Abstract

**Purpose:** The study applied Delphi and AHP method to analyze the factors that can promote Non-commissioned officers (NCO)'s field leadership in about 30 experts.

**Method:** First, we will look at ‘NCO Comprehensive Development 2.0’ in conjunction with Defense Reform 2.0. Afterward, the Delphi method is applied to a group of experts to promote the survey items that affect the field leadership of NCO as three major factors and nine lower fields. Finally, the deciding factors are prioritized using AHP techniques. According to ‘NCO Comprehensive Development 2.0’, the army plans to make active efforts to ensure that NCO in the fourth industrial revolution era will become expert warriors in individual and small unit combat, leaders that soldiers follow on their own and connectors with smooth communication, by 2025. The survey of a group of experts applying the Delphi method conducted the first open questions and gradually induced the selective questions to reflect the expert's feedback and finally completed the survey items.

**Results:** The results of the AHP analysis and the Delphi method selected were found to have the highest identification of improvement in the working environment and organizational culture, followed by the selection and training of NCO and enhancement of leadership capabilities.

**Conclusion:** The study is meaningful in analyzing the factors that could facilitate NCO’s field leadership by utilizing Delphi and AHP methods.

**Keywords** NCO(Non-Commissioned Officer), Field Leadership, Fourth Industrial Revolution, Hyper-Connected Society, Defense Reform 2.0

1. Introduction

Expectations for denuclearization and peace on the Korean Peninsula have been raised. Behind the scenes were the military agreement between South-North Korea and the summit between China and the United States, which lasted until the end of last year.

Amid the drastic change in the security environment, the annual ROK-US Alliance Combined Training has drastically reduced the duration, size of participation, and scope of training and U.S. strategic assets to the Korean Peninsula also been halted. In particular, concerns over military readiness posture were raised, with various exercises prohibited under the inter-Korean military agreement. Besides, the Korean Peninsula’s security environment has been deteriorating again, with North Korea conducting 16 missile tests since the failure of the North Korea-U.S. summit in Hanoi in February 2019[1].
The military’s workforce structure is also undergoing significant changes due to troop reductions following the implementation of Defense Reform 2.0. Moreover, the advent of human population cliffs, the Army is carrying out ‘NCO Comprehensive Development 2.0’ without a hitch to develop the duties and roles of NCO while actively promoting the reduction of troops, shortening the service period of soldiers, and artificial intelligence and unmanned combat systems following the Fourth Industrial Revolution[1]. As of 2018, about 400,000 of the 600,000 military personnel are composed of soldiers, but once Defense Reform 2.0 is completed, the number of military personnel will be reduced to 500,000, mainly soldiers and officers[2]. Besides, the role and responsibility of NCO are becoming more important as the rapid population reduction is taking place in line with the social low birth rate trend, which naturally leads to troop reduction. As a result, the number of soldiers will decrease absolutely, and the proportion of officers and NCO will increase accordingly. Therefore, NCO who play the pivotal role of the military will become more critical.

As NCO’s role has increased, the Army has long been pushing for measures to enhance NCO’s expertise and improve their service conditions through the NCO Comprehensive Development 2.0[3].

The Army is working on a grand blueprint for “fostering correct, competent, dedicated, strong and proud NCO” to 2025. NCO of the future Army are evolving as experts in individual and small unit battles, leaders who follow soldiers with actions, and connectors that can smoothly connect ‘the officers and soldiers, orders and execution, plan and results, people and the military, past and future.’ It is also pushing for innovation in various systems, capacity development, organizational culture[4].

It is expected that the field leadership of NCO at each level will be essential to the discipline, guide, and manage the series of courses from basic training that soldiers will first join the military to adapt to the troops and live smoothly after deployment battalion[5][6][7][8][9][10]. Besides, with the advent of hyper-connected society, information, and communication technology, which has developed more rapidly in the era of the third industrial revolution, is having a tremendous impact on the inside the military. The current millennial generation, who are very familiar with smartphones and Social Media, is good at posting and sharing their lives. It could serve as an ‘Achilles’ heel’ in the military where security is vital. Every move made in the military can be quickly exposed to society and even to the enemy. As the existing closed-minded military became open-minded, it became necessary to prevent and periodically manage accidents in advance through education. As a result, the demand for NCO’s field leadership is also increased. After all, demand from military leaders(Officers) and soldiers for the field leadership of NCO, who can professionally replace the role of quantitatively dwindling soldiers, is very high.

