Algorithm for Innovative Educational E-System on Strategic Management for Technology New Ventures

Sia Tsolova, Sofia University "St. Kliment Ohridski", Bulgaria

The Asian Conference on Society, Education & Technology 2014
Official Conference Proceedings

Abstract
The goal of this article is to present the results from a research on strategy modeling for technology new ventures and the creation of an educational e-system used for education on strategy management and strategy modeling for students on entrepreneurship and entrepreneurs in technological sphere. The presented algorithm is based on research including: adaptation of the classical process of strategic management for technology new ventures; development of an innovative detailed process for strategic modeling for technology new ventures with development of all included sub steps and tools; development of strategic identifying and analyzing modeling canvas; modification of balanced scorecard model; application of 3-dimensional classification model of the basic typological strategies for technology new ventures and defining of the corresponding key factors of success, strategic threads, etc., based on research amongst 121 entrepreneurs in the technological sphere (107 from Bulgaria and 14 from other countries). The implemented educational e-system is designed specifically for education on strategic management in technology entrepreneurship. The algorithm of the e-system gives students and entrepreneurs the possibility to check their skills in strategy modeling by automated comparing of their results with the elaborated through the current research results for the different typological strategies for technology new ventures. The system also teaches students in the sequence of steps in the process of strategic management for technology new ventures. This article is describing the developed and implemented in the system algorithm, underlining processes, tools and interconnections, as well as the automation principles of work of the system and its applications.

Keywords: algorithm, innovation, process, education, strategy, management, modeling, technology, entrepreneurship, e-system.

1. Introduction

The education on strategic management is connected with various tools during all stages of strategic management – strategic analysis, strategic modeling, strategic implementation, strategic execution and strategic control and evaluation stages. The tools used in the educational process 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 Scorecard, etc. Strategic management also has specific differences in the application of strategy management for developed companies and strategic management for startup companies.

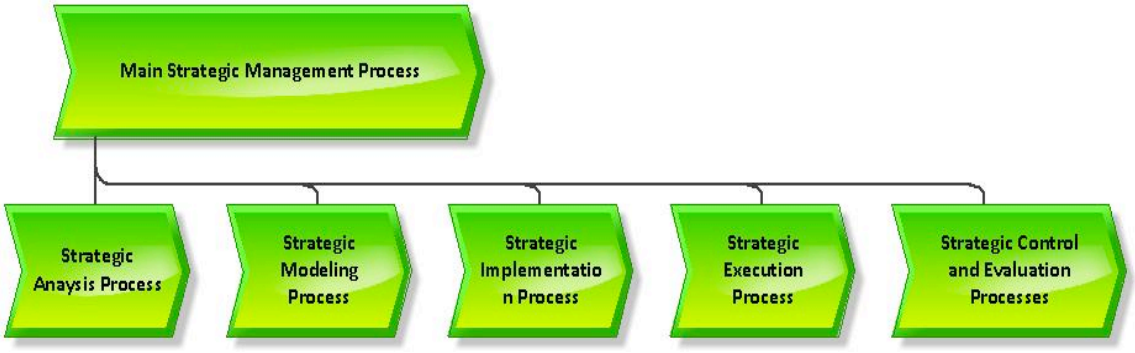

Figure 1: General Strategic management process structure

This article is proposing an algorithm for strategic management educational e-system, which can be used as a tool during the process of education for traditional learning (face to face), blended e-learning and distance e-learning. The system is offering simulation learning environment, which is supporting students in the process of learning strategic management, its processes, tools, interconnections and models. The educational e-system is intended for education of students and entrepreneurs on strategic management for technology startup companies (technology new ventures).

2. Problem formulation

The education on strategic management for technology new ventures is slightly different from the education on strategic management for developed companies in terms of strategy modeling and tools for strategic analysis, as well as strategic implementation, execution and control and evaluation, in terms of the lack of complex hierarchical structures in the technology new ventures. The problems of strategic management education are connected with: (1) high complexity of the taught material, processes, tools, interconnections and non-trivial tasks in the strategic management modeling process and overall strategic management; (2) need of e-system supporting the educational process with virtual learning environment; (3) current strategic management software programs for studying the strategic management processes, tools and methods of strategy modeling are not enough for studying strategic management; (4) specifics of strategic modeling process and its process of work, which cannot be learned by learning to use the strategy management systems only; (5) lack of systems guiding students in strategic management specifically for technology startup companies with corresponding developed strategic tools, etc. All these problems, together with the need of simulated learning environment for education on

this complex discipline – strategic management – lead to the need of research and development of an e-system, supporting and specifically designed for strategic management education.

