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KIND-TIME ANALYSIS OF INFORMATION FOR THE LEARNING AND IMPLEMENTATION OF THE EXPERIENCE IN THE PREPARATION AND USE OF SUB-UNITS OF THE ARMED FORCES OF UKRAINE

Abstract. The **subject matter** of the article is transformation of information during combat sustainment at the tactical level. The **goal** of the study is to develop the method of collecting primary information is at the tactical level of the system of learning and implementing the experience of training and application of units of the Armed Forces of Ukraine. **The tasks** to be solved are: according to the main points of information theory to analyze the information of the learning and implementing the Armed Forces of Ukraine experience system and to assess the level of its qualitative characteristics; based on the analysis of the functional information transformation during combat sustainment in the observation plan to identify flows by kind of information; to formalize the mechanism of information transformation in the learning and implementing experience system according to the "black box" principle; to develop a sample questionnaire to answer the collection of primary information located at the tactical level of the learning and implementing the Armed Forces of Ukraine experience system. General scientific and special **methods** of scientific knowledge are used. The following **results** were obtained: Estimates of qualitative characteristics were calculated to determine ways of improvement the quality indicators of information circulating information in the learning and implementing the Armed Forces of Ukraine experience system. On the analysis of the functional transformation of the combat sustainment information in the observation plan the kinds of information were defined, namely the mechanism of transformation of information in the system was formalized according to the "black screen" principle. A toolkit in the form of detailed survey sheets was developed to collect the primary information at the tactical level of the learning and implementing the Armed Forces of Ukraine experience system and made it possible to increase estimates of qualitative characteristics about three-four times. **Conclusions.** Consideration of the system of learning and implementation of the experience of training and application of the Armed Forces from the point of view of the main provisions of the theory of information will allow to increase the effectiveness of the procedure, to determine the ways of improving the indicators of the quality of information. To improve the quality of incoming primary information in the learning and implementing the Armed Forces of Ukraine experience system, it is considered appropriate to develop tools for its collection in the form of detailed questionnaires. Information for the s learning and implementing experience system on the way of transformation is subjected to a procedure of certain unification, transformation and further separation according to functional characteristics for analysis. The process of preparing and conducting a battle in this case can be considered as a "black box", which directly forms the experience.

Keywords: learning and implementing the Armed Forces of Ukraine experience system; information theory; combat operations sustainment.

Introduction

Formulation of the problem and research tasks. The learning and implementation of the experience (LIE) of the preparation and application of the Armed Forces of Ukraine is absolutely necessary for identifying patterns and trends in the development of military art, the practice of military operations and making recommendations to commanders (chiefs) regarding the development of the Armed Forces, other components of the defense forces of the state, improving the order of their combined preparation and conduct of joint operations (combat operations) [1,2].

The most time-consuming is the collection of primary information, which is at the tactical level of the LIE system. Direct participants in hostilities are involved in the collection of this information, which causes certain difficulties. And if it is technically possible to find means to preserve information in the field, then the occurrence of psychological "blocks" significantly reduces the level of relevance, completeness, reliability and adequacy of information. In any case, the learning of experience begins with obtaining certain a posteriori information and involves its processing.

Analysis of recent research and publications related to the above-mentioned issues proves the relevance of the research.

The governing documents define the general order of activity of military organizational structures regarding the learning and implementation of experience, the terminology of the process of information and data collection is defined. However, it is advisable to continue the development of a toolkit that would provide sufficient completeness of information for decision-making, allow answering relevant questions and evaluate the results of collected and summarized information [1-6].

Thus, the task of improving the efficiency of the procedures of the LIE system process and determining ways to improve the quality of information circulating in the system is **relevant**.

The **goal** of the learning is to develop the method of collecting primary information is at the tactical level of the system of learning and implementing the experience of training and application of units of the Armed Forces of Ukraine.

This goal defined the following research **tasks**:

- according to the main points of information theory to analyze the information of the learning and

implementing the Armed Forces of Ukraine experience system and to assess the level of its qualitative characteristics;

- based on the analysis of the functional information transformation during combat sustainment in the observation plan to identify flows by kind of information; to formalize the mechanism of information transformation in the learning and implementing experience system according to the "black box" principle;

- to develop a sample questionnaire to answer the collection of primary information located at the tactical level of the learning and implementing the Armed Forces of Ukraine experience system.

