Study on Types of Perception on South Korean Emergency Rescue Personnel and System

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Abstract. This study, using Q methodology, examines types of perception on the domestic emergency rescue personnel and system in South Korea. By inspecting detailed effect factors from functional aspects, it purports to suggest future improvements and direction. In this study, the subjectivity study analysis method was utilized to answer two research questions: (1) what are the types of firefighters' perception on domestic emergency rescue personnel and system? and (2) what are the similar characteristics among these types and their implications? To examine the subjectivity of the perception on the domestic emergency rescue personnel and system, this study used Q methodology. If future study can build on quantitative empirical research and comprehensive comparative discourse for its implications, we can expect improvements in the perception on the domestic emergency personnel and system, as well as better policy directions in the relevant studies. Follow-up research will complement the limitations of this research.

Keywords: Emergency rescue personnel, Firefighters, Q methodology, Subjectivity study

1. Introduction

In the past several years, in response to rapidly increasing first-aid and rescue demands, attempts have been made in South Korea to reinforce long-term job competence in various emergency rescue areas such as securing professional emergency rescue personnel. (Kim et al., 2015). In part a response to the fast-rising number of senior citizens who live alone, these attempts included a policy to provide public safety and welfare services such as emergency patient transfer and a plan to participate in the South Korean Ministry of Health and Welfare's pilot project called the Smart Medical Guidance. These efforts also meant to provide consistent high-quality 119 rescue services, while conducting continuous 119 rescue service evaluations and analyses.

Out-of-hospital emergency medical services for emergency patients refer to such measures as consultation, rescue, transfer, first aid, and treatment. To provide them effectively, manpower, equipment, training, and public safety network should all be operated efficiently.

In South Korea, out-of-hospital emergency medical services are managed mostly by the 119 rescue services; thus, identifying relevant factors concerning such emergency patients is very important. Activities of the 119 rescue services have increased every year; recently, to eliminate blind spots of emergency medical service in rural areas, more 119 rescue squads have been allocated. The scope of rescue personnel's first aid treatment has broadened, manpower dedicated to infectious disease has increased, and the patient transfer system has been reinforced. In other words, the 119 emergency medical services have improved alongside the living standards of South Koreans.

Rescue activities are influenced by external conditions such as seasonal factors, time of the day, and epidemic spread (Cao et al., 2009). They are also affected by internal conditions such as manpower of emergency rescue personnel, allocation of ambulances, and rescue workers' level of knowledge as well as personnel factors such as shifts of the workers (Bayley et al., 2008).

As their duties increase in this rapidly changing social environment, the issue of firefighters' perception on emergency rescue personnel and system has become more important. This study aims at better understanding of the stereotype or cognitive changes in firefighters' perception on "emergency rescue." Additionally, with that understanding, this study examines their perception on the emergency rescue personnel and system. The relevant literature analysis assists an objective value analysis and enables an efficient understanding of the study. Further, it induces an evaluation that could present not only an objective establishment of value but also

effective strategies and utilization methods. The specific Q-statements applied in this process include diverse preceding case studies compiled from domestic and overseas data, and the scope of the research encompass all relevant literatures available in South Korea. Accordingly, opinions of relevant respondents were collected, and they were then organized based on their contents, related literature, and the researchers' views.

In addition, this study utilizes Q methodology, which is more heuristic and hypothesizing in structuring the types of firefighters' perception on the domestic emergency rescue personnel and system, identifying, describing and explaining the characteristics by type (Stephenson, 1968; Brown, 1980). In other words, it categorizes the psychological subjectivity of the respondents. While the existing R methodology may allow an objective statistical analysis of types of perception on the domestic emergency rescue personnel and system, Q methodology can also draw a more insightful analysis, identifying the respondents' schema (Brown et al., 1999). Unlike conventional research methods, which arrive at a deductive hypothesis from the existing theories, this study purports to draw an abductive hypothesis through the subjective images that people hold routinely.

