



Development of a web-based management system for disaster management plan/manual

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Abstract

There are many small local governments in Japan. 53% of local governments have less than 30,000 populations. It is difficult to hire the specialists of disaster management for these small sizes of local governments.

However, Japanese disaster basic act ask that the all local governments have to prepare the disaster management plan considering with local situations (population, geological condition, in-land or coastal area, industrial structures and etc.).

For the local offices without special knowledge about disasters, it is difficult to make the plan by themselves. Therefore, when they make a disaster management plan, they refer to similar city or village with their same situations. Otherwise, local offices ask consultant firms to prepare the plan. As the contents of the plans are not clear for understanding the functions of each organization, even for the disaster concerning stakeholders, it is difficult to understand the roles of each organizations. Therefore, the documents cannot be used for actual disasters. Once a plan is prepared, most local governments cannot update or edit the plan regarding to the knowledge and budget limitation. Current style of the plans is completed by PDF files (Portable Document Format) and the file with huge pages is opened on the public web site of local offices.

And a technical breakthrough to manage a disaster management plan is not developed by the research fields. Fire and Disaster Management Agency in Japan make an archive system to search the plans of prefecture level. But since this archive is developed to show the PDF files of the plans, functions of searching the contents in this system is not prepared. PDF files are difficult to compare with different plans of different local governments.

This research develops the web-based management system of disaster management plan to manage the quality of the plans and to achieve effective updating the plans. The quality control is to update necessary elements in the plans even for the small municipalities without disaster knowledge. Effective updating is to solve the difficulties of managing current PDF documents. This system has four basic databases. (1) Database for disaster management plan include the disaster management documents made by each municipalities. This database can show the contents of the plans by HTML document. (2) Database for general information of municipalities include population, industrial conditions, geographical conditions etc. (3) Database for the past disaster archives historical disasters happened in each municipality. (4) Record for updated or changed the documents of the plans are stored. These data-tables can be used to compare the contents of the plans. In this research, the existing around 1,700 kinds of disaster management plans of local government are archived in the SQL database server.

The possible updating points can be proposed for municipalities with few specialists for disaster management throughout the system. The municipalities can understand the necessary updating points proposed by the system. Under the conditions of limitations of knowledge and public budget for disaster management, this system will be useful for quality control of the disaster management plans all over the Japan especially for the small size of municipalities.

Keywords: disaster management plan; database; quality control



1. Introduction

All municipalities have to make a disaster management plan following by Japanese disaster basic act. In order to ensure more tolerance in contents and procedures, more action programs that are administrative documents showing the work each local government should accomplish based on each objective comprehensively and systematically have been made out in addition to local disaster management plans [1]. Many manuals have been drafted that describe the details of procedures of individual work to be implemented, and these manuals have been often used for implementation of work at the time of a disaster. Under the current situation, local disaster management plans, disaster management plans for mutual cooperation, action plans, and every kind of manual coexists in the same local public organization. To raise the unique effectiveness of work of each local government, action programs and every kind of manual, rather than local disaster management plans, have often been revised.

Many local governments have already published their local disaster management plans on the web site, so local disaster management plans of both supporting sides and supported sides can be shared during pre-disaster phase. In this regard, the promotion of the consistency and the standardization of descriptions in local disaster management plans are considered to be significant.

The plans are made by PDF document and to be opened by individual web site (Fig. 1). The format, font size, document organization/ chapter, index, color and etc., almost all contents and paper format are different, but the contents are not drastically different. But the searching or comparing the contents among different municipalities of number of population, location, geological characteristics are difficult.

In order to make wide-area cooperation among municipalities more effective and smooth, it is important to promote the standardization of disaster management plans between supporting sides and supported sides and to attempt to unify local disaster management plans as much as possible.

Therefore, in order to realize more smooth and effective arrangements for wide-area support in local disaster management plans, it is important to promote consistency and standardized description of local disaster management plans as master plans.

This research develops the web-based management system of disaster management plan. This system has four basic databases. (1) Database for disaster management plan include the disaster management documents made by each municipalities. This database can show the contents of the plans by HTML document. (2) Database for general information of municipalities include population, industrial conditions, geographical conditions etc. (3) Database for the past disaster archives historical disasters happened in each municipality. (4) Record for updated or changed the documents of the plans are stored. These databases can be used to compare the contents of the plans for same number of populations. In this research, the existing around 1,700 kinds of plans of local government offices are archives in the SQL database server.

The developed database integrates the horizontal and vertical knowledge (Fig. 2). To build the database the master framework is defined. The diversity by all different municipalities can be achieved on the standard uniform framework. Under the conditions of limitations of knowledge and public budget for disaster management, this system will be useful for quality control of the disaster management plans all over the Japan especially for the small size of municipalities.