Isn’t there any real challenge for NCO to exercise effective field leadership in this environment? This research was started with the idea that.

2. Selection of Analysis Factors Applied by Delphi Method

2.1. Selection of expert groups

Currently, there are many realistic limitations to smoothly exercise leadership in the field when looking at the role of NCO from various perspectives and the corresponding leadership. A group of experts was chosen as NCO because they thought NCO needed to identify their elements of leadership limitations, not from other classes.

The first group was selected by mail and wire to 300 NCO. Of these 300, 100 were selected as the second group, with more than a year of experience as soldiers. The reason for choosing them is that they are familiar with soldiers’ lives, understand their thoughts and activities to a certain extent, and have a will to continue their service. Among the last 100 selected people,
criteria were needed to select real experts. Therefore, NCO with less than five years of retirement, lacking experience, or opposite positions, were excluded. The reason for this is that the beginner did not understand everything through his short experience, and veterans, whose retirement is just around the corner, tend to put more emphasis on his own experience than on an objective perspective. Therefore, the criteria for selecting a group of experts were selected from 15 to 25 years of military experience.

The spectrum was judged to be a suitable target for understanding both the changing system, the old and the new generation, and 64 out of 100 were selected as a result. Since then, there were many NCO with various positions in various fields, and some fields were excluded on the basis of whether they had command experience in line with the purpose of a survey of experts in the field. Finally, it was based on whether he had ever worked in a field where various opinions could be heard vividly and lived with soldiers while training, working, and managing the unit. In particular, 30 out of 64 people were finally selected to form a group of experts by filtering out their recent experience and NCO. As shown in the following <Table 1>.

**Table 1.** Select survey targets for experts.

<table>
<thead>
<tr>
<th>Targets</th>
<th>NCO</th>
<th>NCO who experienced the soldier</th>
<th>NCO who experienced the soldier + career of more than 15 years</th>
<th>NCO who experienced the soldier + career of more than 15 years + Command Activity Experience</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quantity (people)</td>
<td>300</td>
<td>100</td>
<td>64</td>
<td>30</td>
</tr>
</tbody>
</table>

After the selection, the first study selected six representative leaderships of different personalities out of numerous modern leadership. The six representative leadership required for the NCO was selected through three one-on-one interviews with military experts, as shown in <Table 2> by applying Delphi techniques.

**Table 2.** Leadership survey for experts.

<table>
<thead>
<tr>
<th>Survey</th>
<th>Leadership</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>Servant leadership, coaching leadership, transformational leadership, charismatic leadership, empowering leadership, participatory leadership, vision leadership, emotional leadership, partner-type leadership, power leadership, strategic leadership, democratic leadership, affirmative leadership, self-leadership, mission-oriented leadership, entrepreneurship leadership, issue leadership, team leadership, ethical leadership, transactional leadership, great leadership</td>
</tr>
<tr>
<td>2nd</td>
<td>Servant leadership(20), coaching leadership(20), transformation leadership(18), charismatic leadership(20), empowering leadership(20), trading leadership(18), participatory leadership(16), vision leadership(15), partner leadership(16), power leadership(15)</td>
</tr>
<tr>
<td>3rd</td>
<td>Servant leadership(20), coaching leadership(20), transformative leadership(20), charismatic leadership(19), empowering leadership(18), transactional leadership(17)</td>
</tr>
</tbody>
</table>

The interviewee was selected as a combatant through a three-dimensional evaluation of shooting, combat strength, and main skills among the NCO in the Army who have served for more than 15 years.
In particular, 20 exemplary NCO with experience in command (Squad leader, platoon leader, company commander) and leadership education were selected as those with experience in direct training at the Soldier Squad leader’s educational institution or NCO educational institution.

The initial interview asked open questions about the preferred field leadership of the NCO, and 10 of the identified leadership between the initial interviews were selected during the interim interview, and the final interview required the final 10 of them to be re-selected. Finally, the six representative leadership types with the highest score were selected, and the remaining four leadership types were excluded from the survey category with deficient scores of 3 to 5\cite{11}\cite{12}\cite{13}.

2. Selection of analysis factors applied by Delphi Method

2.2. Determining survey items

An expert awareness survey of NCO's field leadership was organized by applying the Delphi techniques.

In this study, a survey using Delphi technique was conducted and analyzed in three stages over two months in an open-type to funnel type. As shown in Table 3.