Therefore, this paper diagnoses the respondents' subjectivity on the domestic emergency rescue personnel and system through Q methodology, and by inspecting detailed effect factors from functional aspects, suggests future improvements and direction.

2. Theoretical Basis and Subject for Inquiry

With the Q methodological approach, this study was intended to find the type that allows the consumer to define and structuralize the firefighters' opinions on the domestic emergency rescue personnel and system, so that the consumer can perceive the type holistically. Created by William Stephens, Q methodology integrates the philosophical, psychological, statistical, and psychological measurement-related concepts to study the human attitude and behavior. It is a special statistical technique to analyze the human subjectivity quantitatively (Zabala et al., 2018). As it deals with the intra-individual difference in significance, not the inter-individual difference, the number of P-sample (persons) poses no limitation. Therefore, compared with R methodology, which has cross-sectional characteristics of a large number of samples, it is highly useful in consumer behavior research in that an in-depth exploration on an individual or small group is possible.

Unlike R methodology, which starts from a hypothesis of the researcher, Q methodology allows the researcher to choose as operational definition the concept of

operant definition, which comes from opinion and meaning formed by the respondents themselves. It is a scientific method because it applies systematic and objective methods. Specifically, it uses a statistical method called factor analysis. While the factor analysis in R methodology is to make the variable as factor, that in the Q methodology is to make the human as factor. Through the Q methodological approach, the researchers also hope for an opportunity to form a hypothesis, namely, subjective perception on the respondents' opinions on remote medical service campaign in the age of COVID-19 (Laden et al., 2018; Taylor et al., 2019).

This study utilized the analysis method of subjectivity research to obtain the answer for the above, and the subjects for inquiry are as follows.

Subject for inquiry 1: What are the types of respondents' perception on domestic emergency rescue personnel and system?

This subject for inquiry 1 purports to examine, in this digital age, the types of respondents' perception on domestic emergency rescue personnel and system, what the characteristics of each type are, and how they relate to the respondents' perception on the current domestic emergency rescue personnel and system.

Subject for inquiry 2: What are the similar characteristics among these types and their implications?

This subject for inquiry 2 purports to examine what similarity exists among the significances analyzed by each type. In so doing, it aims to investigate how the respondent's intention and inner subjective images are seen, for which Q methodology was utilized.

Through the above subjects for inquiry, this study was intended to find the characteristics of the types of respondents' opinions regarding the domestic emergency rescue personnel and system. It was further intended to help improve the perception of the firefighters regarding domestic emergency rescue personnel and system and to improve the related research.

3. Research Method

Research on respondents' perception types regarding the domestic emergency rescue personnel and system would be performed far better with Q methodology because it starts with the perspective of the respondents, enabling the understanding of and explanation on different types of subjectivity of each individual. Because of the limitations of existing methods, the researchers of this paper took the Q methodological approach to evaluate the types of respondents' perception on domestic emergency rescue personnel and system. To do that, each statement in the questionnaire was written on a card, and the cards were sorted out by each respondent,

as explained below. To prepare these statements, the researchers built a Q-concourse from relevant literature and interviews, after which Q-statements were written and P-sample was selected. After the sorting process, the QUANL program for PC was used in order to analyze the result through the Q-factor analysis.

3.1. Q-sample and P-sample

Q-sample for this study consisted of statements reflecting the respondents' value system regarding domestic emergency rescue personnel and system. This study is a retrospective study based on the activities of 119 rescue services compiled from the past five years' statistical yearbook published by National Fire Agency. In order to collect the general concepts, feelings, opinions, and values held by respondents, the researchers conducted a relevant literature review, including professional and academic publications and journals. Afterwards, 51 statements were extracted for Q-population (concourse). In the end, 39 statements were selected from the Q-population, as they were deemed to best represent the research inquiry. The 39 statements selected here were composed in such a way that respondents could choose a positive, neural, or negative attitude toward them. As Q methodology deals with intra-individual differences in significance, and not inter-individual differences, it is not limited by the number of P-sample (persons). In addition, since the purpose of Q methodology is not to induce the characteristics of the concourse from the characteristics of the sample, the probabilistic sampling method was not used in the selection of P-sample. With that in mind, 40 persons were selected as P-sample.