3. Problem Solution. Algorithm for Innovative Educational E-System for Strategic Management.

The upper mentioned challenges in strategic management education can be successfully met by a combination of the following elements: (1) theoretical tools, methodologies, processes and best practices education; (2) learning of the functioning of classical strategic management systems; (3) usage of simulating learning environment for the overall process of strategic management with elements of gamification, simulation and creativity components. Algorithm for such e-system simulating learning environment for strategic management education, designed specifically for strategic management for technology new ventures is presented in this article.

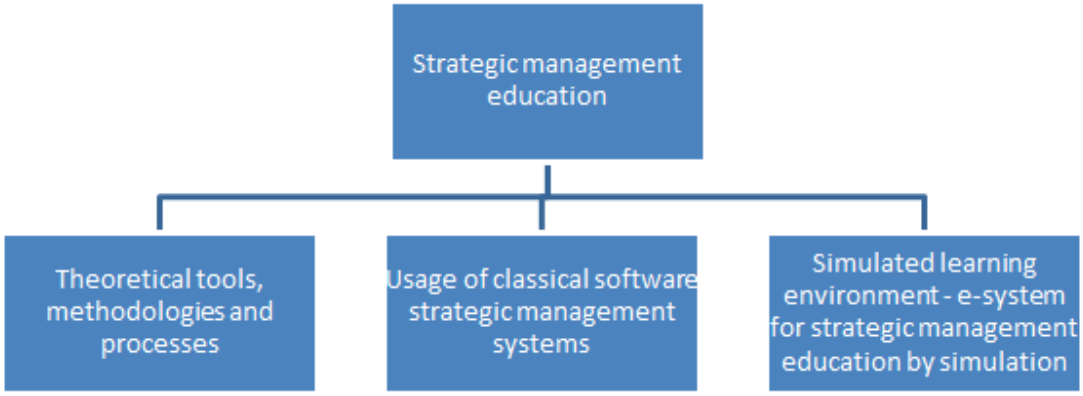

Figure 2: Strategic management education structure

An e-system for strategic management needs to include all basic stages in the strategic management process (see Figure 1.) and also it needs to provide opportunities for: (1) knowledge building, (2) knowledge checking and (3) knowledge applying. All these elements are included in the presented in this article e-system.

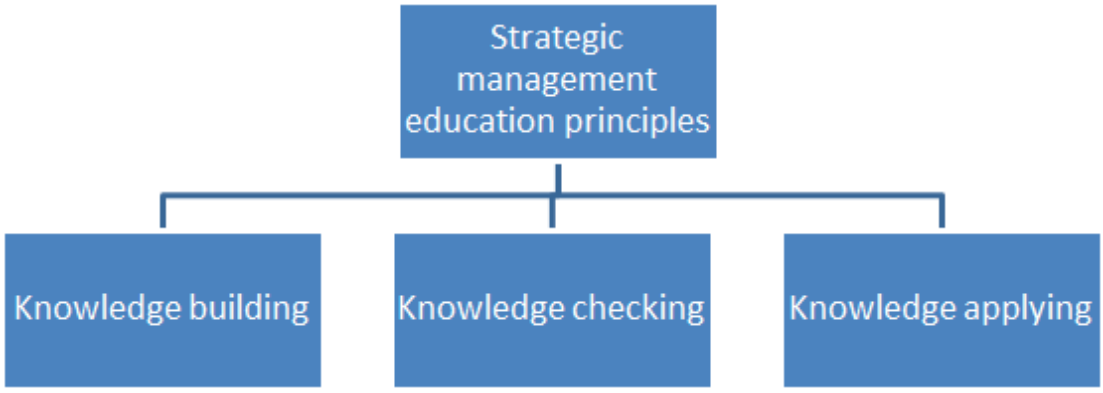

Figure 3:Strategic management education principles

3.1 Entire process overview.

The system for education will start its operation with the students with an overview on the entire process of strategic management and the entire process of functioning of the system. The system covers the following processes: (1) strategic analysis processes – classical strategic analysis tools and innovative analysis tools for technology new ventures; (2) strategy modeling process – typological classification process, defining of typological strategy and defining of company-specific typological strategy; (3) strategic implementation (preparation for strategic execution) – necessary resources, responsibilities for strategic actions execution, projections (target values, deadlines, etc.) and partners and collaboration; (4) strategic execution process – model of prioritization of tasks by urgency and importance and link to skills and knowledge from disciplines Project Management and Operational Management; (5) strategic control and evaluation processes – periodical overview on target values, overview on current deviations in target values, evaluation and correcting activities. While following these processes, students will have access to: (1) knowledge building on strategic tools, processes, methodologies, models and interconnections; (2) knowledge checking by using simulated learning environment and (3) knowledge applying, while working on the different projects and processes of the strategic management educational e-system for technology new ventures.