Main material

1. Analysis of information on the system of learning and implementation of experience (LIE) and assessment of its quality characteristics. The possibility and effectiveness of using information is determined by its following qualities:
- meaningfulness,
- representativeness,
- sufficiency,
- reliability,
- relevance,
- stability,
- relevance,

which directly depend on the chosen method of collecting and forming information. According to the main provisions of information theory [7, 8], any information is characterized by the following general features:
- place of occurrence: incoming/outgoing;
- processing stage: primary / secondary / intermediate / final;
- display method: text /graphic;
- stability: current/constant;
- management functions: planning / reference / accounting / etc.

At the stages of description and observation of the procedure (description of the problematic issue, content of the observation, conclusions, recommendations), the LIE will use the results of a survey of participants in the events, so that LIE information can be classified as incoming, primary, text / graphic / sound.

Since such LIE information is a posteriori in relation to the experience itself, that is, the stages of learning and implementing the experience are chronologically deferred its stability does not have a significant impact on quality. It should be noted that the LIE information management functions are specific to the assigned tasks and will be discussed below.

Let's consider the main characteristics of this information.

The relevance of information is determined by the preservation degree of its value at the time of use and depends on the dynamics of changes in its characteristics and the time interval that has passed since the occurrence of this information.

Taking into account the chronology of the experience introduction and decision-making and its

implementation, the relevance of information in the LIE system is preserved during its passage through the system.

Similar conclusions can be drawn about the *timeliness* of information for the LIE system.

The content of information is determined through the informativeness coefficient characterized by the ratio of the amount of syntactic information (according to Shannon) to the total amount of data.

$$Y = \frac{I}{V_d} \qquad (1)$$

where I − amount of syntactic information; V_d − the total amount of data.

The research results indicate an extremely low coefficient of informativeness of the primary input LIE information.

Thus, the difference $V_d \backslash I$ mainly contains subjective assessments and an emotional description of accompanying actions. First of all, this is due to psychological factors and the personal perception of hostilities by their direct participants and requires both additional resources for its processing and drawing conclusions and more careful planning of the learning of experience.

The *representativeness* of information is related to the correctness of its selection and formation for the purpose of adequate collection of information, in particular, on issues of the LIE. Violation of representativeness of information often leads to its errors.

The most important in this case are:
- the correctness of the concept, taking into account which the original concept was formulated;
- the validity of the selection of essential features and connections of the phenomenon being displayed.

Ensuring representativeness at the tactical level of the LIE system requires the development of high-quality tools for its collection. In particular, determine the volume and content of information of this level in accordance with the structure of the subjects of the LIE system at the observation stage.

The *relevance* of information, which is generally understood as the presence of a connection with the problem and the ability of information to contribute to the process of understanding the problem, in the LIE system can be ensured by the development of tools for active collection, in particular, careful detailing of LIE planning.

According to the study, the *stability* of incoming primary information is high (up to 90%). When obtained from different sources, the information is almost identical. This quality indicator correlates with its sufficiency at the collection stage.

Sufficient (complete) information contains a minimum, but sufficient composition for making the right decision.

The concept of completeness of information is related to its content (semantics) and pragmatics. As incomplete, insufficient for making the right decision, and excessive information reduces the effectiveness of the decisions made. Insufficient information is

characterized by low stability, since its entropy creates a "broken phone" during transformation.

For the effective implementation of experience, the *availability* of information to perception is proposed to be ensured by the implementation of appropriate procedures for its acquisition and transformation. This is achieved, in particular, by matching its semantic form at the stage of learning the experience with the thesaurus at the stage of implementing the experience.

The *accuracy* of the information is determined by the degree of closeness of the received information to the real state of the object, process, phenomenon, etc. By analogy with the above, the accuracy of LIE information a qualitative detailing of the information collection plan should contribute.

The *reliability* of information is determined by its ability to reflect real objects with the necessary accuracy.

 The reliability of the information is measured by the confidence probability of the required accuracy, that is, the probability that the value of the parameter displayed by the information differs from the true value of this parameter within the required accuracy. From the point of view of the LIE procedure, the reliability of input information can be increased by summarizing it. Information comes from different sources in different formats, with varying degrees of subjective perception and processing quality.

