

Comparing the application of social network service with existing method on the efficiency and velocity of spreading mobilization order

-Based on the circumstance of Ulchi focus lens training of South Korean military-

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기존의 예비군 동원 방식과 소셜네트워크를 응용한 새로운 동원 체계의 효율 및 확산 속도 비교연구 -을지 포커스 렌즈 훈련 상황 전제 -

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Abstract

Since June 25th 1950, the beginning of the cold war (Korean war), Korean peninsula is still in a state of war. Officially South and North Korean government call a truce after three years from the beginning day, however both countries are still having several combats in these days. So every Korean citizen male has duty for serving military duty and this lasts even after the serving regular military force, as reserved military. Although South Korea is very small country, the size of military is very large so informing all reserved military takes some time. Since this nation is confronting the enemy and considering the global potential threat, South Korean military needs expedite informing system to call up the reserved military to active duty. In this project, the current informing system has been analyzed and compared with the new method which is using social network service such as Twitter. However mobilization order is very critical. So in our new model there are two ways combined. Using twitter to inform and then use traditional ways to finish the order. This method will provide more efficient and accurate way to cover the call ups.

Keyword : Call up system, Twitter, Military

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1. Introduction

In South Korea, there are more than 3.5 million military forces, including reserved force [1]. Korean men have duty of military service. After the regular certain period of service (POS), from two years to five years; it varies on which service the people take, they become a member of reserve force. When the nation is put on emergency alert such as war or huge disaster, the government declares the mobilization order to reserve force. There are several ways to call up the reserve military such as informing through the agency of people or phone calls.

On May, 2011 there was an official report from The President's Council on Informatization Strategies which was dealing with several national strategies about realizing the network society of communication, trust, creativity by based on platform [2].

Based on this report we figured out the social network service, such as Twitter, can be an efficient alternative method for calling out the reserve force because of its rapid spreading velocity and cost effectiveness.

From the certain experiences of serving the military duty as an officer of reserve force resource and mobilization administration department at Capital Defense Command and police officer at Seoul Metropolitan Police Agency in South Korea, we figured out there are several issues of current informing system for call up the reserved military.

In this project, there will be practical data set from the current system and official report from the South Korean government. Also our mathematical formulation will be used for analyzing the data set and comparing the new method which we figured out.

In the next chapter, the issues of current informing system will be presented. Third chapter, there will be backgrounds of our research which is more practical contents rather than academic literature. However there are critical academic literatures which provide us to build mathematic model for analyzing new method. In the forth chapter the critical analysis of current calling up system and new method which assumes using the Twitter are provided. The data of current system is

based on the empirical data from our military POS and simple survey from officers of our previous military office. The fifth chapter will discuss about the results of both analyses and compare which is better to use. In the last chapter, we will discuss about the limitations of our model and future works.

2. Problem definition

Currently, there are serious combats between North Korea and South Korea such as sinking of Republic of Korea Navy (ROKN) corvette Choenan or shelling of island Yeonpyeong[3][4]. Both cases can derive serious war, which can cause nuclear impact. Korean peninsula is covered by three strong nations; China, Russia, Japan. Also there are US militaries in South Korea and Japan. So technically there are at least four powerful countries are directly related on this site.

To protect the country and prevent from the potential threat, South Korean has enormous military power; the expenditure of budget was world 10th in 2010 by defense white paper of The Ministry of National Defense of Korea[1]. South Korean military is composed with two types of forces. One is the regular forces which are served by six hundred and fifty thousand soldiers whom are professional soldiers or whom are in the duty. And the other is reserved military which are served by 3.5 million of veterans whom already have military duty.

Since the reserve military has very large numbers whom are now living in normal life, it is very hard to call out this number. There are several agents to manage the reserve force. However they are struggling to give the mobilization order in certain period, such as irregular reserve force training or state of national emergency. These officers call the veterans by phone or visiting their residents to inform the mobilization. From our empirical review this process take too much times and resources. The officers were 8398 soldiers in 2007 whom can be utilize as combat units [5]. So this can be a loss of real combat unit.