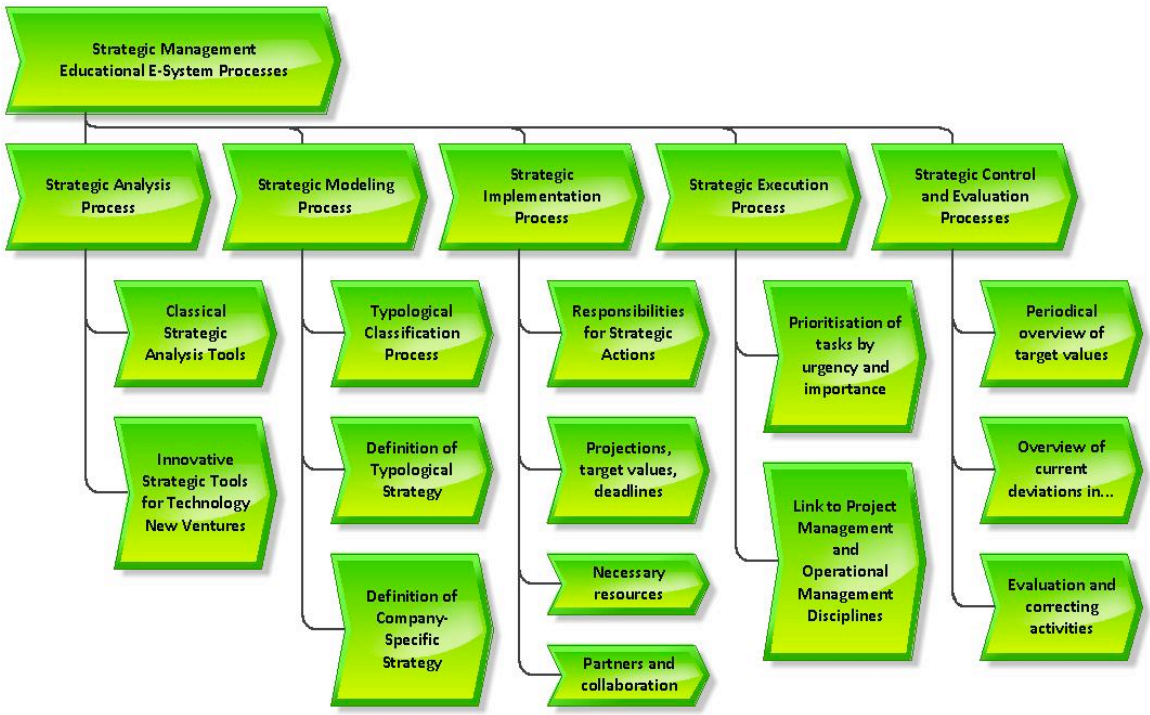

Figure 4: Educational E-System for Strategic Management Processes.

3.1.1. Initial steps in strategic management –Mission and Vision of the Company

The strategic management for each company starts with defining Mission and Vision for the company. There will be two steps in this initial part of the system: (1) gamification on Mission and Vision statements for popular companies and (2) defining of Mission and Vision of the company they will be working on, following several rules and guidelines.

The gamification process includes theoretical basics and definitions on the Mission and Vision statements (knowledge building) and a gamification based on quiz for Mission and Vision statements for popular companies in the technology sphere, according the focus and examples in the developed educational e-system. The system proposes different Mission and Vision statements and students have to guess the popular technology company to which the statements belong (knowledge testing) with evaluating from one to five the quality of the statements, according their opinion. The method has been tested amongst a course on Strategic management at master degree students in master degree program Technology Entrepreneurship at Sofia University "St. Kliment Ohridski" and proved to be very successful and very positively accepted amongst students.

The second process is connected with knowledge applying in developing through creativity process in groups of 3 a Mission and Vision statement for the technology startup company, which will be their model for simulation during the educational process on strategic management for technology new ventures.

Figure 5:Strategic analysis education e-system components.

3.2. Strategic analysis process.

Strategic analysis process in the educational system consists of two steps: (1) introduction of the classical strategic analysis tools, which are most appropriate for the technology new ventures sphere (identified by research of the author) and (2) presentation of innovative tool specifically developed for strategic analysis for technology new ventures, consisting of all most important elements for the next stage of strategic management - strategic modeling stage.