Table 3. Steps to refine the delphi survey.

<table>
<thead>
<tr>
<th>Step 1</th>
<th>Step 2</th>
<th>Step 3</th>
<th>Determining the final survey item</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open Question by e-mail</td>
<td>Inquiries about survey items by e-mail</td>
<td>telephone conversations and face-to-face interviews</td>
<td></td>
</tr>
</tbody>
</table>

It is the same as the general expert judgment technique to calculate the cost by placing importance on experience when selecting experts. However, Delphi techniques use coordinators so that experts are not affected by prejudice or mood. First, 30 elected NCO were asked by open questions if there were any obstacles to the NCO exercising their field leadership by using social media such as text messages, e-mail, Kakao Talk, Facebook, and Instagram. As shown in the following Table 4.

Table 4. Open survey results summary.

- When selecting NCO, it is necessary to increase the barriers to entry into the military by strengthening evaluation criteria such as personality, group spirit, and military expertise(ex. police officer, fire fighter).
- A more professional and systematic leadership education is needed in a training institution.
- As more and more people lack mannerism and active-moving as they settle for a period of stagnation in promotion of bosses and promotion of master sergeant, the overall perception of NCO is getting worse.
- There are many NCO who have no expertise in their duties. Efforts are needed for self-development.
- NCO should try to become complementary to each other from their relationship with officers, and it is necessary for officers to respect NCO as colleagues.
- Field leadership training is required to suit the reality of field units.
- Receive unilateral instructions from an officer and passive-moving only because he does not have the right to make decisions.
- The workload of NCO has become exorbitant, and the authority and responsibility are granted, but in the end, if problems arise, the NCO who is fully responsible for the work must take responsibility.
In some cases, officers look down on NCO as subordinates and ignore them to prevent NCO from exercising their abilities. To accomplish a mission, one orders emotionally, with one’s rank ahead rather than rational judgment.

It is urgent for NCO to take responsibility and prepare the atmosphere and conditions in which they can perform their duties.

Under the pretext of being a NCO, the work has only increased, causing more stress.

First, the opinions of each of the various experts (selected 30 NCO) were collected and aggregated. The results were then communicated to everyone so that they could share and iron out differences. At this time, the adjustment process is not limited to one time, but the same process is repeated several times, and if the result (cost) is finally matched, it is calculated as development cost. Quantitative and qualitative assessments were also conducted so that opinions on the field could be heard, not finished in a one-dimensional survey. Through this, the contents of the survey were questioned without any doubt, and the interview was conducted honestly.

In the second survey, a large factor was selected based on the results of the first survey and detailed factors were selected accordingly. However, this time, experts began to react negatively to the term 'Obstruction factor' as an optional survey was conducted.

Since all experts have served in the military for more than 15 years, they preferred more positive expressions because of their inherent organizational characteristics and conservative tendencies. As a result, all the questions were inevitably changed to positive ones, and the survey was repeated to develop the items.

What was a bit disappointing was that all the experts are working in their current positions, so gathering in one place is practically limited. As a result, the survey was compiled through social media and phone calls, so it is also informed in advance that sufficient communication between each other has not been achieved.

As a result, three major factors and nine lower fields were selected to apply the AHP technique, as shown in <Table 5> below.

Table 5. Setting up survey items for applying AHP method.

<table>
<thead>
<tr>
<th>Major factors</th>
<th>Lower fields</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Complementing the selection and training system</td>
<td>1.1 Personality tests and selection criteria between NCO should be raised.</td>
</tr>
<tr>
<td></td>
<td>1.2 The link of leadership education in the training course should be maintained.</td>
</tr>
<tr>
<td></td>
<td>1.3 Classes shall be added to promote job satisfaction.</td>
</tr>
<tr>
<td>2. Leadership capacity enhancement</td>
<td>2.1 Voluntary efforts are needed to develop leadership competencies.</td>
</tr>
<tr>
<td></td>
<td>2.2 Opportunities for communication between the higher and lower ranks shall be provided.</td>
</tr>
<tr>
<td></td>
<td>2.3 Leadership opportunity education should be expanded to suit field conditions.</td>
</tr>
<tr>
<td>3. Organizational culture improvement</td>
<td>3.1 Appropriate authority shall be granted according to responsibility.</td>
</tr>
</tbody>
</table>
3. Selection of Analysis Factors Applied by Delphi Method

3.1. AHP research model and hierarchy design

The research model for analyzing the factors of field leadership facilitation of NCO is shown in <Figure 1>. The research model determined three areas of the system as the dominant factors through expert recognition surveys using Delphi techniques.