Fig. 1 – Web site for disaster management plan in Ishinomaki city case

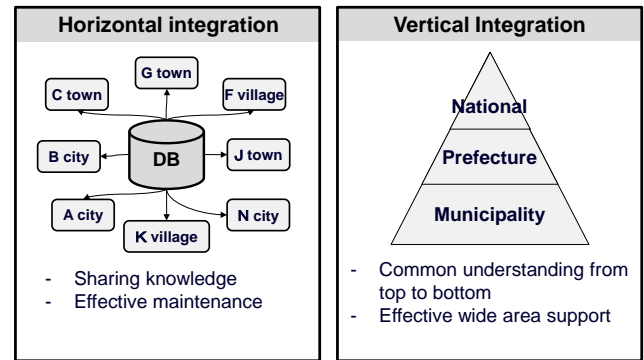


Fig. 2 – Horizontal and Vertical integration by the developed database

2. Comparison and analysis of local disaster management plans

Although the significance of the consistency and standardization of descriptions of local disaster management plans is mentioned above, the following problems have been pointed out in current descriptions of disaster response activities in local disaster management plans: 1) the mutual relationship among descriptions of each work is unclear and 2) the degree of minuteness and roughness of descriptions is uneven [2]. Accordingly, local disaster management plans of local governments are compared and analyzed in this chapter. As the object of comparison and analysis, local disaster management plans of Yokohama City, Kawasaki City, and Sagami-hara City, all in Kanagawa Prefecture and standing on the supporting side at the time of the Great East Japan Earthquake and that of Sendai City, Miyagi Prefecture, standing on the supported side are selected. The themes of emergency measures, restoration, and reconstruction are taken up from the chapter on measures for earthquake disasters. As reasons why these cities were selected as supporting sides in comparison and analysis, the following conditions can be given: they actually provided wide-area support at the time of the Great East Japan Earthquake, sizes of local governments are similar, and large-scale damage is supposed in Yokohama City, Kawasaki City, and Sagami-hara City at the time of the scenario Tokyo Metropolitan Earthquake, so they have the possibility to stand on the supported side in the future.

2.1 Analysis of contents

For problem 1), mutual relationships among descriptions in each work of local disaster management plans is unclear, the basic disaster prevention plan shows the outlines of basic disaster activities or response, however this plan does not show concrete content in terms of the individual work. It seems that this problem is reflected typically in tables of contents of current local disaster management plans.

Accordingly, we compared tables of contents in order to grasp the whole structure of local disaster management plans. Table 1 compares items in local disaster management plans of Kawasaki City, Sagami-hara City, and Sendai City, taking the plan of Yokohama City as standard. Diagonal lines in the table indicate that there is no corresponding counterpart. Table 1 shows that descriptions are different in all items, even in evacuation, which seems to be related to wide-area support, transportation related to commodities, and stability of social life.

The number of pages corresponding to each item shown in Table 1 is totaled up and the percentage of this number to that of all pages is shown in Fig. 3. The figure makes clear the differences in the volume of each item and that items are treated in a concentrated way. For stability of social life, this item accounts for 9.8% in Yokohama City, 17.5% in Kawasaki City, 9.9% in Sagami-hara City, and 9.0% in Sendai City, a situation that



indicates differences among these cities. For evacuation, this item accounts for 7.0% in Yokohama City, 9.0% in Kawasaki City, 9.1% in Sagamihara City, and 8.2% in Sendai City. From Fig. 4 showing the numbers of pages for each item, it can be seen that Kawasaki City uses as much as 17 pages for the item of evacuation, but this is because the list of shelters is printed there. There thus seems to be significant difference in the volume of this item among these cities.

Yokohama City assigns as much as 29.4% to the item of headquarters for disaster response, but this can be explained by the fact that all of the functions of each post are listed there.

2.2 Comparison of keywords

For problem 2), the degree of minuteness and roughness of description is non-uniform, keywords used in local disaster management plans are analyzed. It is thought that the outlines of the degree of minuteness and roughness of description could be grasped by comparing the frequency in use of keywords.

Taking evacuation as a basic keyword, evacuation plan, management of shelter, and response to those who need protection were analyzed. Keywords used in each local disaster management plan consisting of more than two Japanese characters, whether Chinese, katakana, or hiragana, are extracted, collected, and ordered in sequence of high frequency in columns in Table 2. The number of uses of keywords in each local disaster management plan is counted and the rate of the number to all is shown in ranks of Table 2. The keyword evacuation, for example, is used 141 times in all local disaster management plans: Yokohama City accounts for 31.9%, Kawasaki City 16.3%, Sagamihara City 25.5% and Sendai City 26.2% respectively. Accordingly, it can be seen that the frequency in use of this keyword in Yokohama City is high in comparison to other cities. Taking another example, the keyword special shelter is used 14 times in all, but Yokohama City accounts for 100%. It can be judged that this is a keyword that is not used in cities other than Yokohama City.