Also there are other problems of informing the mobilization order. In 2005, the data from the

Military Manpower Administration shows that more than 6.5 thousand veterans were living out of the country [5]. These people were not counting on the duty of reserve force in the normal term. However in the state of national emergency, they should be called out to active the duty. Last year the South Korea had severe attack by the North Korean artillery. However both of us, who are still in the reserve military duty, didn't know until the news on internet or broadcasting. At the time South Korean government contacted all the military service units, including emergency units such as us whom stays out of the country. But there was no contact from any department of Korean government.

To save the time and increase the efficiency and broadness of the informing progress, we analyze the current method under the Ulchi Focus Lens situation, which is the official training that pretends war in the country and suggest new alternative way in this research.

3. Back ground research

In this chapter, the information of current Korean official war game, Ulchi Focus Lens, is provided. However this training is the military official we provide only contents which are publically known. Also the academic research of social network service (SNS) deals with efficiency of twitter speed.

3.1. Ulchi Focus Lens

The Ulchi Focus Lens, as known as UFL, is the biggest military training in the South Korea. This exercise begins mid of August until the early September annually. In this period, the government is officially in the state of emergency. This training is not just driven by Republic of Korea (ROK) military command but also US military is combined as partner. This exercise has various kind of simulation of war and emergency state. The main objective of UFL is to defend against North Korean attack. So every public office in ROK is involved in this exercise. Since there are many organizations are involved and they are run by various simulations,

the purpose of this training is exercising and evaluating the result to improve crisis action planning and process.

During the training, there is the ROK annual national mobilization field training exercise. The official scenario of the exercise is a combination with Army, Navy and Air force. The training simulates the attacks of every possible conventional force of South Korea, which means including all the potential threat by any country, and defends offriendly forces on the Korean peninsula. This is one of major exercise in the UFL because of importance of reserve force. The Military of ROK has approximately four million troops, and more than four of five are reserve forces. So it is very important to manage this force in the certain cases. Following Figure.1 is the picture of UFL on 2010.



Figure 1. Simulation of combat in the city

3.2. The academic and practical review of efficiency of SNS

In very recent day, May 2011, there was an official proposal to make network society based on social platforms. According to this report, South Korea has very strong IT infrastructure and the people this county is very familiar to IT. Choi presented that SNS, such as Twitter, can be applied to new national communication platform by using the case of recent Japanese disaster. Japanese had been used the SNS as emergency communications network during the recent meltdown case. Also he mentioned that the number of visitors and using time of SNS is now bigger than usual internet portal service, such as Yahoo or Google [2].

Han mentioned the interaction of SNS user in Korea is 80.6% in 2010 [6]. In his report he used Twitter as general case and interaction in the Twitter means tweet and then retweet.

Since our new alternative is based on using the twitter because of the diffusion speed, we research the Yang's recent paper. In her paper, she predicts the speed, scale and range of information diffusion in Twitter by her unique model. She also provides implications for the end users of twitter and the system builders. In our project, we focused majorly about speed of the diffusion speed. In Yang's paper, the Cox proportional hazards regression model was used to quantify the number of the speed of diffusion. To verify her model she used "Iran Election" case [7].

However in her case she is not dealing with emergency cases. So we found another thesis which was written by Vieweg et al. This paper is also recently published at Crisis Informatics. In this research they analyzed the microblog posts. They actually analyze the real emergency cases from North America, Oklahoma Grassfires and Red River Floods. They put the word for informing certain emergency case as "situational awareness (SA)"[8]. The thesis well covered how the situation changes during the events. They analyzed certain statements and keywords to figure out how the situation moves. Although they considered "situational update" to see how the circumstance changes to support understanding of "the big picture", they didn't provide any speed relating issues about the case.

So in our report we focused on the case of UFL which is same situation as emergency case and analyzed the current system with mathematical algorithm to see how long it takes to inform the mobilization order to call out the reserve force. From the analysis we figured out that actual time of informing is much less than the military regulation of informing time. However we intuitively knew it is possible to make much efficient call out system than the current. We both have more than 8 years experience in this practical area and still serving as reserve force.

So the new alternative which we built in this project suggests that 11 hours can save comparing

with current system. In the national emergency case, such as confronting the war, time is very critical issue to manage.

