to transfer knowledge than **Weakest - Tie**.

## (2) Motivation of Transfer

The result revealed that the motivation of transfer could be various based on main factors as “**Trustable and Reliable**”. For Example; Miss Yurika got Age-Butsudan (Boat preparedness) Knowledge from her Community Leader (Jichi-kai) and she trusts her leader because she learnt that her leader has duty to protect her from flood. This phenomenal is not normal for one individual person to believe in others who are not their family or relative. This could be interpreted that the relation among Waju community member is close and united.

In the same time, the study also expressed that community realized and worried about the risk of next generation's safety and they are willing to protect their prosperities motivate community to transfer knowledge. The first reason to transfer knowledge is that to transfer to the person that they concern and worry about the most as their relatives, their spouse or their friend. Come along with the trend of willingness to transfer their knowledge to My Relative- Tie.

## 5. Conclusion

Consideration about transferring experience knowledge like flood mitigation and preparedness knowledge as Waju should concentrate more on transfer among communities, neighborhoods and friends according to the result of this paper. Even though, the trend of transfer to next generation from current knowledge holder is mentioned pretty much to relative, kinship person as children and grandchildren. It is not surprising that people tend to think that they should transfer important information to the people who they have closeness to and anxiousness about the most. It is so called Strongest Tie. According to this study, the effective transfer knowledge should be from communities, neighborhoods or friends ( $\mu_2$ ). Encouraging strengthening community is one recommendation to maintain the level of transfer knowledge in the future. Besides transfer the knowledge among relative people, community should also try to transfer knowledge to other members in their community, neighborhoods or friends as well.

Nevertheless, flood is not severe recently, make community felt relief from flood damage and they no longer have had chance to work against flood together anymore, community's recognition of flood is decreased and so do relationship between them. However, community should have had remain their socialization to keep their recognition of flood and possibility to transfer their local knowledge. From this point, Social Network Ties have brought to this study from its potential to both strengthening community socialization and in the same time increase opportunity of community to transfer their local knowledge. Social Network theory has been studied in this research, according to its potential function to transfer information. Social Network Ties has influence on local knowledge transfer and indirect advantage got from the attitude which tried to transfer knowledge among community, community strengthening. Encourage strengthening community is also forward direction to maintain or enhance the level of transferring in the future.

As a suggestion of this paper, to strengthen communities in Waju, community leaders (Mentioned as "Jichi-kai") can be the great supporter in Waju case. The research found that Jichi-kai was most mentioned by the respondents to be the first contact person to ask help and they were ready to follow the rules of Jichi-kai if flood occurs. Jichi-kai can operate some activities in the community in order to stimulate opportunities of the community to transfer knowledge among them. The activities can be started from making documents about flood knowledge together in community then next trying to find the channel to distribute all knowledge in the community.

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