3.2. Q sorting and data analysis

When the selection of Q-sample and P-sample was finished, each respondent (Q-sorter) in the P-sample was asked to sort the Q-sample with a certain method, which is referred to as Q-sorting. In Q-sorting, each respondent makes up their mind about a complex subject or situation in the statement and ranks it within a certain distribution.

    Q-sorting procedure is as follows. After reading each card that contains a statement, the respondent sorts them into 3 groups of positive (+), neutral (0), and negative (-). Afterwards, the respondent further sorts the positive statements in order of positiveness from the outside (+4) to inside toward the neutral group and in the same way, sorts the negative statements. For the 2 statements placed at both ends, an in-depth interview was performed because it provides useful information in interpreting Q-factor.

To examine the types of perception on the domestic emergency rescue personnel and system, collected results were assigned scores. After completion of the survey for P-sample, 1 point was assigned to the most negative case (-4), 2 points to the next one (-3), 3 points to the next one (-2), 4 points to the next one (-1), 5 points to the neutral (0), 6 points to the next one up (+1), 7 points to the next one up (+2), 8 points to the next one up (+3), and 9 points for the most positive case (+4). (Figure 1). These scores were coded in the order of statement numbers, and the results were obtained by processing such data with the QUANL program for PC.

4. Research Results

To examine the types of perception of firefighters on domestic emergency rescue personnel and system, a Q-factor analysis was performed, whose results can be arranged as follows [Figure 1] and [Table 1].
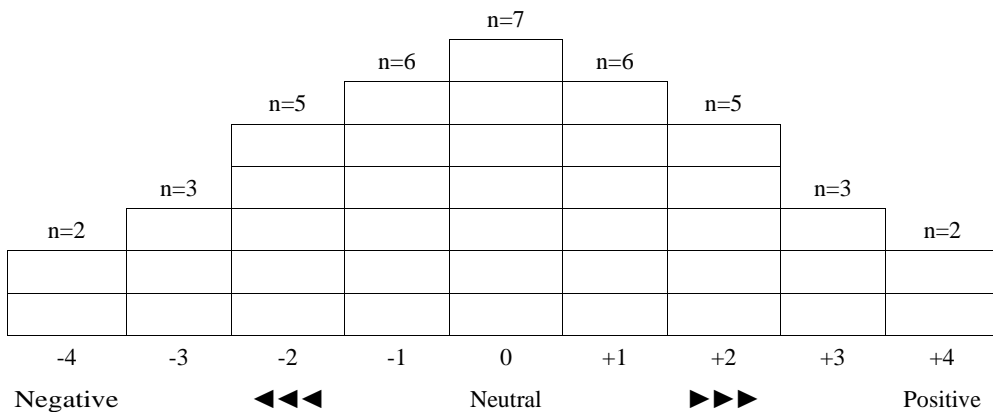

Fig. 1: Statement distribution.

After the QUANL program was run, the results showed that 10 persons, 12 persons, 7 persons, and 11 persons, respectively, fell into 4 types, which take up 48% (0.4774) of entire variables. (The number of persons in each type has no significance.) In addition, out of factor weight shown in each type of 40 respondents, those whose factor weight is 1.0 or higher are 6, 2, 3, and 3, showing that Type 1 corresponds to the highest factor. In addition, as shown in [Table 2], the representative eigenvalue that shows the size of variable of each type was 10.5220, 3.9807, 2.9728, and 1.6203, respectively. Additionally, the field activity data of the 119 rescue services were collected, such as the number of dispatches and transfer cases, categorization by places of accidents and age, and the number of cardiac arrest patients. Also, the

number of dispatches versus that of actual transfer cases, as well as the cardiac arrest cases sorted by accident locations and age groups, were collected.

Table 1: Score distribution and number of statements.