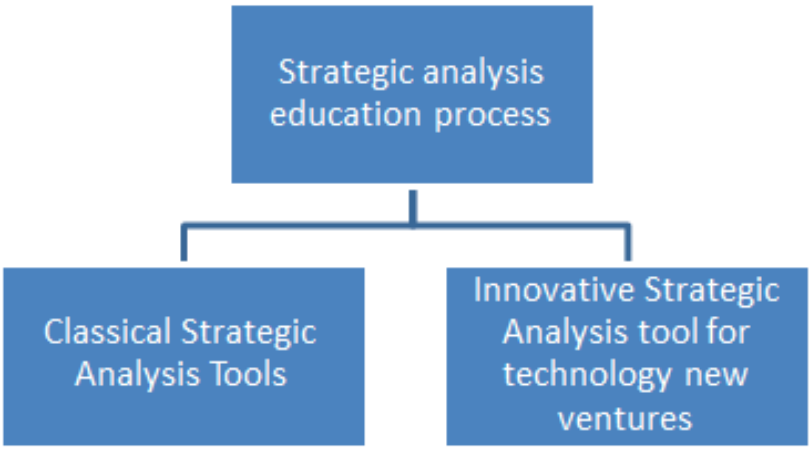

Figure 6: Strategic analysis education e-system components.

3.2.1. Classical Strategic analysis tools

The research on the level of usage of strategic analysis tools, implemented amongst 121 entrepreneurs in the technology sphere (107 from Bulgaria and 14 from other countries) proved the low level of usage of classical strategic analysis tools from entrepreneurs in the technology sphere. The results below are showing the levels of usage of four of the most popular strategic analysis tools.

Table 1: Usage of Strategic analysis tools (research by author).

№	Research on Usage of Classical Strategic Analysis Tools Amongst 121 Entrepreneurs in the Technology Sphere			
	Strategic Analysis Tool	Yes, I use it.	No, I don't use it.	I am not acquainted with it.
1	SWOT analysis	70%	7%	22%
2	PEST (PESTLE/PESTEL) analysis	30%	10%	60%
3	GAP analysis	32%	12%	55%
4	USP (Unique Selling Proposition) analysis	26%	9%	64%

The results from the research are quite low, despite the high level of education on entrepreneurship and management of the participants in the research, shown on the next table, high level of usage of methods for strategic management and early level of technology startup companies' development, shown on the next tables.

Table 2: Level of education of participants (research by author) .

Have you been studying entrepreneurship and management?	**Results**
Yes, I have.	65%
No, I haven't.	20%
Self-learning	15%

Table 3: Level of education of participants (research by author).

Are you using the methods of strategic management?	Results
Yes, I do.	41%
Yes, I do sometimes.	41%
No, I don't.	18%

Table 4: Level of technology startup companies' development (research by author).

Stage of startup development	Results
At stage "idea development"	69%
At stage "business starting"	12%
At stage "new working business idea"	19%

The results from the implemented research confirm the need of suitable strategic analysis tools, supporting the strategic management process and the need of further training, guidelines and development of innovative tools, meeting the needs and specifics of technology new ventures in a higher degree. The classical strategic analysis tools, which were defined to be most important for the strategic management of technology new ventures in the current research are:

- SWOT analysis
- PEST (PESTEL/PESTLE) analysis
- 5 Porter's Forces analysis
- Unique Selling Proposition analysis
- Core Competences analysis
- Niche/Gap analysis
- GAP analysis

The system contains the following three stages: (1) theoretical information and practical guidelines for practical work with the tools, as well as usable templates for the tools; (2) gamification on knowledge checking – for each tool there are some pre-developed strategic analysis with the different tools for famous companies, which are given in mixed group. Students have to order statements to the correct position (box) in the tools developed; (3) creativity process on using strategic analysis tools for creating strategy analysis for the technology startup company, with which they are working during the course of education. In this way all three steps in the educational process are covered by the system.

