

Innovative Algorithm for Simulated Learning Environment on Strategic Modeling on Technology New Ventures

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Abstract: - This paper aims presenting the results from a research on modeling of innovative simulated learning environment for strategic modeling as a part of the educational process on strategic management. This simulated learning environment is based on a research of innovative strategic modeling algorithms and includes innovative tools, classification framework, strategic modeling process and modified balanced scorecard model. The presented simulated learning environment is designed for education on strategic modeling, by presenting simulated learning environment of strategic modeling for technology new ventures. The presented in this paper algorithm can be used as a further basis for development of innovative e-system for e-learning (blended and distance learning), as well as it can be included in a complete simulated learning environment in the field of strategic management, containing all strategic management stages – strategic analysis, strategic modeling, strategy implementation, strategy execution and strategic control and evaluation, as a part of its second stage – strategic modeling.

Key-Words: - education; e-system; strategic; formulation; process; algorithm; tools; e-learning; distance learning.

1 Introduction

The education on strategy management has always been connected with usage of various tools at each of the strategic management stages - strategic analysis, strategy modeling (similar terms used: formulation, planning), strategy implementation, strategy execution and strategy control and evaluation stages.



Figure 1: General Strategic management process structure

The tools used in the educational process [3] are connected with the basic theoretical tools and processes in strategic management and education on the usage of the most widely spread software platforms for strategic management - BSC Designed, QPR, etc. Currently the most difficult part in the educational process on strategic management is the second stage of strategic formulation. Strategic formulation for technology new ventures is even more specific, due to the various needs and differences from general strategies formulation. All these points, together with the fact that currently strategy formulation's

specifics cannot be learned from using the software platforms [7], which are only tools in the strategic formulation, as well as the low number of available tools [2], specifically designed for strategic formulation for technology new ventures is supporting the need to further research the subject and develop suitable software systems [6] supporting the educational process on strategic formulation as part of the strategic management process.

2 Problem Formulation

Strategic management education consists of education on the five basic stages in strategic management. Each of these stages has its unique tools and processes, which are connected with different educational needs [4]. Currently the basic educational methods in strategic management are theoretical education on tools' structure, usage and application, as well as direct education on working with the different programs for strategic management [1], such as BSC Designed, QPR Designer, etc.

These existing programs all include the stages of strategic formulation, strategic implementation, execution and control and evaluation. Strategic

analysis is connected with a period before using the systems, and strategic modeling stage itself, included in the software platforms, is based on direct setting of the strategic goals for the company, without reference or directions in the process. For this reason, education on strategic formulation cannot be successfully implemented using only the existing strategic management systems, as well as only using the theoretical basic tools.

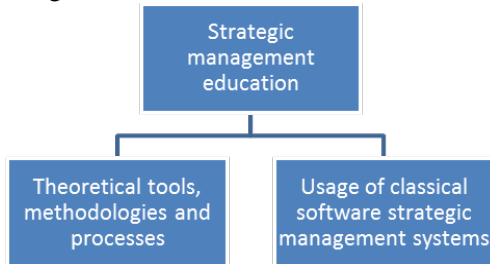


Figure 2: Strategic management education structure

This problem is even more persistent on educating strategic management for technology new ventures (technology startup companies). The theoretical basics are developed generally for all types of companies, which is not sufficient for the needs of the technology new ventures.

For this reason, an algorithm of a system is proposed in this paper, designed for education on strategic modeling, as part of the education on strategic management for technology new ventures.

The proposed paper includes the algorithm and work of the e-system, its automation and used processes, student's interaction with the system and the principles of education with the e-system in the educational process on strategy modeling as part of the education on strategic management.

3 Problem Solution

The proposed in this paper solution of the problem is connected with the future creation of strategic modeling educational system, designed for technology new ventures. The proposed in this chapter algorithm includes all developed for the needs of the system tools, processes and interconnections between the different elements of the system. The general steps in the process of strategic modelling for technology new ventures are defining the general steps in the process of education on strategic modelling for technology new ventures.

The general steps in the process of strategic modeling are:

(1) Results from using the strategic analysis tools for initial strategic analysis;

(2) Application of typological strategy classification;

(3) Overview of the developed typological strategies tables, designed through a modified for technology new ventures balanced scorecard model [5];

(4) Modelling of specific strategy by defining company-specific strategic data for the particular technology start-up company in the developed table;

(5) Defining specific steps and responsibilities for the developed strategy's further implementation process.



Figure 3: Strategic modeling process (overview).

The general steps in the process of education on strategic modeling for technology new ventures, which are part of the proposed algorithm are:

(1) Learning the entire process of strategic modeling steps; (see fig. 3.)