Among 102 keywords selected in analysis, the number of keywords used in common in all four cities is 6, or 5.8%, that of the keywords used in common in three is 5, or 4.9%, and that of keywords used in common in two is 13, or 12.7%. Of all keywords, 76.5% are used individually in each city. Keywords that indicate at least the same content could be unified into single terms. This seems to be the first step toward more smooth management of wide-area cooperation, leading to the standardization of disaster response activities in the future.



Table 1 – Comparison of lists of contents of local disaster management plans (extract)

Phase	Item	Yokohama City		Kawasaki City		Sagamihara City		Sendai City			
		Chapter	Section	Chapter	Section	Chapter	Section	Chapter	Section		
Emergency response	Headquarters for disaster response	Chapter 2 Establishment of headquarters for disaster response	Section 1 Establishment of headquarters for disaster response of Yokohama City	Chapter 1 Organization	Section 1 Headquarters for disaster response	Chapter 1 Activities of headquarters for disaster response of the city	Section 1 Arrangement of organizations	1 System for disaster response activities	1 System for disaster management organizations		
			Section 2 Abolition and reduction of headquarters for disaster response of Yokohama City	Chapter 3 System for initial response (Part 3 Plan for initial disaster response)	Section 1 System for initial response of staff of headquarters for disaster response					2 System for communication	
			Section 3 Organization and management		Section 2 System for initial response of headquarters for disaster response and headquarters of ward					3 Warning system	
					Section 3 Initial response of headquarters for disaster response and headquarters of ward					4 Headquarters for disaster warning of Sendai City	
	Evacuation	Chapter 8 Evacuation and acceptance of victims	Section 1 Evacuation plan	Chapter 4 Measures for evacuation	Section 1 Evacuation plan	Chapter 2 Measures for fire-fighting and evacuation guidance	Section 2 Measures for evacuation guidance	7 Evacuation plan and plan for management of shelter	1 Organizations and businesses involved		
			Section 2 Evacuation and acceptance of victims		Section 2 Establishment and management of shelter		Section 1 Measures for management of shelter		2 Implementation of recommendation of evacuation		
							Chapter 6 Management of shelter			3 Designation of warning areas	
										4 Evacuation guidance	
										5 Evacuation of residents	
										6 Evacuation to designated shelters	
										7 List of shelters	
										8 Establishment of shelter and accommodation of victims	
			Section 3 Measures for evacuation and support of those who need protection				Section 1 Support of those who need protection at the time of disaster		Chapter 12 Support of those who need protection at the time of disaster		9 Management of shelter
			Section 4 Establishment and management of special shelter								1 Organizations and businesses involved
Section 5 Measures to prevent confusion at main stations, etc.	Chapter 5 Prevention of confusion, support of commuters	Section 1 Measures to prevent confusion caused by inappropriate information	Chapter 2 Measures for fire-fighting and evacuation guidance	Section 3 Support of commuters	2 Principles for response						
		Section 2 Measures to prevent confusion at terminal stations, etc.		7 Evacuation plan and plan for management of shelter	3 Emergency measures for the aged and the handicapped at home						
		Section 3 Support of commuters			4 Emergency measures for social welfare facilities, etc.						
Transportation	Chapter 10 Safety of transportation	Section 1 Safety of transportation route	Chapter 8 Transportation plan		Section 1 Goods to be transported and transportation methods			11 Plan for emergency transportation	1 Organizations and businesses involved		
		Section 2 Safety of transportation system		Section 2 Safety of roads for emergency activities	2 Goods to be transported						
				Section 3 Base for collection and delivery of relief goods	3 Safety of road traffic						
		Section 3 Improvement in marine transport		Section 4 Location and coordination of airplane arrival and departure	4 Safety of transport vehicles						
		Section 4 Base for collection and delivery of materials			5 Transportation by airplane						
					6 Transportation by watercraft						
					Coordination on emergency transportation at the time of disaster						
	Stability of social life	Chapter 12 Stability of social life	Section 1 Emergency water supply	Chapter 7 Supply of drinking water, food, and commodities	Section 1 Supply of drinking water	Chapter 7 Support of life of victims	Section 1 Measures for emergency water supply	9 Emergency water supply and restoration plan	1 Organizations and businesses involved		
									2 Emergency system at the time of disaster		
									3 Plan for emergency water supply		
Section 2 Food supply			Section 2 Food supply		4 Plan for emergency restoration						
Section 3 Supply of commodities			Section 3 Supply of commodities		5 Method of communication under emergency system						
Section 4 Acceptance and distribution of relief goods			Section 4 Request for support		6 Request for support of organizations						
		Chapter 10 Plan for disposal of disaster waste		Section 2 Organizations engaged with disposal of disaster waste	Chapter 9 Measures for cleaning	Section 2 Measures for food supply	8 Plan for food and relief goods	1 Organizations and businesses involved			
				Section 3 Basic policies on disposal of disaster waste				2 Relation to Disaster Relief Act			
			Section 5 Disposal of disaster waste such as sewage and garbage	Section 4 Business of general affairs team		Section 3 Measures for supply of commodities		3 Food supply			
				Section 5 Business of disaster waste disposal team				4 Supply of commodities			
Emergency response	Stability of social life	Chapter 12 Stability of social life		Chapter 10 Plan for disposal of disaster waste	Section 6 Business of garbage collection team	Chapter 9 Measures for cleaning	Section 1 Cleaning and disposal of rubbles etc.	17 Plan for cleaning	5 Stability of supply		
					Section 7 Business of garbage disposal team				6 Acceptance and distribution of relief materials		
										1 Organizations and businesses involved	
										2 Basic policies on cleaning plan at the time of disaster	
										3 Improvement in emergency system	
										4 Collection and transportation of general garbage	
		Chapter 12 Stability of social life		Chapter 10 Plan for disposal of disaster waste		Chapter 9 Measures for cleaning	Section 1 Cleaning and disposal of rubbles etc.	17 Plan for cleaning	5 Disposal of the rubble		
									6 Collection and disposal of livestock corpses		