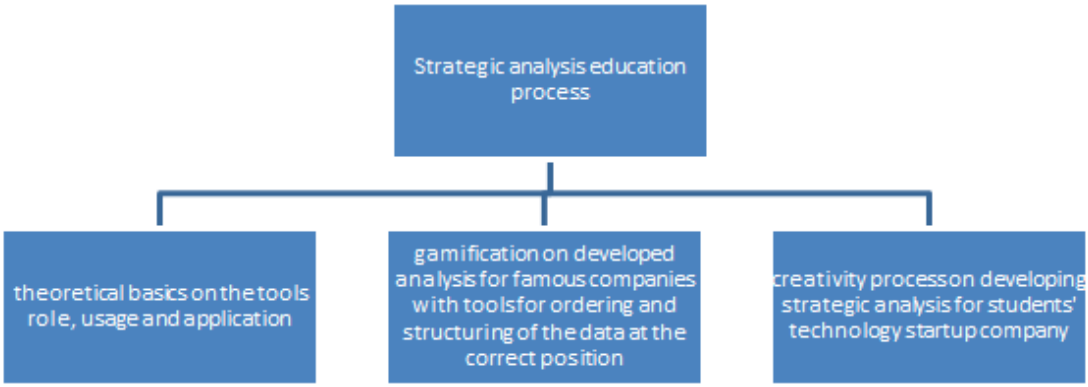

Figure 7:Strategic analysis education e-system components.

3.2.2. Innovative SIAMC tool for technology new ventures

The second part of the system aims introducing work with innovative tool for strategic analysis, which is specifically designed by the author for technology new ventures, being verified amongst 121 entrepreneurs in technology sphere and additional research and development of processes for its application.

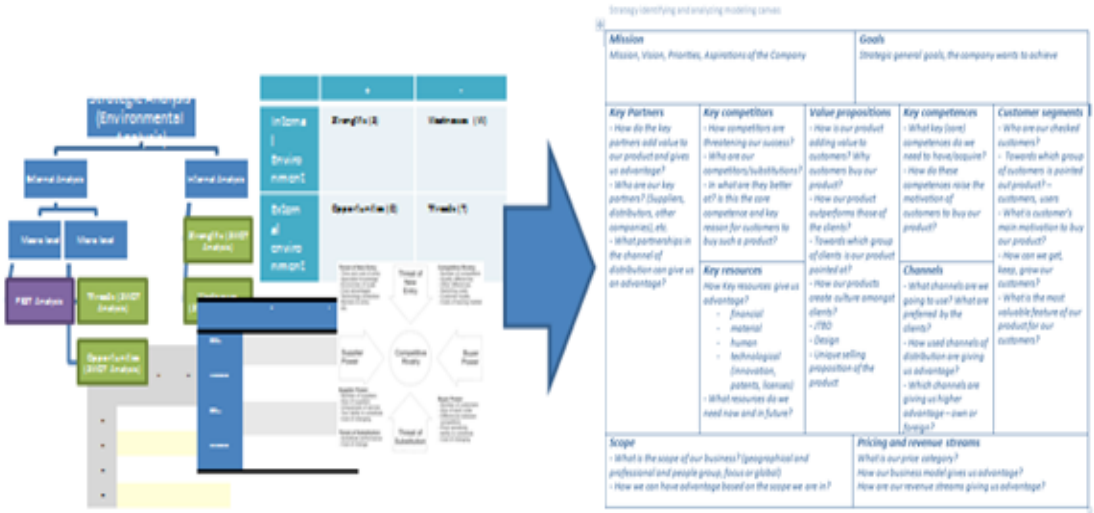

Figure 8: Development of the unified Strategy analyzing and identifying modeling canvas (SIAMC).

During the development of the tool by the author, the research amongst 121 technology entrepreneurs on the level of importance of the included in the developed instrument categories has given the following results:

Table 5: Level of importance of the categories in Strategy identifying and analysing modeling canvas (SIAMC), according research.

Categories in the developed instrument	High importance	Average importance	Total: High and Average Importance	Low importance
Clients	93%	7%	99%	1%
Product	88%	11%	99%	1%
Strategic goals	80%	19%	99%	1%
Mission	63%	30%	93%	7%
Competitors	61%	36%	98%	2%
Key resources	60%	33%	93%	7%
Market scope	60%	37%	98%	2%
Pricing and revenue streams	60%	37%	97%	3%
Key competence/skills	50%	45%	94%	6%
Key partners	48%	43%	91%	9%
Channels	46%	47%	93%	7%

These results can be applied also as a proof for the importance of the categories groups and their suitability for participation in the unified tool. The tool is structured in the form of canvas, which has proven its applicability in the sphere of technology entrepreneurship and management. The tool aims providing the most essential information at one unified tool, providing the necessary information after analysis for the next stage of strategic management – strategic modeling for technology new ventures. The tool is presented at Figure 9.