4. Analysis

The current calling out system shows better results than the government expects. The ROK military requires three days to call out the reserve force to active. However in the analysis, the data which based on the survey of current officers in the reserve force management department, of the system shows that only 24 hours are needed. But in the modern war 24 hours are still late. So we provided new model to shorten this period. To compare current and new alternative, we used same mathematic analysis. The new alternative presents only 13 hours to inform the mobilization order in the same situation.

4.1. Current Method

In South Korea, when Ulchi Focus Lens (UFL) is held, the Ministry of National Defense regards it as real situation and proclaims the mobilization order to some regiment by randomly. The regiment received the order propagate it to subordinate battalion and as a last step, the battalion call each reserve force for the mobilization order. Each battalion control one township and have several agent as the number of reserve force in their township[1].

Table 1. The number of agents in each battalion [1]

The Number of Reserve Force	The Number of Agents
1~500	2
501~1000	3
1001~1500	4
1501~2000	5
2001~2500	6
2501~3000	7
3001~	Divide Township

As regulations, the mobilization order is proclaimed three days before the training [10]. After the order notified, at first, each agent calls every reserve force by telephone. However, some people do not response this call for various reasons such as changing phone number, out of country, or simply not answer. Next, the agents visit the people who do not response for notifying the mobilization order. If there is no one at their house, the agents posted the official mobilization order letter on the door or put in it to post box and we assumed it as a completion of the mobilization order.

According to our survey from the 28 agents who works in 52 nd division 211 regiment, it takes 2.63 minutes per person to call and inform the mobilization order and 59.22% of recipients answer the phone call. The delivery time for visiting their house is 6.61 minutes per person. Since 52nd division defend Seoul, the capital of South Korea, this is the result from city area and might be estimated less than average of whole country because of the high density of population.

Table 2. The necessary time for each method [2]

The Notification Method	Time (per person)
Telephone	2.63 min
Visiting	6.61 min

To measure how long time it will take to notify mobilization order to reserve force we used the actual data about reserve force census from the statistic data set of municipal city government, Goyang city in 2004 including 34 township and 33,725 reserve forces[9]. By using this data set, we made current system model and calculated the necessary time to call all reserve force by Matlab.

$$Time = (N_i \times T_{call} + N(1 - R_{call})T_{visit}) \div A_i$$

(Equation 1)

- N_i : The number of reserve force in each township i
- T_{call} : Average Time for calling per person (minute)
- R_{call} : Response rate for calling
- T_{visit} : Average time for visiting per person (minute)
- A_i : The number of agents in each township i

Then calculate the average time of 34 townships. From this calculation, we derived the average necessary time to notify mobilization order to reserve force under current system.

4.2. New Method using Social Network Service

To shorten the necessary time under current system, we adopted Social Network Service (SNS), especially Twitter. By using Twitter at the first step of notifying, the agent can reduce the number of reserve force they have to call. Twitter, with its sole purpose of sharing short statuses to a largely public audience, has properties that the information spread rapidly and the interaction occurs actively [2,7].

According to report from Korean government, the Korean social network users forward the information than other countries about twice fast and interact actively about 8 times. For this reason, Korean society is suitable to adopt social network service for a new communication channel [2].

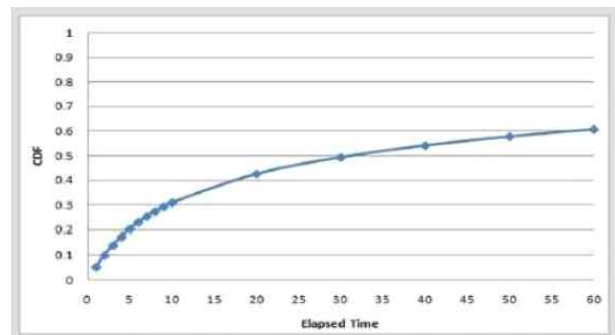


Figure 2. The information diffusion in Twitter during 1 hour [2]

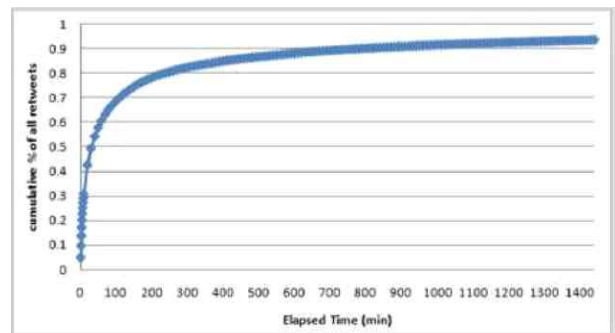


Figure 3. The information diffusion in Twitter during 24 hour [2]