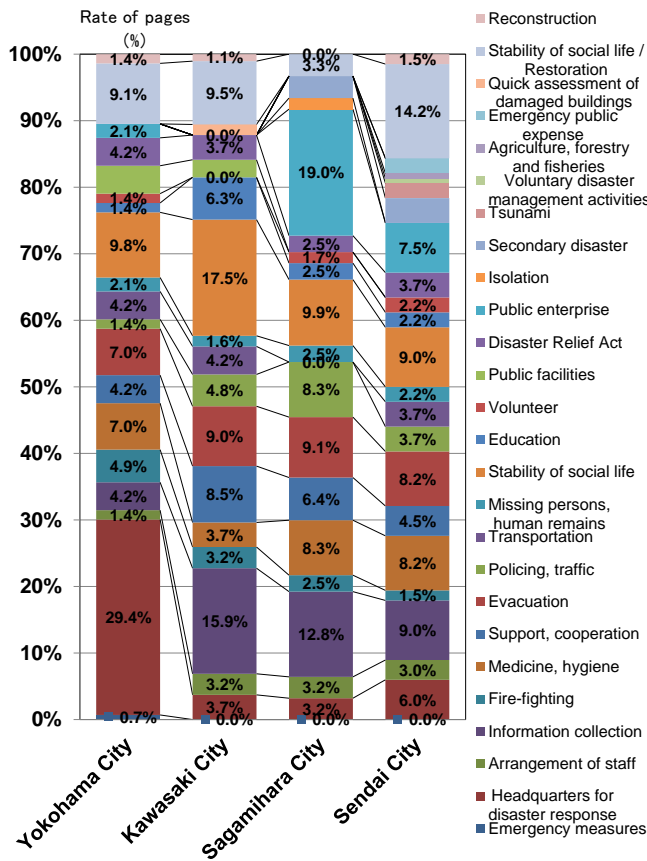


Fig. 3 – Comparison of rate of pages in local disaster management plans of municipalities

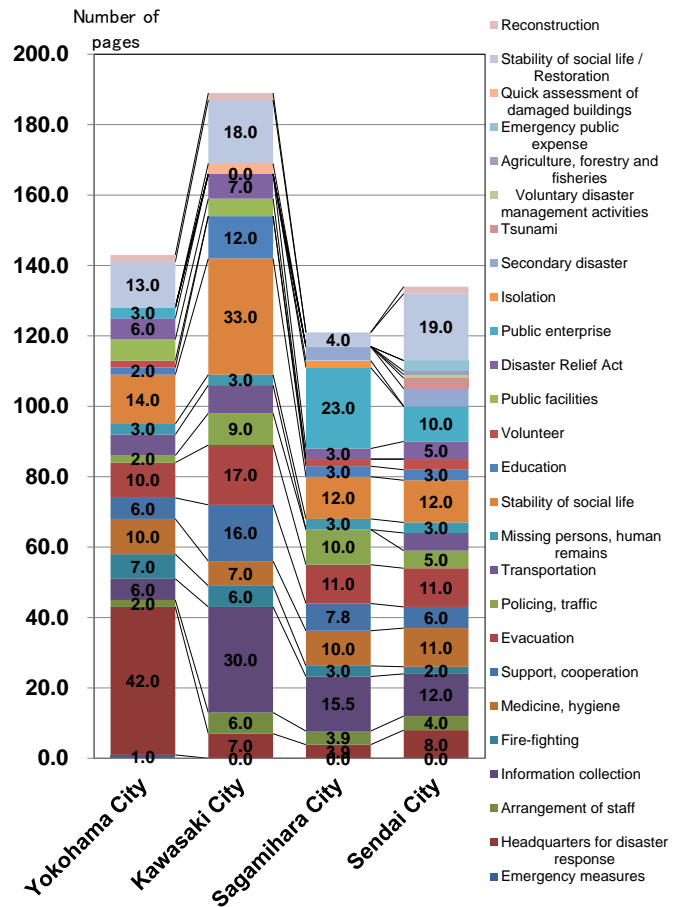


Fig. 4 – Comparison of number of pages in local disaster management plans of municipalities