Strategy identifying and analyzing modeling canvas

Mission *Describe the Mission, Vision, Values, Priorities and Aspirations of the Company*			***Goals*** *What are the Strategic general goals, the company wants to achieve*	
Key Resources *How Key resources give us advantage?* - *financial* - *material* - *human* - *technological (innovation, patents, licenses)* *- What are the techno-logical capabilities of our company?* *- What resources do we need now and in future?*	***Key Partners*** *- How do the key partners add value to our product and gives us advantage?* *- Who are our key partners? (Suppliers, distributors, other companies), etc.* *- What partnerships in the channel of distribution can give us an advantage?* ***Key Competitors*** *- How competitors are threatening our success?* *- Who are our competitors/substitutions?* *- In what are they better at? Is this the core competence and key reason for customers to buy such a product?*	***Value Propositions*** *- How is our product adding value to customers? Why customers buy our product?* *- How our product outperforms those of the clients?* *- Towards which group of clients is our product pointed at?* *- How our products create culture amongst clients?* *- JTBD* *- Design* *- Unique selling proposition of the product* *- What level of quality is enough to gain competitive advantage?*	***Scope*** *- What is the scope of our business? (geographical and professional and people group, focus or global)* *- How we can have advantage based on the scope we are in?* ***Channels*** *- What channels are we going to use? What are preferred by the clients?* *- How used channels of distribution are giving us advantage?* *- Which channels are giving us higher advantage – own or foreign?*	***Customer segments*** *- Who are our checked customers?* *- What is the scope of the market?* *- What is the maturity of the market?* *- Towards which group of customers is pointed out product? – customers, users* *- What is customer's main motivation to buy our product?* *- How can we get, keep, grow our customers?* *- What is the most valuable feature of our product for our customers?*
Key competences *- What key (core) competences do we need to have/acquire?* *- How do these competences raise the motivation of customers to buy our product?*			***Pricing and revenue streams*** *What is our price category?* *How does our business model give us advantage?* *How are our revenue streams giving us advantage?*	

Figure 9: Strategic identifying and analyzing modeling canvas (Strategy modeling canvas SIAMC)

The tool has 11 categories and set of guiding questions, developed for each of the categories. The tool also has developed, by the author, a process of usage, presented at Figure 10. The process consists of three steps: Step (A), which is defining of the scope of competition, includes work on the categories in sequence as follows: 1) Mission; 2) Goals; 3) Market scope; 4) Clients. Step (B), which is defining of competitive advantage, includes work on the following categories: 5) Key competences; 6) Product; 7) Key competitors; 8) Key partners; 9) Pricing and revenue streams. Step (C) - defining of key elements from the strategic plan of actions, includes the following categories: 10) Key resources; 11) Channels of distribution (incl. advertising activity).

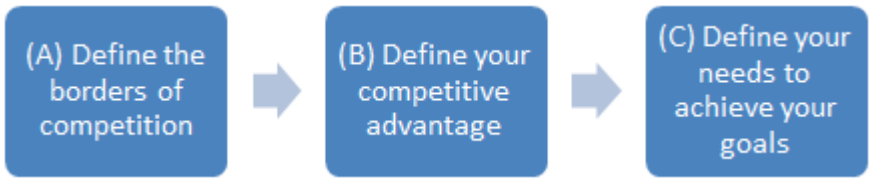

Figure 10: 3-step (A-B-C) process of work with the developed Strategic identifying and analyzing modeling canvas (SIAMC).

The process is forming the sequence of usage of the strategic identifying and analyzing modeling canvas (SIAMC), developed by the author, which can be used by technology new ventures as a transition step between the stages of strategic analysis and the stage of strategic modeling.

