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## THE DEVELOPMENT OF MODEL FOR REFLEXIVE DETERMINATION BEHAVIOR STRATEGIES BASED ON SWOT AND TOWS ANALYSIS

The article considers develop of model for reflexive determination of behavior strategies based on SWOT and TOWS analysis that can be used as a theoretical basis for planning information operations

**Keywords:** information operations, swot and twos analysis, strategic planning.

### Introduction

**Formulation of the problem in general.** One of the components for modeling process and information operations planning is to define the tasks of information influence of the fighting parties. Research in this area suggests that important is a development of a mathematical model of reflexive formalization of information representations of fighting parties about their behavior based on strategic analysis models. The classical models of SWOT and TOWS analysis didn't take into account the strategic nature of information reflexive influence between two fighting sides and now in need of further theoretical development [1 –4].

**The purpose of the article** is to develop a model for reflexive determination of fighting parties behavior strategies based on SWOT and TOWS analysis in the information confrontation.

### Statement of Materials Research

Methods of strategic analysis are ones of the approaches of formalization decision-making processes at the strategic level. The best known are two types of strategic analysis: SWOT and TOWS analysis [5, 6].

The essence of SWOT-analysis is to formalize all the factors and events that affect the decision-making process of party A on 4 categories: strengths of player A ( $S_A$ ), weaknesses of player A ( $W_A$ ), opportunities of player A ( $O_A$ ) and threats of player A ( $T_A$ ). Opportunities and threats of player A are characterized by external factors of the environment, and it can not be controlled by the object of research.

The combination of strengths, weaknesses, opportunities, and threats of player A formalized as a SWOT analysis model ( $M_A^{SWOT}$ ). It is a representation of information views of player A from player A point of view.

To formalize the possible behavior strategies of player A and evaluating the moving ways from one state to another used the TOWS analysis. It formed the model of TOWS analysis for player A ( $M_A^{TOWS}$ ). In general, the model to determine the next behavior strategies of player A is presented on Fig. 1.

		External factors	
		Opportunities of player A ( $O_A$ )	Threats of player A $T = \{T_1, T_{N_T}\}$
Internal factors	Strengths of player A ( $S_A$ )	Strategies of $SO_A$ type of player A	Strategies of $ST_A$ type of player A
	Weaknesses of palyer A ( $W_A$ )	Strategies of $WO_A$ type of player A	Strategies of $WT_A$ type of player A

Fig. 1. The classic TOWS analysis model of information views for player A

1. Player A strategies aimed at using strengths to get the best results from existing opportunities (strategies of  $SO_A$  type).

2. Player A strategies aimed to use strengths to minimize threats (strategies of  $ST_A$  type).

3. Player A strategies aimed at minimizing weaknesses through the use of existing opportunities (strategies of  $WO_A$  type).

4. Player A strategies aimed at minimizing weaknesses and threats (strategies of  $WT_A$  type).

The formalization of interaction between two competitive players about information views of strengths, weaknesses, opportunities and threats of each player regarding himself and the opposing party using SWOT-analysis allows to create SWOT-analysis model ( $M_{A-B}^{SWOT}$ ). It has information about representations players relative strengths, weaknesses, opportunities and threats from the another player, which in general terms is as follows

$$M_{A-B}^{SWOT} = \{S_{A-B}, W_{A-B}, O_{A-B}, T_{A-B}\},$$

where  $S_{A-B}$  – views about strengths of player B from player A side;  $W_{A-B}$  – views about weaknesses of player B from player A side;  $O_{A-B}$  – views about opportunities of player B from player A side;  $T_{A-B}$  – views about threats of player B from player A side.

The following logical and semantic relationships between views of competing players about their strengths and threats, which show reflective nature of the processes of information confrontation were re-

vealed at the time of experimental verification the model:  $S_{B-A} = S_{A-A}$ ;  $T_{B-A} = T_{B-B}$ . Note that  $M_{A-A}^{SWOT}$  is a model of views player A about himself, and  $M_{A-B}^{SWOT}$  is a model of views about player B from player A side.

The formalization of interaction between two competitive players about information views of strategies of each player regarding himself and the opposing party using TOWS-analysis allows to create TOWS-analysis model ( $M_{A-B}^{TOWS}$ ). It has information about views of players on strategies of another player, which in general terms for player A is as follows

$$M_{A-B}^{TOWS} = \{SO_{A-B}, ST_{A-B}, WO_{A-B}, WT_{A-B}\},$$

where  $SO_{A-B}$  - views about strategies that aim to use strengths to maximize results from available opportunities of player B from player A point of view (strategies of SO type);  $ST_{A-B}$  - views about strategies that aim to use strengths to minimize threats from player B from player A point of view (strategies of SO type);  $WO_{A-B}$  - views about strategies that aim to use strengths to minimize weakness from available opportunities of player B from player A point of view (strategies of WO type);  $WT_{A-B}$  - views about strategies that aim to minimize threats and weaknesses from player B from player A point of view (strategies of WT type).

The following logical and semantic relationships between views of competing players about their behavior strategies, which show reflective nature of the processes of information confrontation were revealed at the time of experimental verification the model:

$$SO_{A-B} = SO_{B-B} \wedge \neg SO_{B-A};$$

$$ST_{A-B} = ST_{B-B} \wedge \neg ST_{B-A};$$

$$WO_{A-B} = WO_{B-B} \wedge \neg WO_{B-A};$$

$$WT_{A-B} = WT_{B-B} \wedge \neg WT_{B-A}.$$

Note that  $M_{A-A}^{TOWS}$  is a model of strategies views player A about himself, and  $M_{A-B}^{TOWS}$  is a model of strategies views about player B from player A side.

The generalized TOWS analysis model ( $\bar{M}_A^{TOWS}$ ) about views of player A is as follows

$$\bar{M}_A^{TOWS} = \{M_{A-A}^{TOWS}, M_{B-A}^{TOWS}\},$$

where  $M_{A-A}^{TOWS}$  - model of views about behavior strategies of player A about himself;  $M_{B-A}^{TOWS}$  - model of views about behavior strategies of player A from player B point of view.

## Conclusions

The developed models for reflexive determination behavioral strategies based on SWOT and TOWS analysis is theoretical basis for the development of proposals for planning information operations.

It is practical to use these model at the time of development mathematical and software for special information systems, expert decision support systems. It can be valuable for writing guidelines and documents of regulation policy for command and control departments.

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## РОЗРОБКА МОДЕЛІ РЕФЛЕКСИВНОГО ВИЗНАЧЕННЯ СТРАТЕГІЙ ПОВЕДІНКИ НА ОСНОВІ SWOT І TOWS АНАЛІЗУ

А.О. Феклістов

У статті розглядається розробка моделі для рефлексивного визначення стратегій поведінки на основі SWOT і TOWS аналізу, яка може бути використана в якості теоретичної основи для планування інформаційних операцій

**Ключові слова:** інформаційні операції, SWOT і TOWS аналіз, стратегічне планування.

## РАЗРАБОТКА МОДЕЛИ РЕФЛЕКСИВНОГО ОПРЕДЕЛЕНИЯ СТРАТЕГИЙ ПОВЕДЕНИЯ НА ОСНОВЕ SWOT И TOWS АНАЛИЗА

А.А. Феклистов

В статье рассматривается разработка модели рефлексивного определения стратегий поведения на основе SWOT и TOWS анализа, которая может быть использована в качестве теоретической основы для планирования информационных операций.

**Ключевые слова:** информационные операции, SWOT и TOWS анализ, стратегическое планирование.