2.3 Comparison of work flows of relief goods

In addition to the above analyses of tables of contents and degrees of minuteness and roughness of description in local disaster management plans, the work flow is also analyzed. Relief goods are taken up as the work to be analyzed and a comparison is made between Yokohama City and Kawasaki City. A work flow chart is drawn both to show the flow of work and to clarify the exchange of information accompanying each work.

Fig. 5 and 6 show the work flows of relief goods in Yokohama City and Kawasaki City, respectively. In these charts, flows of main work are extracted from local disaster management plans. More detailed work flow charts have been drawn separately, but only Fig. 5 and 6 are shown due to space limitations. The flow of “Adding up of needs for goods”, “Request for provision of goods”, and “Keeping, sorting, and delivery of goods” are same for the two cities. The large difference can be found in the point that the work of “Keeping, sorting, and delivery of goods” is accomplished by ward in Kawasaki City, while Yokohama City has entrusted this work to a private transportation company. According to the interview on Kawasaki City conducted by the authors after the 2011 Great East Japan Earthquake, ward had not been equipped with fork lifts and appropriate space for sorting goods, so it took much time for many ward officials to sort goods, hindering other work and increasing the fatigue of officials. The current situation has been made clear, where keeping and sorting of relief goods are difficult to be implemented by ward. After conducting interview from the official in charge of risk management at Kawasaki City, we concluded that standardization of work for wide-area support could lead to more smooth and effective delivery of relief goods.

Table 2 – Comparison of keywords related to “evacuation”

Keyword	sequence of appearance	Yokohama City	Kawasaki City	Sagamihara City	Sendai City	Keyword	sequence of appearance	Yokohama City	Kawasaki City	Sagamihara City	Sendai City
Evacuation	141	31.9	16.3	25.5	26.2	Tsunami evacuation	1	100	0	0	0
Shelter	112	2.7	21.4	47.3	28.6	Appropriate shelter	1	0	0	0	100
Recommendation to evacuation	55	23.6	20	1.8	54.5	Second evacuation	1	0	100	0	0
Evacuee	55	27.3	10.9	20	41.8	Flowchart for evacuation	1	0	0	0	100
Evacuation guidance	36	22.2	2.8	63.9	11.1	Support of evacuation	1	0	0	0	100
Special shelter	14	100	0	0	0	Commencement of evacuation	1	0	0	0	100
Evacuation route	13	15.4	0	23.1	61.5	Activities for evacuation	1	100	0	0	0
Official in charge of shelter	12	0	0	100	0	Evacuated residents	1	0	0	0	100
Evacuation facility	11	27.3	72.7	0	0	Evacuation planning	1	0	0	100	0
Situation on evacuation	9	11.1	44.4	0	44.4	Instruction on evacuation	1	0	0	0	100
Welfare shelter	9	0	0	100	0	Confirmation of evacuees	1	0	100	0	0
Place for evacuation	8	50	12.5	0	37.5	Table for confirmation of evacuees	1	0	100	0	0
Place to be evacuated	8	12.5	0	37.5	50	Evacuees themselves	1	0	0	0	100
Management of shelter	7	0	0	85.7	14.3	Evacuated inhabitants	1	100	0	0	0
Place for wide-area evacuation	6	0	66.7	33.3	0	Figure of shelter	1	0	100	0	0
Action for evacuation	6	0	0	33.3	66.7	Committee on shelter management	1	0	0	0	100
Designated shelter	5	0	20	0	80	Meeting for shelter management	1	0	100	0	0
Evacuation plan	5	20	20	40	20	General management of shelter	1	0	0	100	100
Committee on shelter management	4	0	0	0	100	Staff for establishment and management of shelter	1	0	0	0	0
Number of persons to be evacuated	4	50	0	0	50	Arrangement for establishment of shelter	1	0	0	100	0
Temporary place for evacuation	3	0	66.7	33.3	0	Shelter facility	1	0	0	0	100
Shelter for accommodation	3	0	0	0	100	Other than shelter facility	1	0	0	100	0
Resister of evacuees	3	0	0	33.3	66.7	Self-governing organization of shelter	1	0	100	0	0
Manual on shelter management	3	0	0	0	100	District around shelter	1	0	0	100	0
Council on shelter management	3	0	0	100	0	Information on shelter	1	0	0	100	0
Life of evacuation	3	66.7	0	0	33.3	Measures for shelter	1	0	100	0	0
Area for evacuation	3	0	0	0	100	Official in charge of shelter	1	0	0	100	0
Residents to be evacuated	3	0	0	0	100	Department in charge of shelter	1	0	0	100	0
Road for evacuation	3	0	0	100	0	List of shelters, etc.	1	0	0	0	100
Temporary tent for evacuation	2	0	0	0	100	According to shelter	1	0	0	0	100
List of places for wide-area evacuation	2	0	0	50	50	Management of place for evacuation	1	100	0	0	0
Number of evacuees	2	0	50	50	0	Information on evacuation	1	100	0	0	0
Accommodations for evacuation	2	50	0	0	50	Evacuated households	1	0	100	0	0
Facility for accommodations for evacuation	2	0	50	0	50	Evacuation measures	1	0	100	0	0
Establishment of shelter	2	0	0	50	50	Arrangement for evacuation	1	0	0	0	100
Manager of shelter	2	0	0	0	100	Object of evacuation	1	0	100	0	0
Complementary facility to shelter	2	0	100	0	0	Number of households to be evacuated	1	100	0	0	0
Measures for evacuation	2	0	50	50	0	District to be evacuated	1	0	100	0	0
Within area to be evacuated	2	0	0	0	100	Area to be evacuated	1	0	0	100	0
Method for evacuation	2	0	100	0	0	Location for evacuation	1	0	0	100	0
Activity to guide evacuation	2	0	0	100	0	Within district to be evacuated	1	100	0	0	0
Complementary place for evacuation	2	100	0	0	0	Measures against lengthening of evacuation	1	0	0	0	100
List of temporary places for evacuation	1	0	0	100	0	On way to evacuation	1	0	0	0	100
Each shelter	1	100	0	0	0	Staff in charge of evacuation guidance	1	0	0	100	0
Emergency evacuation	1	0	0	0	100	Person in charge of evacuation guidance	1	0	0	100	0
Evacuation team at ward branch	1	100	0	0	0	Arrangement for evacuation guidance	1	0	0	0	100
??Evacuation on warning??	1	0	0	0	100	Measures for evacuation guidance	1	0	0	0	100
Wide-area evacuation	1	0	0	100	0	Between headquarters and shelter	1	0	0	0	100
List of designated shelters	1	0	0	0	100	Other measures for evacuation	1	0	0	100	0
Evacuation in advance	1	0	0	100	0	Large number of evacuees	1	0	0	0	100
Evacuation on own	1	0	0	100	0	List of places for evacuation in region	1	0	0	0	100