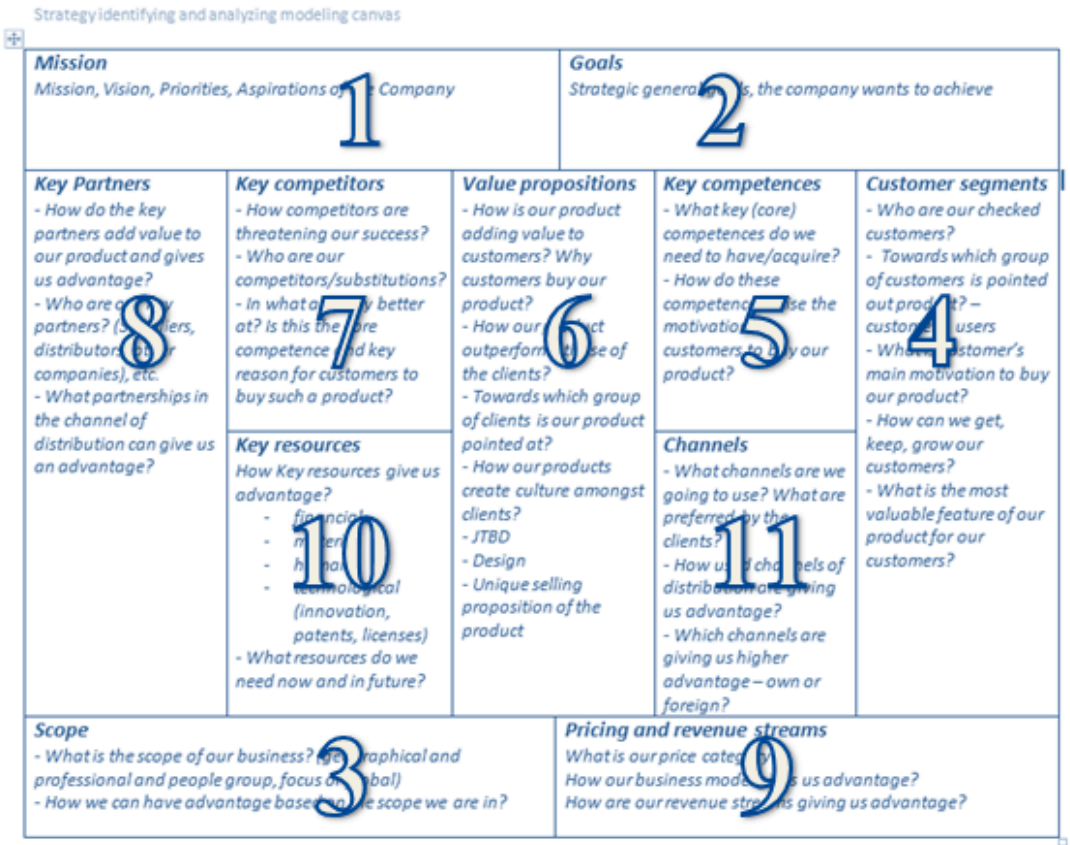

Figure 11: Sequence of work with the developed Strategy analyzing and identifying modeling canvas

The process of education consists of the three steps, described for the classical strategic analysis tools in the previous part of this chapter, since the role, usage and applying of the tools is the same.

3.3. Strategic modeling process

The stage of strategic modeling is the most difficult part in the process of strategic management. It is often connected with words such as talent, gift, art, visionary, etc., due to the lack of clear guidelines for its development process. The developed by the author process of strategic modeling for technology new ventures, however, is solving this problem and offers access to the classical tools for strategic classification, as well as to an innovative three-dimensional classification model for strategy modeling for technology new ventures, which also has full developed for each of its models – typological strategy, table of strategic choices and process of work with the tool.

The presented in the system basic theoretical tools are Porter's Generic Strategies and Ansoff's Product-Market Matrix and the innovative tool, combining the two strategic modeling tools, providing an innovative tools for strategy modeling, specifically designed for technology new ventures.

The process of education with the system has the following steps: (1) theoretical basics on the tools; (2) gamification on working with typological strategy's quizzes and (3) creativity process on specifying company-specific strategy for their technology startup companies.

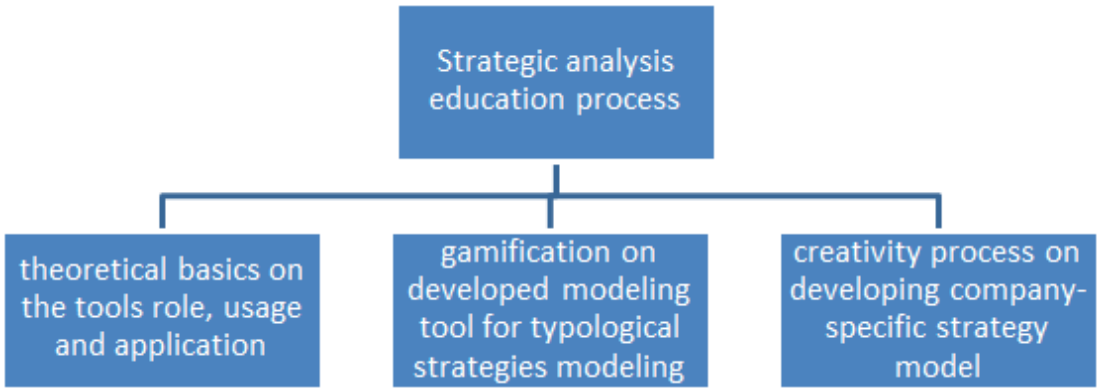

Figure 12:Strategic modeling education e-system components.

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 (theoretical preparation); (2) Working on step 1: analyzing and applying results from the strategic analysis, implemented with strategic analysis tools during for strategic classification process; (3) Working on step 2: defining of typological strategy's characteristics; (4) Working on step 3: defining of company specific strategy. (see Figure 13)

The process of strategy modeling has the following stages in its process:

Figure 13: Strategic modeling process steps

3.3.1. Strategic classification process.

The classification process uses the innovative strategic modeling classification matrix, which consists of the following axes: (1) level of innovative capacity of the company; (2) market scope; (3) market maturity.