The input information is responsible for conveying the main details of the problem, as it is possible to be careful, with which detailing, the caution is behind the scheme "who?, what?, when?, where? and why?" guilty but sufficient for further analysis.

Also, in order to improve the quality of the input primary information in the LIE system, it is important to expand the toolkit and select from looking at detailed information archways.

2. Functional transformation of information during operations combat sustainment. In order to characterize the LIE information according to its functional capabilities, it is advisable to consider its transformation during combat operations combat sustainment.

According to the main provisions of the Charter of the Ground Forces [9], the combat operations combat sustainment consists in organizing and implementing measures aimed at creating favorable conditions for the troops to fulfill their tasks.

The combat sustainment is carried out continuously both during the preparation and at the start of the battle.

The combat operations combat sustainment involves a combat, logistical, medical and moral and psychological component.

In view of the above, information in these areas is a priori regarding the battle itself as an event at the stage of its preparation and conduct, and a posteriori at the stage of the execution of the at the stage of primary information collecting in the LIE system (Fig. 1).
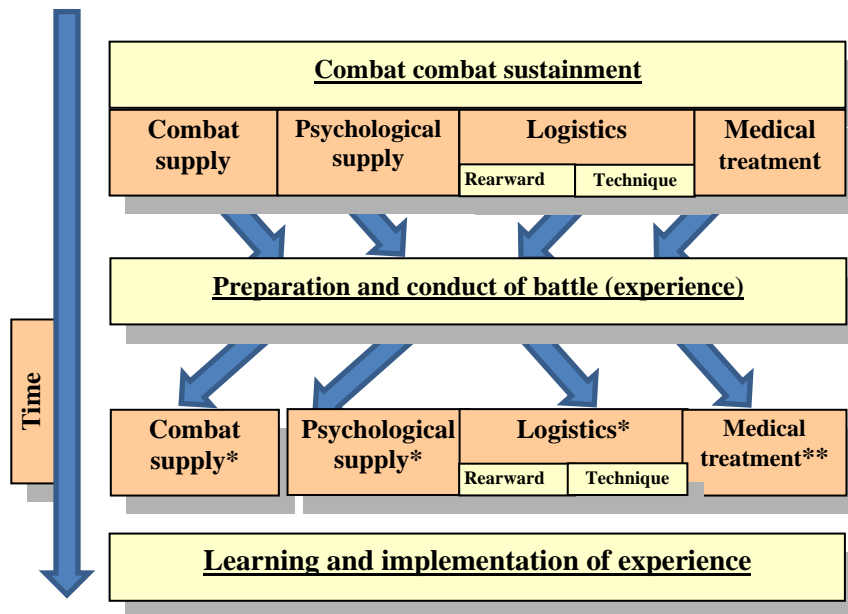

Fig. 1. Functional transformation of information during operations combat sustainment

In this regard, the authors propose to carry out a kind-time analysis of the information of the Ministry of Internal Affairs, namely: to distinguish in the plan of observation (collection of information) flows by kinds of information: combat, logistical (in particular, technical), psychological (moral-psychological), medical.

So, as can be seen from the figure, the information for the LIE system on the way of transformation is subjected to the procedure of certain unification, transformation and further separation according to functional characteristics for analysis [9].

3. The mechanism of information transformation in the LIE system according to the "black box" principle. The process of preparing and conducting a battle in this case can be considered as a "black box" directly forms the experience. In this case, the a priori information Q can be presented as a set

according to the kinds of information:

$$Q = \left\{ Q_c, Q_{ps}, Q_l, Q_{med} \right\}, \qquad (2)$$

where Q_c − a priori information on the combat support of the battle;

Q_{mp} − a priori information of moral and psychological support of the battle;

Q_l − a priori information on logistics of the battle;

Q_m − a priori information of combat medical treatment.

In relation to the "black box", this information will be input (Fig. 2).