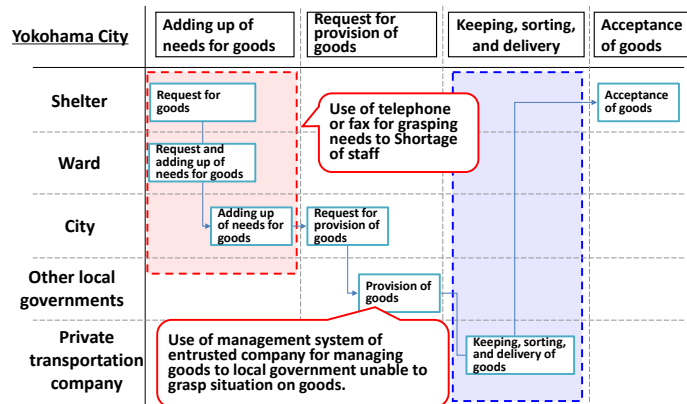


Fig. 5 – Work flows of relief goods in Yokohama City

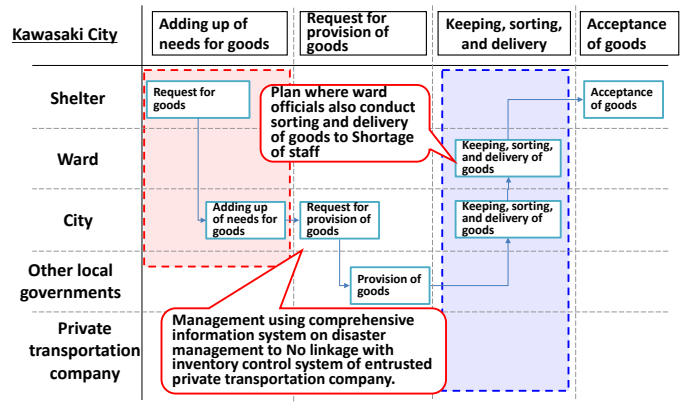


Fig. 6 – Work flows of relief goods in Kawasaki City

3. Database

Each municipality needs to manage the disaster management plan. But updating the contents is difficult due to lack of specialists or limitation of budget for disaster management divisions. Generally, officials shift to other department from the department of disaster management about for three or four years under the Japanese staff reassignment management system. Even for the Officials with experiences of some years for disaster management have to shift to other department. There are knowledge gaps between the municipalities with specialist or experienced officials. Under the insufficient knowledge or budget, effective quality controlling of disaster management plan is important for the future Japanese local governments by the database technology. This research collects disaster management plans from almost all municipalities to make a database to manage the documents for designing by the database.