In hardware, selection of adverts and strengthening of the training system through strict enforcement of laws, systems and regulations was selected. In software, valued 'strengthening the field leadership capacity of NCO through self-effort, opportunity education was selected. Lastly, in Orgaware, substantial improvement to the army's organizational culture was the dominant factor in facilitating the leadership of NCO.

Figure 1. NCO’s field leadership promotion research model.

![Figure 1](image)

Based on these structured research models, the hierarchy, according to the Analytical Hierarchy Process (AHP) for factor analysis that promotes the on-site leadership of NCO, is shown in <Figure 2>.
Analyzing experts’ surveys in the exercise of field leadership is divided into three categories, as shown above. The major factors, divided into three, is again divided into three lower fields.

The first is complementing the selection and training system in the hardware section. The lower fields resulted in the addition of classes for job satisfaction, the link between a personality test and selection criteria, and leadership education. In particular, the addition of classes for job satisfaction has raised concerns about identity due to the current four-tier NCO hierarchy. In addition, there was a qualitative assessment that the job satisfaction level was significantly reduced because there were no more goals after the promotion of the master sergeant.

The second is the leadership capacity enhancement in the software section. The lower fields resulted in the need for voluntary efforts of NCO, active communication between colleagues, and Expanding Training for Leadership in Field Troops. What is noteworthy here is that voluntary efforts by NCO are needed. It is to recognize the internal problems by itself and emphasize those NCO should change themselves.

The third is the improvement of the organizational culture in the army in orgaware section. The lower fields resulted in the need to give proper authority according to responsibility, guarantee self-directed working conditions, and relieve stress on excessive work. The main point is that responsibilities should be appropriately empowered. In other words, the right should be adequately given so that leadership can be exercised through more effective mission execution.

3.2. Analysis results of AHP method

The AHP analysis results on the facilitation factors of NCO’s field leadership are shown in Table 6. In the AHP survey, all 30 people were reasonably assessed to have a CI value of less than 0.1.

In the major factors, the highest opinion was orgaware that there was a need for substantial improvement in the army’s organizational culture. The factors of complementing the selection and training system in hardware was next, and the field leadership capacity of NCO in software was relatively low.

The specific importance of each field is as follows.
The highest weighting was the opinion that the NCO in (2) software should make efforts to develop their leadership capabilities. It can be seen as a concern about the tendency of N-generation that NCO (mostly beginners) neglect self-development during work or after work, rather than developing the counseling and combat skills necessary for field leadership.

<table>
<thead>
<tr>
<th>Table 6. Weight by assessment item.</th>
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<tbody>
<tr>
<td>Tasks</td>
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<tr>
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<tr>
<td><strong>Major factor</strong></td>
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<td></td>
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<tr>
<td><strong>Hardware field (1)</strong></td>
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<td><strong>Software field (2)</strong></td>
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<tr>
<td><strong>Orgaware field (3)</strong></td>
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The second-highest weighting item is the (3)orgaware. It means that before the NCO are held accountable for the consequences, they should first look at whether the authority to follow the responsibilities has been properly granted. A group of experts said that NCO are perceived as "responsible but not authorized." Therefore, officers should be able to properly empower in line with the position and duties of the NCO. It is necessary to ensure that the NCO can take the lead in his work to suit the role of a follower.

The third highest weighting item is (1)hardware. The plan to increase the current four-tier to the five-tier class system was the highest to resolve the long-term stagnation within the classes and to motivate the job. The plan was an issue that was actively reviewed by the military, but it was a pending policy due to difficulties securing the budget and lack of consensus.

Priorities on items that may facilitate the exercise of field leadership by NCO are shown in Table 7.

<table>
<thead>
<tr>
<th>Table 7. Priority by assessment item.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evaluation item</td>
</tr>
<tr>
<td>---</td>
</tr>
<tr>
<td>1 3.1 Appropriate authority shall be granted according to responsibility.</td>
</tr>
<tr>
<td>2 1.3 Classes shall be added to promote job satisfaction.</td>
</tr>
</tbody>
</table>
Each of the three major factors was weighted individually. Therefore, the total of nine fields of groups were not ranked among all nine, but weighted in the major factors so that they could be ranked from 1st to 9th.