By analogy, we introduce a set of a posteriori information:

Q'_c − a posteriori information regarding the combat support of the battle;

Q'_{mp} − a posteriori information of the moral and psychological support of the battle;

Q'_l − a posteriori information on logistical support of the battle;

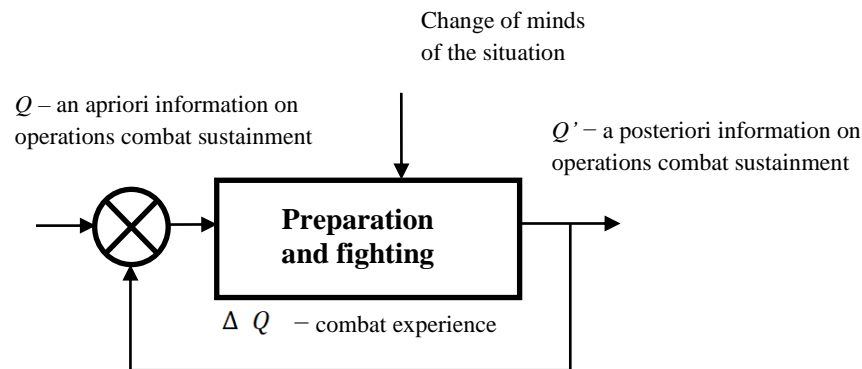Q'_m − a posteriori information on combat medical treatment.

Fig. 2. The mechanism of information transformation in the LIE system according to the "black box" principle

It is natural to assume that the information on the comprehensive support of the battle before Q and after Q' preparation and conduct of this battle will differ.

Proceeding from this, the experience will consist in the analysis of the results when the conditions of the situation change. Thus, the functioning of the LIE system can be represented as a classic "black box" with negative feedback (combat experience) and external influence changing of minds of the situation [10].

4. Survey sheets for the collection of primary information of the tactical level of the LIE system the Armed Forces of Ukraine experience system. To improve the quality of information, an effective method is to use questionnaires, the answers to which will chronology events at the elementary-tactical level.

For example, in order to generalize the combat experience of the Military Institute of Tank Troops of the National Technical University "Kharkiv Polytechnic Institute" involved in the defense of the city of Kharkiv, the direct participants were asked to consider a small tactical episode (street, district, building) and answer the following questions:

- what was the situation (situation)
- the number of your own/enemy's forces, their movement routes;
- what was the task of the unit;
- how the task was solved;
- what problematic issues (extraordinary situations) were (occurred),
- what decisions were made, the effectiveness of the decisions made,
- to recommend now (conclusion from this situation);

- general recommendations for actions in this situation (to fulfill the assigned task);
- how was the communication with the senior headquarters, with the subordinate, with neighboring (interacting) units; by which means: radio stations, lights, code words, signals, etc.

With the help of the survey sheet, the procedure of collecting information was simplified, and the quality of the received information increased [11].

The intermediate results of the research showed a low coefficient of informativeness of the primary input information - approximately 11% (Fig. 3, a).

Well, the participants of the events tell a lot of things that are not directly related to the preparation and fighting ("we lost the laptop", etc.).

It was not trivial to determine the volume and content of information for a specific narrator - in the best case, the information was organized chronologically.

Meanwhile, when received from different sources, almost identical information about the situation was obtained.

After collecting information with the help of such questionnaires, it became possible to divide this information according to the functional. The quality of information obtained from questionnaires has improved significantly, the informativeness ratio has increased to 57% (Fig. 3, b).

This conclusion is illustrated by the results of comparisons of the information content coefficients of the observation plan in accordance with the combat operations sustainment functional.

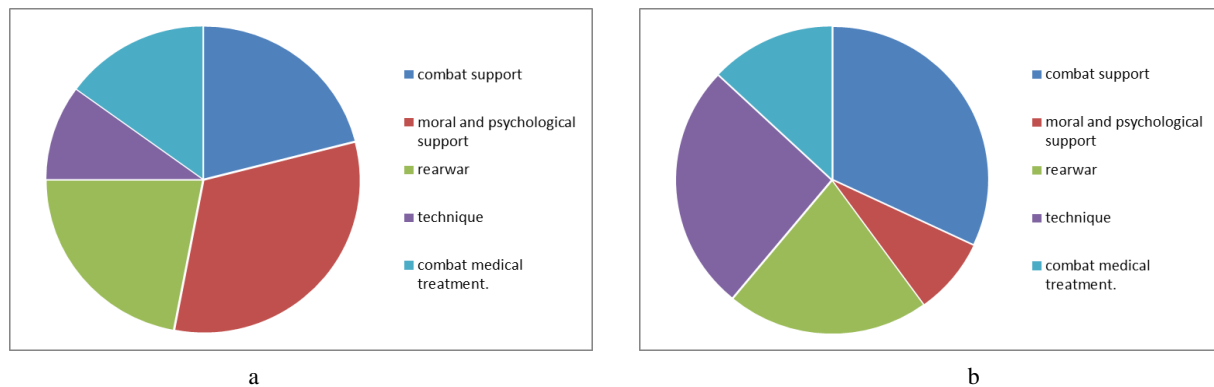So, the informativeness coefficient of technical support data has significantly increased.