Distribution	-4	-3	2	1	0	1	2	3	4
Score	1	2	3	4	5	6	7	8	9
Number of statement	2	3	5	6	7	6	5	3	2

[Table 3] shows the correlation among the types, with similarities and differences among them. Particularly, the correlation between Type 1 and Type 3 shows the most favorable correlation. As for the correlation between other types, overall positive correlation is shown. [Table 4-1] shows the analysis of factor weight by type according to demographic property of respondents. Here, "factor weight" is the figure that can judge the explanation power of the respondents regarding the relevant type. In addition, [Table 4-2] shows the standard score by type for 4 types according to Q-statement.

Table 2: Eigenvalue and percentage of variable.

Eigenvalue	10.5220	3.9807	2.9728	1.6203
Percentage of variable	.2631	.0995	.0743	.0405
Accumulation frequency	.2631	.3626	.4369	.4774

Table 3: Correlation between each type.

	Type 1	Type 2	Type 3	Type 4
Type 1	1.000	-	-	-
Type 2	.204	1.000	-	-
Type 3	.530	.144	1.000	-
Type 4	.457	.401	-.483	1.000

Table 4-1: Demographic characteristics of the subjects.

Type	ID	Gender	Age	Position/Work	Average Z score
TYPE 1 (N= 10) 6	4	Male	30s	Firefighter/above 3 years/rescue	1.0380
	7	Male	40s	Firefighter/above 3 years/rescue	.9031

	10	Male	30s	Firefighter/above 3 years/rescue	1.2296
	22	Male	30s	Firefighter/above 3 years/rescue	1.1902
	23	Male	30s	Firefighter/above 3 years/rescue	.5516
	24	Male	30s	Firefighter/above 3 years/rescue	2.8403
	30	Male	30s	Firefighter/above 3 years/rescue	.6224
	35	Male	30s	Firefighter/above 3 years/rescue	.5564
	37	Male	30s	Firefighter/above 3 years/rescue	1.1400
	40	Male	30s	Firefighter/above 3 years/rescue	1.6666
TYPE 2 (N= 12) 2	5	Male	50s	Firefighter/above 3 years/rescue	.4180
	9	Male	20s	Firefighter/above 3 years/rescue	.7882
	12	Male	30s	Firefighter/above 3 years/rescue	.9716
	13	Male	40s	Firefighter/above 3 years/rescue	.0436
	16	Male	30s	Firefighter/above 3 years/rescue	.7681
	19	Male	40s	Firefighter/above 3 years/rescue	.2033
	20	Male	30s	Firefighter/above 3 years/rescue	1.1015
	27	Male	30s	Firefighter/above 3 years/rescue	.4706
	28	Male	30s	Firefighter/above 3 years/rescue	.3058
	31	Male	30s	Firefighter/above 3 years/rescue	.4546
	32	Male	50s	Firefighter/above 3 years/rescue	.3527
	36	Male	40s	Firefighter/above 3 years/rescue	1.0614
TYPE 3 (N= 7) 3	1	Male	30s	Firefighter/above 3 years/rescue	.4587
	6	Male	50s	Firefighter/above 3 years/rescue	.7984
	11	Male	20s	Firefighter/above 3 years/rescue	.3568
	14	Male	30s	Firefighter/above 3 years/rescue	1.0269
	15	Male	40s	Firefighter/above 3 years/rescue	1.0495
	29	Male	50s	Firefighter/above 3 years/rescue	.9119
	33	Male	30s	Firefighter/above 3 years/rescue	2.3678
TYPE 4 (N= 11) 3	2	Male	30s	Firefighter/above 3 years/rescue	.6491
	3	Male	40s	Firefighter/above 3 years/rescue	.9117
	8	Male	30s	Firefighter/above 3 years/rescue	.6016
	17	Male	40s	Firefighter/above 3 years/rescue	1.2448

	18	Male	30s	Firefighter/above 3 years/rescue	.5422
	21	Male	30s	Firefighter/above 3 years/rescue	1.6198
	25	Male	50s	Firefighter/above 3 years/rescue	.4889
	26	Male	30s	Firefighter/above 3 years/rescue	.2716
	34	Male	30s	Firefighter/above 3 years/rescue	.7162
	38	Male	30s	Firefighter/above 3 years/rescue	1.5737
	39	Male	30s	Firefighter/above 3 years/rescue	.5766

Table 4-2: Q-statement and Standard Score by each Type.