Table 3. The speed of information diffusion in Twitter [2]

Time After Tweet	Diffusion Rate
30 min	50%
60 min	60%
24 hours	90.3%

Table 4. The response rate in Twitter [2]

	Response Rate
World Average	10%
South Korea	80.6%

Now, we used these properties to inform the mobilization order more rapidly. The difference with current system is that the agents notify the mobilization order with Twitter at first. Then they collect the response from Twitter during specific time period, T_{wait} , and after T_{wait} , they start notifying the mobilization order with current method, telephone calling and visiting. To make a model be simple, we choose three time periods for T_{wait} .

Since the information diffusion rate increases rapidly during first 60 minutes, we choose 30 minutes and 60minutes. We also choose 24 hours later for observing diffusion completing. Because after 24 hours, the information diffusion rate increased up to 90.3 % and the rates become slowdown almost zero, we assumed it as a diffusion completing.

To verify this method, we also used actual data set from Goyang city and calculated the necessary time to call all reserve force by Matlab [9].

$$Time = T_{wait} + [N_i \times (1 - D_t R_{Twitter}) T_{call} + N_i (1 - D_t R_{Twitter}) (1 - R_{call}) T_{visit}] \div A_i \quad (\text{Equation 2})$$

N_i : The number of reserve force in each township i

T_{wait} : Time between tweet and calling (minute)

D_t : Tweet diffusion rate during time t

$R_{Twitter}$: Response rate during t

T_{call} : Average Time for calling per person (minute)

R_{call} : Response rate for calling

T_{visit} : Average time for visiting per person (minute)

A_i : The number of agents in each township i

5. Result & Discussion

From the analyses of each system, relying on only Twitter has several problems in the time consuming and the response rate. To improve these problems our new alternative is combined with the current system and application of Twitter. The analyses presents also how and when to apply the Twitter. The key of our model is how to deal with timing of the application. Following table 5. compares each result of different times for applying Twitter.

Table 5. Result of comparing the methods

Method	Time (hours)
Current	23.9933
T_{wait_30min}	14.8245
T_{wait_60min}	13.3842
$T_{wait_24hours}$	29.9945

By comparing new method with current, we discovered using Tweeter is about 10.6 hours faster than current system as the maximum. The average time for mobilization order varies according to the T_{wait} . Among four scenarios, the new method using Twitter and waiting for spreading 60 minutes showed 13.3842 hours and this is the fastest time record than other scenarios.

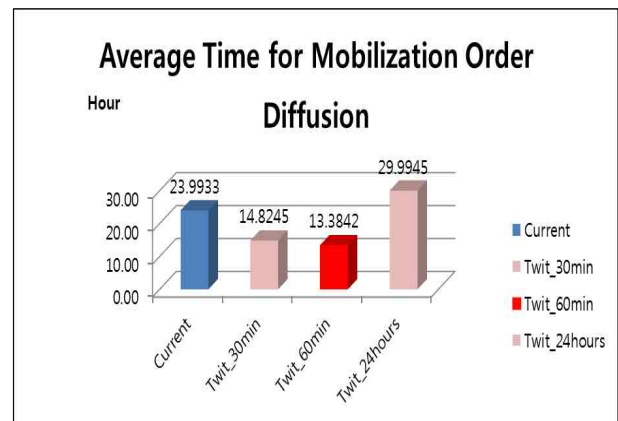


Figure 4. Average Time for Mobilization Oder Diffusion From Matlab

Through using SNS to the mobilization order, we can attain three advantages. First of all, the most critical thing is that the nation will summon their

reserve force more quickly than before when they confront the national risk situation like war. SNS like Twitter spread the information fast and especially, the diffusion speed of an early stage is exceedingly fast. Although the SNS has a limitation that cannot verify the response, the use of SNS will be greatly helpful to propagate national notification like the mobilization order.