Fig. 7 shows the numbers of collected disaster management plans from municipalities. 1,410 (1,018 and 392) disaster management plans are collected. 1,018 municipalities are collected by accessing the web site showing the disaster management plan by PDF respectively. 392 municipalities are obtained to contact to the deviation that manage the disaster management plan. Then, the municipalities send those documents directly by e-mail or CD-ROM. As obtained documents are different format or style, this research develops the document analyzer. The analyzer can identify the structures of the document. The results create the structures and sentences.

Fig. 8 shows the overview of the database design for the web-based management system of disaster management plan. This system has four basic databases. (1) Database for disaster management plan include the disaster management documents made by each municipalities. This database can show the contents of the plans by HTML document. SVG (Scalable Vector Graphic) masking on map of Geospatial Information Authority of Japan is available on the web conditions. Access to the plans from the map from the database of disaster management plan. (2) Database for general information of municipalities include population, industrial conditions, geographical conditions etc. (3) Database for the past disaster archives historical disasters happened in each municipality. Contents of the disaster management plans can be connected to the past disaster knowledge. For example, contents of evacuation facility operations in the disaster management plan can link the problems of evacuation facility operations during the 1995 Kobe earthquake disaster, or the 2011 Great East Japan earthquake disaster. (4) Record for updated or changed the documents of the plans are stored. Updating history of each plan are recorded to share the knowledge among all municipalities. The maintenance of the plans are uniformly managed all over the Japan keeping with minimum requirements of quality of the contents.