ITEM DESCRIPTIONS	TYPAL ARRAY
N'S FOR EACH TYPE ARE	1 2 3 4 10 12 7 11
1. Emergency rescue personnel must maintain the safety in the disaster site.	1.3 -1.1 1.8 .1
2. Emergency rescue personnel must deal with the emergency competently.	1.4 - .1 .9 .6
3. For emergency rescue personnel, identifying the cause of accident is important.	.0 -2.8 .3 -1.6
4. Emergency rescue personnel must prepare the site log.	
5. Emergency rescue personnel's priority is to save lives.	.7 .4 .7 .0
6. Emergency rescue personnel must receive professional continuing education.	1.3 .0 1.7 .8
	.5 1.3 2.0 .6
7. Emergency rescue personnel must have sufficient knowledge on various emergency accidents.	1.4 .9 1.5 .1
8. Emergency rescue personnel must treat all matters quickly no matter what they are.	-1.1 -1.9 -.6 -2.1
9. Emergency rescue personnel only deals with patient transfer rather than efficient emergency rescue.	-1.7 -1.3 -2.0 -2.3
10. Those who are not qualified as emergency rescue participate in the transfer process.	-.9 .1 -1.5 -1.9
11. It is common that no emergency rescue personnel are found in the ambulance carrying an emergency patient.	.8 .6 -1.5 -1.9
12. Emergency rescue system for first aid and/or emergency transfer of patients from various accidents and disaster site is still not sufficient.	1.0 -.6 -1.3 -.3
13. Dealing with precious lives of emergency patients is managed too carelessly.	
14. There is a desperate need for emergency rescue personnel for long distance transfers.	-1.1 -2.0 -1.3 -1. .5 -.8 -.7 .3

15. Currently, there is shortage of emergency rescue personnel.	
16. National efforts should be made for a better emergency rescue system.	1.9 1.6 -.4 .2
	1.8 .7 .3 1.6
17. Diverse emergency rescue manpower with actual field practice should be fostered.	1.2 1.0 .7 1.3
18. Realistic changes in the emergency rescue policy are needed.	
19. Emergency rescue must be done according to medical treatment standards.	.9 -.3 -.0 1.3
20. During pre-hospital transfer stage, the information center or medical institution needs the organization or system operated according to sufficient and clear criteria.	.9 -.1 .7 .5 .3 -.6 -.4 .9
21. With regard to inter-hospital transfer organizations, medical management of the emergency system is required for the safety of patient.	.3 -.5 .4 .2
22. It is ideal that the dispatch system is managed at the national level.	
23. Emergency rescue system should have a comprehensive system using all the available means of communication.	.0 -.3 -.7 .7 -.2 -.7 .3 .4
24. Accurate criteria should be established for all the actions implemented within the emergency rescue system.	.1 .3 .6 .3
25. It is essential that medical institutions save the patient's life and minimize complications by providing appropriate diagnosis and emergency treatment.	.2 -.1 1.0 .8
26. Although the frequency is low, if the patient needs special treatment, a hospital where such special treatment is possible should be secured.	-.3 -1.3 -.2 .2
27. To improve current active emergency rescue personnel's capability, continuing education should be done on a regular basis.	-.5 .3 1.3 .6
28. A sufficient budget to operate emergency rescue system must be secured.	.1 1.8 .6 1.0
29. Effectiveness of emergency rescue system should be evaluated periodically.	-1.5 -.4 .2 -.5
30. Basic first aid can be performed by laypersons before the emergency rescue system personnel arrive at the scene, through promoting and educating for such activity.	-.7 1.0 -.9 1.7
31. Cooperative systems should be maintained among the areas adjacent to the site of disaster and large casualty.	-.7 .3 -.1 -.3
32. The ambulances should be equipped with sophisticated communication system and cutting-edge medical equipment.	-.7 .7 -.6 -.7
33. The number of professional emergency doctors and emergency rescue personnel is insufficient.	-.4 1.7 -1.0 -.2
34. The scope of emergency rescue personnel's legal liability must be clearly set.	