In a different view point, using SNS to the mobilization order reduce the number of agents who work in management part for reserve force and as a result, it can reduce national defense expenditure. There is nearly 10,000 agents working at reserve force department and the Ministry of National Defense, South Korea, have a plan to reduce this personnel since the number of army is gradually decreasing as birth rate is decreasing [1]. In this current situation, SNS is proper alternative plan for reducing the officer and transfer them to an arm branch.

In addition, SNS can be a new channel to inform national urgent news to the people who have resided abroad. In 2010, when the shelling of island Yeonpyeong occurred suddenly, the reserve forces staying abroad did not receive any notice about this limited warfare even though the government officially announced Gabho alarm and the Ministry of National Defense also did Jindogae level one warning signal. Gabho alarm means the highest risk alarm for public security and Jindogae level one means also the highest alarm for a local war or warmongering situation [4]. There are more than 65,000 reserve forces staying outside of South Korea and as a member of a nation and a reserve force, they must be notified national emergency situation and prepare it [12].

6. Further Work

Improving the efficiency of national warning diffusion requires the support of information technology. For this reason, we analyzed SNS as a new media of national warning and especially, since Twitter is one of the fastest media for diffusion of information, we mainly analyzed Twitter. However,

there might be an error with current real situation to some extent because this research was basically based on the assumption that all reserve forces are using Twitter. Recently, Twitter user and the diffusion rate of smart phone which is main device for accessing Twitter are exponentially increasing [13]. Therefore, we expect this research can be adopted real situation when the number of Twitter or similar SNS users reaches significant level at early date.

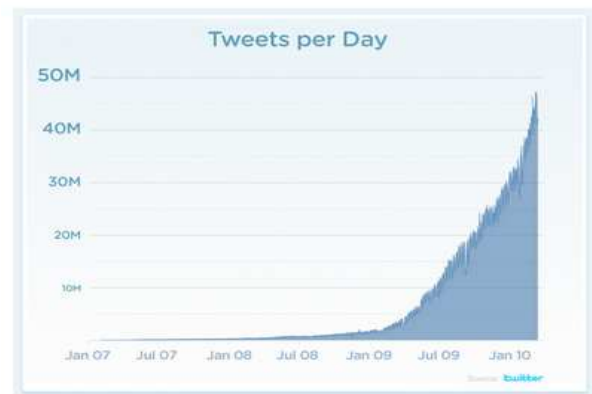


Figure 5. Tweets per day [13]

In our case, we used war game scenario which is publically known to the citizen. However the informing mobilization order can be confidential when the real war happens. This is the difference between normal disaster case and our case. By Twitter, the security of data can't be ensured. For securing the information, some kind of "hot line" function has to be built.

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Appenix A

Survey sheet and answer

Survey sheet (설문 조사)

1. How long did you work in this area?
(근무기간이 어떻게 됩니까)
a) 1~6 months (1~6개월)
b) 7~12months (7~12개월),
c) 13~18 months (13~18개월)
d) 18~24months (19~24개월)
e) More than 24 months (24개월 이상)

2. How many people did you call to reserve force in an hour?
(한 시간에 몇 명의 예비군 훈련 대상자에게 연락을 했습니까)

3. How many people did answer your phone in No.2?
(1번 문항에서 연락을 취했던 대상자 중 몇 명이 응답을 하였습니까)

4. How many people did you visit in an hour?
(직접 훈련 대상자를 찾아갔을 경우 한 시간에 몇 명을 방문할 수 있습니까)

Thank you

Respondent	Q1	Q2	Q3	Q4
1	b	33	20	7
2	a	27	15	8
3	c	25	14	9
4	a	17	7	5
5	d	26	12	7
6	c	24	15	6
7	a	28	20	8
8	c	20	10	6
9	a	15	10	4
10	d	37	20	10
11	a	13	6	5
12	c	25	15	6
13	d	22	10	5
14	b	18	10	7
15	c	15	8	6
16	d	25	14	7
17	c	20	15	7
18	b	25	15	6
19	b	15	9	7
20	d	23	14	5
21	a	12	6	5
22	a	18	12	4
23	c	24	15	7
24	d	25	14	8
25	b	20	12	6
26	b	21	15	5
27	c	40	30	11
28	a	25	20	8
Average	11.57	22.79	13.68	6.61
Average Time per person	2.63			
Average response rate for calling	59.22			%