(2) Working on step 1: analyzing and applying results from the strategic analysis, implemented with strategic analysis tools are the first step of strategic management;

(3) Working on step 2: learning different basic types of strategies (typological strategies) for technology new ventures;

(4) Working on step 3: learning the process and strategy specific steps and tools in strategic modeling;

(5) Working on step 4: understanding tables of strategic choices;

(6) Working on step 5: learning additional steps for final defining of strategic choices and creating of company-specific strategies. (see figure 4 below text)



Figure 4: Educational process general steps

Following this overall educational process of the system, a detailed overview on each step is presented.

2.1 Entire process overview.

The presented process of strategic management (see figure 1), together with the presented overall process of strategic modeling (see figure 3) and the process of education on strategy modeling (see figure 4) are presented to the students, using the system, in order to have clear view on the strategic modeling basics.

2.2 Application of strategic analysis results.

The presented system is focused only on strategy modeling, but the close exchange of information with the previous and next stages in the strategic management process are influencing a lot on the process of strategy modeling. For this reason, an application of the strategic analysis results is the first step in the process. It is connected with gathering of essential information for the strategic analysis on several essential questions, connected with the product-market fit for the technology startup company and supports the initial process of identifying the basic characteristics of the company, according the classification model.

The first basic step from the algorithm at this stage is defining of company's classification based on the results from the previous stage of strategic management – strategic analysis (see 2.1.1.);

2.1.1 Defining of company's classification.

The defining of company's classification based on the results from the previous stage of strategic management – strategic analysis, includes the defining the following steps in the process:

- (1) defining of target market scope;
- (2) defining of level of market maturity;
- (3) defining of level of innovative potential of the new technology venture.



Figure 5: Process of strategic classification.

The values for each of the characteristics are chosen between the following:

- (1) target market scope = {"global"; "local"}
- (2) market maturity = {"new/emerging market"; "existing market"}
- (3) innovative potential of the new technology venture = {"innovator"; "follower"}

After implementing this step, eight possibilities of typological strategy choice are available.

2.3. Defining basic typological strategies.

At this stage of the educational system's process, a defining of typological strategy for the educational company is implemented. The process consists of two steps:

- (1) Choosing most appropriate typological strategy definition (see 2.3.1.);
- (2) Overview on the entire typological strategy classification and their typological strategy's definitions (correcting step) (see 2.3.2.);

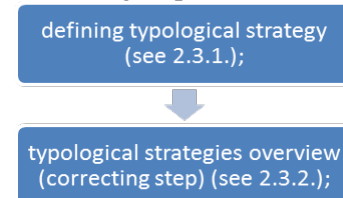


Figure 6: Choosing correct typological strategy steps.

2.3.1. Choosing most-appropriate typological strategy definition.

Following the defining of basic company's characteristics, a single choice of classification for the company should be made, according the following relations.

$$NVTs = f(IC, MS, MM)$$

Where NVTs is the technology new venture typological strategy, IC is the company's innovation capabilities (innovative potential of the new technology venture), MS is the market scope (target market scope) and MM is the market maturity. Each of these variables has two values, which defines a total of 8 typological strategies [8].

After identifying these characteristics, a knowledge checking and correcting step is implemented.

2.3.2. Typological strategies overview.

At this step a list of the definitions of all eight typological strategies is offered to the student. They should choose the one, which, according them, is most appropriate for the identified characteristics of the company. At the next correcting step of the process, the correct typological strategy is presented.

After choosing and confirming the correct typological strategy for the technology new ventures, a next step in the educational process is developing the typological and company-specific strategies from the students with the support of the system

2.4 Strategy formulation steps.

The basic steps in the strategy formulation process for the typological strategy are:

- (1) Defining key success factors (see 2.4.1.);
- (2) Defining strategic goals (see 2.4.2.);

- (3) Defining key performance indicators (see 2.4.3.);
- (4) Defining of typological strategic actions (see 2.4.4.).

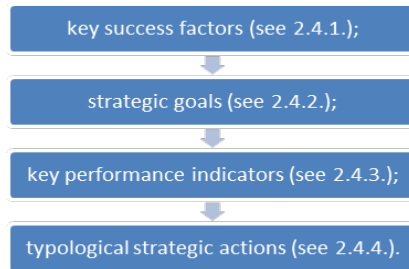


Figure 7: Strategy formulation process basic steps.

After defining all these elements, a table of strategic choices is introduced.

2.4.1. Defining key success factors.

The process of defining key success factors in the educational system consists of two steps:

- (1) Choosing most appropriate key success factors from the list of all key success factors from the developed typological strategies tables;
- (2) Overview of correct key success factors for the chosen typological strategy (correcting step).