35. Emergency transfer system tailored to South Korea should be established.	-.8 .7 -.6 .3
36. The qualification requirements for emergency rescue personnel who are not medical practitioners should be reinforced and a completion of further training must be required after a certain period.	-1.0 .1 -.6 -.2 -1.0 .8 -.2 -1.4
37. Various criteria for drugs and medical equipment to be furnished inside the ambulances should be prepared, and the exact number of ambulances within a certain area should be identified to respond to the emergency demands.	
38. A national policy should be set regarding efficient patient transfer and criteria for the hospitals in the area that can treat the emergency patients.	-1.5 -.3 -.7 -.7
39. For large-scale disasters, there is a need for a disaster relief control committee that encompasses multiple institutions (police stations, fire stations, hospitals, and the military), as well as the emergency medical service and rescue system overseen by hospitals.	-1.4 .8 -.4 -.3 -1.4 .2 -.6 1.0

4.1. Type 1 (N= 10): National emergency treatment type

As analyzed below [Table 5], out of 10 persons belonging to Type 1, the number of respondents whose factor weight is over 1 is 6. Those six most positively responded to Q-statement No. 15 [Currently, there is shortage of emergency rescue personnel. (Z-score=1.86)] They responded most negatively to Q-statement No. 9 [Emergency rescue personnel only deals with patient transfer rather than efficient emergency rescue. (Z-score=-1.70)]. After all, they strongly agreed that efforts at the national level are required to resolve the issue of emergency rescue personnel and to set the direction of emergency rescue system.

Table 5: Q Statements above standard score ±1.00.

	Q statements	Standard score
P	15. Currently, there is shortage of emergency rescue personnel.	1.86
	16. National efforts should be made for a better emergency rescue system.	1.79
	2. Emergency rescue personnel must deal with the emergency competently.	1.45
N	39. For large-scale disasters, there is a need for a disaster relief control committee that encompasses multiple institutions (police stations, fire stations, hospitals, and the military), as well as the emergency medical service and rescue system overseen by hospitals.	-1.41

	Standard score
37. Various criteria for drugs and medical equipment to be furnished inside the ambulances should be prepared, and the exact number of ambulances within a certain area should be identified to respond to the emergency demands.	-1.45
29. Effectiveness of emergency rescue system should be evaluated periodically.	-1.48
9. Emergency rescue personnel only deals with patient transfer rather than efficient emergency rescue.	-1.70

(* The statements and Z-scores are the highest scores (±1) in type 1.)

4.2. Type 2 (N=12): Man-power budget reinforcement type

As shown below [Table 6], out of 12 persons belonging to Type 2, the number of respondents whose factor weight is over 1 is 2. Those two most positively responded to Q-statement No. 28 [A sufficient budget to operate emergency rescue system must be secured. (Z-score=1.77)]. They responded most negatively to Q-statement No. 3 [For emergency rescue personnel, identifying the cause of accident is important. (Z-score=-1.70)]. Therefore, they seemed to agree strongly with preparing for the maximum emergency rescue system and sufficient support for the professional emergency physicians and emergency rescue personnel through identifying the cause of accident.

Table 6: Q Statements above standard score ±1.00.

	Q statements	Standard score
P	28. A sufficient budget to operate emergency rescue system must be secured.	1.77
	33. The number of professional emergency doctors and emergency rescue personnel is insufficient.	1.69
	15. Currently, there is shortage of emergency rescue personnel.	1.65
N	8. Emergency rescue personnel must treat all matters quickly no matter what they are.	-1.87
	13. Dealing with precious lives of emergency patients is managed too carelessly.	-2.03
	3. For emergency rescue personnel, identifying the cause of accident is important.	-2.79

(* The statements and Z-scores are the highest scores (±1) in type 2.)