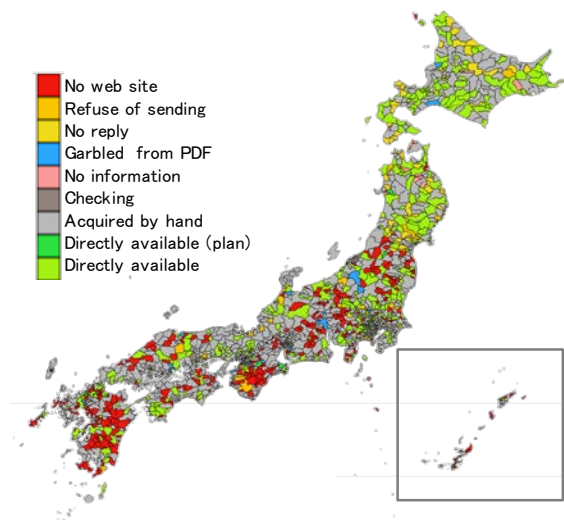


Fig. 7 (a) – Databased disaster management plan

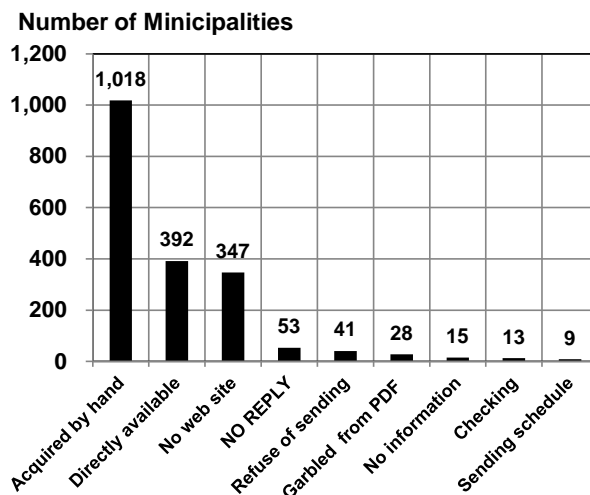


Fig. 7 (b) – Collecting conditions of disaster management plan

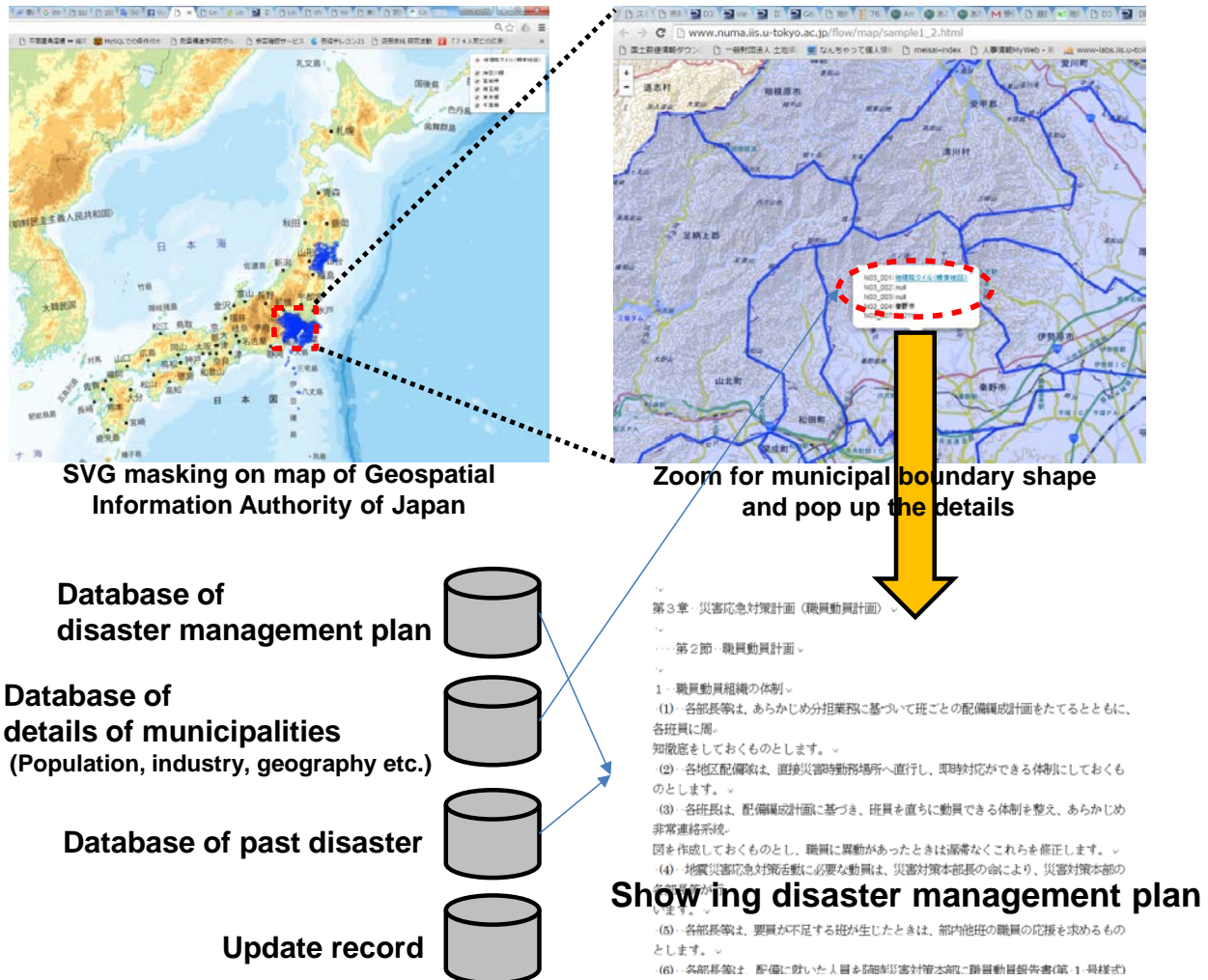


Fig. 8 Developed database design

4. Conclusion

This research develops the web-based management system of disaster management plan with four basic databases to manage the quality of the plans and to achieve effective updating the ones. The disaster management plans of about 1,410 municipalities are archived. The system can provide the basic searching the contents and comparison with other municipalities. The quality controlling and effective updating will be possible for all over the Japan.

In the scenario Tokyo Metropolitan Earthquake, limited numbers of officials of local governments would have to implement disaster response activities. Support based on wide-area cooperation is important in cases in which sufficient numbers of officials could not be ensured. Standardization of descriptions of local disaster management plans is significant in order to construct effective mutual support for smooth and effective acceptance of support.

Through the experiences of the 2011 Great East Japan Earthquake disaster, more local governments conclude agreements on mutual support in the time of disaster and revise existing local disaster management



plans. To make cooperation among the Japanese Government, prefectures, and municipalities more effective, the description of local disaster management plans should be uniformed to have same languages among responders.

In the previous study [3], disaster response activities were classified into three categories by analyzing work in basic disaster management plans using flowcharts and graphs of procedures for information processing. These categories are 1) work specific to individual organizations, 2) work having common procedures for implementation, and 3) work needed by cooperation among organizations. In order to promote the effective disaster response activities, developed database is useful for understanding of different level of the works in the plans to manage the response activities.

5. References

- [1] S. NAGAMATSU, H. HAYASHI, and Y. KAWATA, “The Problem of Disaster Management Policy and Local Plan for Disaster Prevention”, *Journal of Institute of Social Safety Science* (7), pp.395-404, 2005.11.
- [2] T. UEDA and H. HAYASHI, “Computer Support System of Disaster Response: Electric Documentation of Shelter Manual”, *Journal of Institute of Social Safety Science* (8), pp.242-247, 1998.10.
- [3] Y. IWASA, H. HAYASHI, and T. KONDO, “Business Activity Analysis of the “Basic Plan for Disaster Prevention” for More Standardized Emergency Response”, *Journal of Institute of Social Safety Science* (7), pp.193-202, 2003.11.