The overall order of items was identified in order of appropriate authorization, the addition of rank, and voluntary self-development. It is essential to give proper authority to the NCO who exercises field leadership. In order for NCO to carry out their duties with a sense of ownership, proper authorization of responsibility should come first before holding them accountable for the consequences.

NCO may easily fall into mannerism and passively perform his duties due to his long-term work in a position in a unit. In order to improve the unique working environment of NCO, structural systems are needed, and measures and efforts must be taken to overcome these problems themselves.

Realistically, the military's unique culture, which values results rather than process, will not change easily. Also, noteworthy here is the fourth-place factor. When selecting NCO in the hardware field, the opinion that personality tests and selection criteria need to be raised is thought to require in-depth consideration.

4. Conclusion and Implication

Today, NCO's status has improved a lot compared to the past, including job security, academic background and so on. Many improvements have been made in salary, pension system, and residential environment, and NCO have also increased their knowledge levels, mostly college graduates. It is no longer difficult to find someone with a master's degree or doctorate. Despite the considerable number of highly educated personnel, 'What does it mean that we need to test our personality and raise selection criteria for the selection?'

The army is a group with a particular purpose of national defense, an organization that requires obedience to orders, community consciousness, strong will to fight, and sacrifice. Some so many people cannot quickly adapt to the military amid a clear gap from the rapidly changing society in modern times. Therefore, the field leadership of NCO should be dealt with deeply and in-depth research and countermeasures will be needed in conjunction with the progress of NCO Comprehensive Development 2.0

The significance and limitations of the research are rapidly spreading to the military the advanced technologies of AI+ICBMS in the fourth industrial revolution amid the high interest of Defense Reform 2.0. Interest in field leadership of NCO with soldiers is also rising due to troop reductions, shorter service periods, the importance of life, and the advent of hyper-connected societies. With the population cliff emerging as a serious social issue in recent years, indeed, interest in 'NCO Comprehensive Development 2.0' is not high compared to the Defense Reform 2.0[14][15]. NCO Comprehensive Development 2.0 is a crucial project that has long been pursued in conjunction with reducing troops due to the population cliff, the development of defense technology in the era of the fourth industrial revolution, and the enhance-
ment of NCO’s expertise, and the improvement of service conditions. Nevertheless, little progress has been made until recently in expanding the number of NCO, developing leadership, and specialization under the NCO Comprehensive Development 2.0[16][17][18][19][20][21].

In this study, it has been surveyed the factors that impede the field leadership of NCO in the rapidly changing environment. We examined the expert group’s perception of how to promote the field leadership exercise of NCO. A group of experts for the survey was selected from among NCO who served as soldiers and served in the military for more than 15 years as experienced leaders, including squad leaders, deputy commanders, and company commanders.

The survey items were conducted with open and optional questions by applying Delphi techniques, and quantitative analyses were conducted throughout three stages. Furthermore, qualitative analysis was added to the listener’s opinions.

Additionally, we examined the expert group's perception of how to promote the field leadership exercise of NCO. A group of experts for the survey was selected from among NCO who served as soldiers and served in the military for more than 15 years as experienced leaders, including squad leader, platoon leader and company commander.

The survey items were conducted with open and optional questions by applying Delphi techniques, and quantitative analyses were conducted for three stages. Furthermore, qualitative analysis was added to the listener's opinions.

5. References

5.1. Journal articles


5.2. Thesis degree


5.3. Books


5.4. Conference proceedings


6. Appendix

6.1. Authors contribution

<table>
<thead>
<tr>
<th>Initial name</th>
<th>Contribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lead Author</td>
<td>DGL</td>
</tr>
</tbody>
</table>
| Corresponding Author* | SIP | -Set of concepts☐
|                |              | -Design ☑
|                |              | -Getting results ☑
|                |              | -Analysis ☑
|                |              | -Make a significant contribution to collection ☑
|                |              | -Final approval of the paper ☑
|                |              | -Corresponding ☑
|                |              | -Significant contributions to concepts, designs, practices, analysis and interpretation of data ☑
|                |              | -Participants in Drafting and Revising Papers ☑
|                |              | -Someone who can explain all aspects of the paper ☑
|                |              | -Getting results ☑
|                |              | -Analysis ☑
|                |              | -Play a decisive role in modification ☑
| Co-Author     | YSL          |

*Corresponding Author*