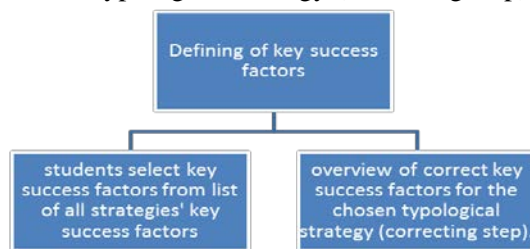


Figure 8: Defining of key success factors by students.

The process of education on corresponding to the strategy key success factors includes displaying of a list of all key success factors for all typological strategies, identified through research[8] and setting of system options for students, to make a choice amongst the displayed key success factors. A next correcting step is showing the correct for this typological strategy key success factors.

2.4.2. Defining strategic goals.

The process of defining strategic goals is following the key success factors and is directly connected with the defined key success factors. For each key success factor, one or more strategic goals are defined. The steps in this process are:

- (1) choosing most appropriate strategic goals from the list of strategic goals for all typological strategies, in order to successfully achieve the key success factors for the defined typological strategy;
- (2) overview of correct strategic goals for the chosen typological strategy (correcting step);

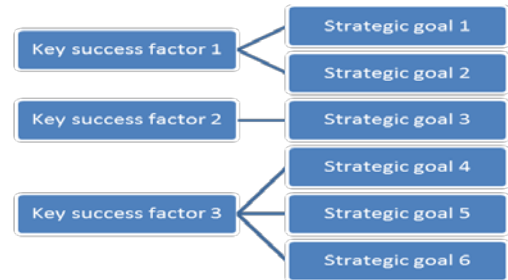


Figure 9: KSF and Strategic goals relations (structure)

The proposed algorithm is aiming training on identification of correct strategic goals for the particular typological strategy for the technology new ventures. In the proposed algorithm, the overview of the correct strategic goals and their relations with the corresponding key success factors is essential for the identification of general relations between these two factors.

Next step in the process is defining of suitable key performance indicators for the typological strategic set of choices.

2.4.3. Defining key performance indicators.

The educational process of defining key performance indicators includes:

- (1) Choosing most appropriate key performance indicators for successfully achieving the strategic goals from the list of all key performance indicators for all typological strategies;
- (2) Overview of the correct key performance indicators for the chosen typological strategy (correcting step);

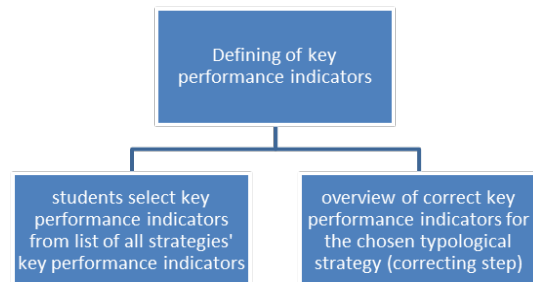


Figure 10: Defining of key performance indicators steps

Defining of key performance indicators is connected with the defining of leading and lagging indicators, according the perspective, to which a particular set of key success factors and corresponding strategic goals belongs to.

Key performance indicators are specifying the types of indicators, according which the future strategic control and evaluation is going to measure company success in reaching the defined strategic goals.

After choosing the most appropriate for each strategic goal, one or more key performance indicators, the student see the correct list of key

performance indicators for each of the elements of the table of strategic choices.

2.4.4. Defining typological strategic actions.

The defining of typological strategic actions is choosing types of actions for each chosen strategic goal, which will help company achieve its goals.

The full set of typological strategic actions and later described the company-specific strategic actions, described further in this paper will present the set of strategic choices and company's strategy itself.

The main steps in defining the typological actions are:

(1) Choosing most appropriate typological actions for successfully achieving the strategic goals from the list of all typological actions from the developed typological strategies tables;

(2) Overview of correct typological actions for the chosen typological strategy (correcting step);

For each strategic action, a minimum of one typological strategic action is chosen. These categories of typological actions are leading later to easier specifying of company-specific actions. The typological actions is describing a general type of actions, which should be implemented in order to achieve the corresponding strategic goals.

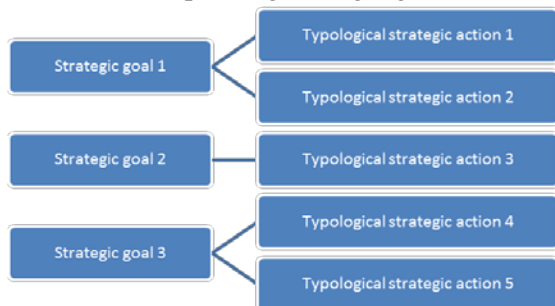


Figure 11: Strategic goals and Strategic actions relations

After all the typological strategic modeling steps are implemented, a table of strategic choices is presented as part of the algorithm.