4.3. Type 3 (N= 7): Continuous emergency professional type

As shown below [Table 7], out of 7 persons belonging to Type 3, the number of respondents whose factor weight is over 1 is 3. Those three most positively responded to Q-statement No. 6 [Emergency rescue personnel must receive professional continuing education. (Z-score=1.99)] and responded most negatively to Q-statement No. 9 [Emergency rescue personnel only deals with patient transfer rather than efficient emergency rescue. (Z-score=-1.97)]. Therefore, they seemed to agree strongly that emergency rescue personnel not only deal with the emergency patient transfer but prioritize maintaining the safety in the disaster site and saving lives. They also positively responded to professional continuing education of emergency rescue personnel, skillful handling of emergency, and improvement of knowledge on various emergency accidents.

Table 7: Q Statements above standard score ±1.00.

	Q statements	Standard score
P	6. Emergency rescue personnel must receive professional continuing education.	1.99
	2. Emergency rescue personnel must deal with the emergency competently.	1.90
	1. Emergency rescue personnel must maintain the safety in the disaster site.	1.80
	5. Emergency rescue personnel's priority is to save lives.	1.73
	7. Emergency rescue personnel must have sufficient knowledge on various emergency accidents.	1.49
N	10. Those who are not qualified as emergency rescue participate in the transfer process.	-1.53
	11. It is common that no emergency rescue personnel are found in the ambulance carrying an emergency patient.	-1.54
	9. Emergency rescue personnel only deals with patient transfer rather than efficient emergency rescue.	-1.97

(* The statements and Z-scores are the highest scores (±1) in type 3.)

4.4. Type 4 (N= 11): Basic emergency treatment settlement type

As shown below [Table 7], out of 11 persons belonging to Type 4, the number of respondents whose factor weight is over 1 is 3. Those three most positively responded to Q-statement No. 30 [Basic first aid can be performed by laypersons before the emergency rescue system personnel arrive at the scene, through promoting and educating for such activity. (Z-score=1.70)] and responded most negatively to Q-

statement No. 9 [Emergency rescue personnel only deals with patient transfer rather than efficient emergency rescue. (Z-score=-1.97)]. As such, Type 4 positively responded to public education and promotion, importance of basic first aid performance by emergency rescue personnel, and the establishment of an emergency rescue services at the national level.

Table 8: Q Statements above standard score ±1.00.

	Q statements		Standard score
P	30. Basic first aid can be performed by laypersons before the emergency rescue system personnel arrive at the scene, through promoting and educating for such activity.		1.70
	16. National efforts should be made for a better emergency rescue system.		1.61
N	3. For emergency rescue personnel, identifying the cause of accident is important.		-1.57
	11. It is common that no emergency rescue personnel are found in the ambulance carrying an emergency patient.		-1.88
	10. Those who are not qualified as emergency rescue participate in the transfer process.		-1.94
	8. Emergency rescue personnel must treat all matters quickly no matter what they are.		-2.09
	9. Emergency rescue personnel only deals with patient transfer rather than efficient emergency rescue.		-2.29

(* The statements and Z-scores are the highest scores (±1) in type 4.)

Table 9: Consensus Q-statements & average Z-scores of each type.

Item Description	Average Z-Score
17. Diverse emergency rescue manpower with actual field practice should be fostered.	1.05
4. Emergency rescue personnel must prepare the site log.	.44
24. Accurate criteria should be established for all the actions implemented within the emergency rescue system.	.32
21. With regard to inter-hospital transfer organizations, medical management of the emergency system is required for the safety of patient.	.08
31. Cooperative systems should be maintained among the areas adjacent to the site of disaster and large casualty.	-.20