a	b

Fig. 3. Informativeness coefficients of the observation plan in accordance
with the combat operations sustainment functional

It should be noted that the coefficient of informativeness of the data of the Ministry of Internal Affairs regarding moral, psychological and rear support has decreased.

Conclusions

1. Consideration of the system of learning and implementation of the experience of training and application of the Armed Forces from the point of view of the main provisions of the theory of information will allow increasing the effectiveness of the procedure, to determine the ways of improving the indicators of the quality of information.

2. To improve the quality of incoming primary information in the learning and implementing the Armed Forces of Ukraine experience system, it is considered appropriate to develop tools for its collection in the form of detailed questionnaires.

3. Information for the s learning and implementing experience system on the way of transformation is subjected to a procedure of certain unification, transformation and further separation according to functional characteristics for analysis.

The process of preparing and conducting a battle in this case can be considered as a "black box", which directly forms the experience.

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**Видово-часовий аналіз інформації для вивчення та впровадження досвіду
підготовки і застосування підрозділів Збройних Сил України**

О. В. Серпухов, О. А. Макогон, О. П. Клімов, О. В. Ісаков, І. О. Ковальов, Л. В. Маєр, Т. В. Лаврут

Анотація. Предметом вивчення в статті є перетворення інформації при всебічному забезпеченні бою на тактичному рівні. **Метою статті є** розробка методики збору первинної інформації, яка знаходиться на тактичному рівні системи вивчення і впровадження досвіду підготовки і застосування підрозділів ЗС України. **Завдання дослідження**: з точки зору основних положень теорії інформації провести аналіз інформації, яка циркулює у системі вивчення і впровадження досвіду (ВВД) та оцінити її якість; на основі аналізу функціонального перетворення інформації при всебічному забезпеченні бою виділити у плані спостереження (зборі інформації) потоки за видами інформації; формалізувати механізм перетворення інформації у системі ВВД за принципом "чорної скрині"; розробити зразок опитувального аркуші для збору первинної інформації, яка знаходиться на тактичному рівні системи ВВД підготовки і застосування Збройних Сил України. Методологічною основою дослідження стали загальнонаукові та спеціальні **методи** наукового пізнання. **Отримані наступні результати:** Обраховані оцінки якісних характеристик для визначення шляхів удосконалення показників якості інформації, яка, циркулює в системі вивчення та впровадження досвіду Збройних Сил України. На основі аналізу функціонального перетворення інформації при всебічному забезпеченні бою у плані спостереження були виділені потоки за видами інформації, а сам механізм перетворення інформації у системі ВВД був формалізований за принципом "чорної скрині". Для збору первинної інформації на тактичному рівні системи ВВД Збройних Сил України було розроблено інструментарій її збору у вигляді детальних опитувальних аркушів, що дозволило підвищити оцінки якісних характеристик приблизно в три-чотири рази. **Висновки.** Розгляд системи вивчення і впровадження досвіду підготовки та застосування Збройних Сил з точки зору основних положень теорії інформації дозволить підвищити ефективність процедури ВВД, визначити шляхи вдосконалення показників якості інформації. Для підвищення якості надходження до системи ВВД первинної інформації доцільно розробити інструментарій її збору у вигляді деталізованих опитувальних аркушів. Інформація для системи ВВД на шляху перетворення піддається процедурі певного об'єднання, трансформації та подальшого розділення за функціональними ознаками для аналізу. Процес підготовки та ведення бою в цьому випадку можна розглядати як "чорну скриню", яка безпосередньо формує досвід.

Ключові слова: система вивчення і впровадження досвіду підготовки та застосування Збройних Сил; теорія інформації; всебічне забезпечення бою.