2.5 Table of strategic choices.

The table of strategic choices is presenting all data from the previous steps of the process. The presented table includes the identified key success factors, typological strategic goals, key performance indicators and typological strategic actions.

TABLE I. TABLE OF STRATEGIC CHOICES (STRUCTURE).

Structure of the table of strategic choices for typological strategies			
Key success factors	Typological Strategic Goals	Key Performance Indicators	Typological Strategic Actions
Data*	Data*	Data*	Data*

*) Data is ordered according to the Balanced Scorecard Model

In the strategy formulation process a modified Balanced Scorecard Model for sustainable strategic development of technology new venture is used [8]. The used in this algorithm perspectives for the Balanced Scorecard Model are: financial perspective, client's perspective, product perspective, internal processes perspective and learning and growth perspective. All key success factors, strategic goals and other elements of the strategic table of choices are ordered according to these five categories.

TABLE II. TABLE OF STRATEGIC CHOICES (WITH BSC MODEL).

Key success factors	Strategic goals	Key performance indicators	General typological actions
<i>Financial perspective</i>			
data	data	data	data
<i>Clients perspective</i>			
data	data	data	data
<i>Product perspective</i>			
data	data	data	data
<i>Perspective Internal processes</i>			
data	data	data	data
<i>Perspective Learning and Growth</i>			
data	data	data	data

The presented typological strategy for technology new ventures is laying the basics of the further development of the strategy of the specific company, which is enriching and further specifying the strategic choices from the previous steps.

2.6 Define company-specific strategy.

The final step in the educational system for strategy modeling for technology new ventures is defining a specific strategy for the particular company. The specific for the company strategy distinguished from the typological strategy by its content and structure. The detailed table contents strategic choices, based on the typical for the particular typological strategy for technology new ventures, but also specific for the company strategic choices. The detailed table of strategic choices represents the strategy of the particular technology startup company. The process of specification of the company strategy includes:

(1) Defining of the specific target values for each key performance indicator;

(2) Defining of the specific actions for achieving the strategic goals, which are part of the general direction of the typological actions for the company.

(3) Specifying a team member responsible for successfully achieving each strategic action and target values;

(4) Overview of the ready table of strategic choices.

The ready table of strategic choices is the final step in the strategy modeling process. The table is

containing a detailed description of the strategy of the company, and its structure and data are offering a smooth transition towards the next step in the strategic management process – the stage of strategic implementation.



Figure 12: Defining of company specific strategy steps

The final table of company-specific strategic choices has the following structure.

TABLE III. TABLE OF COMPANY-SPECIFIC STRATEGIC CHOICES.

Key success factors	Strategic goals	KPIs	Target values	General typological actions	Specific strategic actions	Responsible person
<i>Financial perspective</i>						
data	data	data	data	data	data	data
<i>Clients perspective</i>						
data	data	data	data	data	data	data
<i>Product perspective</i>						
data	data	data	data	data	data	data
<i>Perspective Internal processes</i>						
data	data	data	data	data	data	data
<i>Perspective Learning and Growth</i>						
data	data	data	data	data	data	data

The developed in this process model of strategy is ready for application in the next stage of strategic management process – strategy implementation and for this reason, the proposed educational algorithm, designed for strategy modeling for technology startup companies is applicable also as a part of a wider educational framework on strategic management, or as a standalone tool for education on strategic modeling. It is providing education on all stages and elements in the strategic modeling process and is proposing an algorithm for education, combining theoretical knowledge application, as well as final creative steps on the ready company-specific table of strategic choices.

4 Conclusion

The presented algorithm is focused towards the strategic modeling process for technology new ventures, as part of the overall strategic management educational process. The algorithm is presenting innovative tools and processes for strategy modeling, as well as classification for typological

strategies for technology new ventures, a modified model of the balanced scorecard and innovative educational process on strategy modeling, including simulated learning environment, simulating actual strategy modeling process and correcting at each step the students propositions, while also introducing a creative options for final details and specifications in the development of the company-specific strategy for their technology new venture. The propose algorithm can be used on education for the different typological strategies from the presented classification and further it can be used as an educational tool for the stages of strategic modeling. The proposed algorithm may be used as a basis for further creation of a supportive educational e-system on strategy modeling, which can be used at all types of strategic management education – traditional (face to face) learning, blended e-learning and distance e-learning.

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