5. Discussion

As shown above [Table 9], from the Q-statements, 4 types were drawn in this study: Type 1 [(N= 10): National emergency treatment type], Type 2 [(N= 12): Man-power budget reinforcement type)], Type 3 [(N= 7): Continuous emergency professional type)], Type 4 [(N= 11): Basic emergency treatment settlement type)]. The number of statements all four types agreed similarly were 5, of which 4 were positive statements and 1 a negative statement. The respondents tended to respond most positively to No. 17 [Diverse emergency rescue manpower with actual field practice should be fostered. Z-score=1.05]. They tended to respond negatively to No. 31[Cooperative systems should be maintained among the areas adjacent to the site of disaster and large casualty. Z-score=-0.201)]. In other words, the respondents agreed with fostering of diverse emergency rescue personnel who have actual field practice, preparing of site logs, establishing of accurate criteria for the treatment within the emergency rescue system, and the need for medical management in accordance with emergency rescue system for the safety of emergency patients (Capp et al., 2017; Bashiri et al.).

This study intended to diagnose the firefighters' perception on domestic emergency rescue personnel and system, to find out the detailed effects in the functional aspect, and to suggest the improvements and solutions.

First, to examine the subjective tendency of the respondents regarding the subjects of this paper, Q methodology was used, and to verify that, two subjects of inquiry were established. Subject for inquiry 1: What are the types of firefighters' perception on domestic emergency rescue personnel and system? Subject for inquiry 2: What are the similar characteristics among these types and their implications?

Based on the subjects of inquiry, 4 types (Type 1 [(N= 10): National emergency treatment Type], Type 2 [(N=12): Man-power budget reinforcement type)], Type 3 [(N= 7): Continuous emergency professional type)], Type 4 [(N= 11): Basic emergency treatment settlement type) were drawn. Specifically, an analysis showed that each type has unique characteristics. In all 4 types, most of the respondents strongly agreed that the issue of perception on domestic emergency rescue personnel and system calls for multi-faceted discussions and systematic support in various aspects.

Next, the following data were discussed. The number of total dispatch cases in 2020 was 2,766,136, and that of transfer cases was 1,594,390. The average transfer ratio to the dispatch cases was 58.6%, listing Gwangju Metropolitan City with the highest rate of 66.2% and the Province of Chungcheongnamdo with the lowest rate of 51.4%. The top three accident sites were homes (61.7%), roads (12.5%), and traffic areas other than the roads (6.4%). Of the patients, the age group with the highest

number was those of 60 years or older (49.6%), followed by those in their 50s (16.2%) and 40s (10.7%). Cardiac arrest patients in 2020 were 27,201, and by area, the highest was the Province of Gyeonggi-do (6,342), followed by Seoul Special City (3,967), Busan Metropolitan City (1,891), and the Province of Gyeongsangbukdo (1,863). That the average transfer ratio to the dispatch cases was 58.6% indicating that more public education and promotion are needed. In many cases, transfer by personal vehicles or self-transfer was possible. The number of actual transfers by the rescue services was highest with those in their 60s or older. As for causes of dispatch, internal diseases caused by acute or chronic conditions were more frequent than external injuries. Particularly, emergency from internal diseases took place most frequently at homes. Dispatch rate was high in the patients with hypertension, diabetes, heart disease, and respiratory disease, and the transfer rate was higher in these cases as well.

This study has limitations in that, as it utilized a small-scale group of firefighters, it did not perform comparative analyses with diverse cases. Nevertheless, its significance lies in presenting the basic data for in-depth and special research as a preliminary stage to research the participation experience of diverse types of respondents. In the follow-up research, diversification and objectification of respondents will be attempted gradually, developing detailed questions and analysis methods of Q methodology.

An analysis of emergency medical services data published by National Fire Agency shows that the transfer ratio to dispatch cases was not high. It also shows that, in the cases of acute and chronic diseases, impending cardiac arrests and cardiac arrest situations took place most frequently at homes. Dispatch cases related to trauma were most frequent among those in their 40s and 50s. The above data confirms the need for securing of sufficient emergency medical service personnel, as well as the need for further public education and promotion.

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