The typological classification model has the following presentation:

$$NVTS = f(IC, MS, MM) \qquad (1)$$

where NVTS is the new venture typological strategy, IC is the company's innovation capabilities, MS is the market scope and MM is the market maturity. Each of these variables (1) has two values, which defines a total of 8 typological strategies, described further in the chapter. The values, which IC has are: "innovator" and "follower". The values of MS are: "local market" and "global market". The values of MM are: "new or emerging market" and "existing market". Each of the groups of values for the variables is forming a full set in the described field and thus eight typological strategies in total are formed.

IC ∈ {"0";"1"}, where "0" when "follower" and "1" when "innovator";
MS ∈ {"0";"1"}, where "0" when "local market" and "1" when "global market";
MM ∈ {"0";"1"}, where "0" when "existing market" and "1" when "new/emerging market"; NVTS is a set of all eight combinations.

Table 6: Typological strategies for technology new ventures – classification model.

Typological strategies - Global Market – Level Second		
	High innovation capabilities	***Low innovation capabilities***
New / Emerging Market	**4**	**3**
Existing Market	**2**	**1**

Typological strategies - Local Market – Level First		
	High innovation capabilities	***Low innovation capabilities***
New / Emerging Market	**4**	**3**
Existing Market	**2**	**1**

The general steps in the process of education on Strategy Classification Process in the process of education include defining of company's position at one of the typological strategies from the strategy classification model, following the steps at Figure 14.

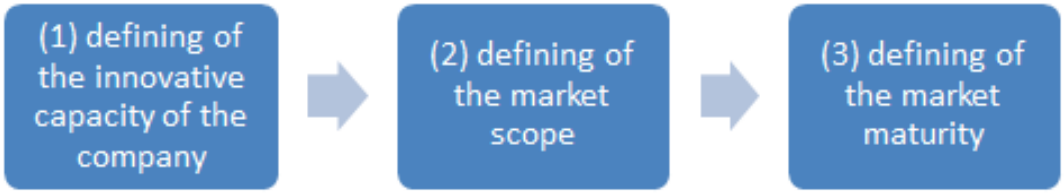

Figure 14: Strategic modeling process steps.

Application of strategic analysis with SIAMC tools is needed at this stage of strategy's modeling. After defining of company's typological strategies, an overview on all typological strategies definitions is made, as a correcting step for students to confirm the correctness of their choice, or correct it by choosing the right category.

3.3.2. Typological strategy formulation process.

The defining of typological strategy is following the step of choosing typological strategy type. The process of defining of typological strategy in the education system has the following steps (see Figure 15)

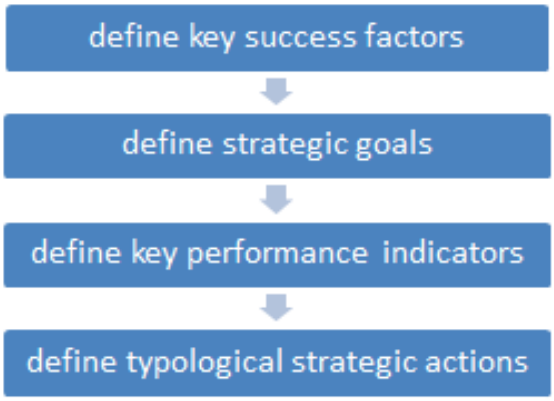

Figure 15: Strategy formulation process basic steps.

At each of these steps in the educational system's process, a defining of part of the typological strategy for the educational company is implemented. The process consists of two steps: (1) Choosing most appropriate typological strategy definition (key success factor, strategic goals, key performance indicators, typological strategic actions); (2) Overview on the entire typological strategy classification and their correct typological strategy's definitions (correcting step).

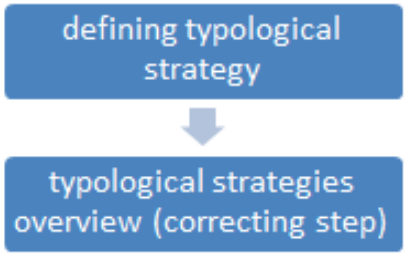

Figure 16: Choosing correct typological strategy steps.

Key success factors process of education in the typological strategy stage consists of the following steps: (1) students select key success factors from list of all strategies' key success factors; (2) overview of correct key success factors for the chosen typological strategy (correcting step).

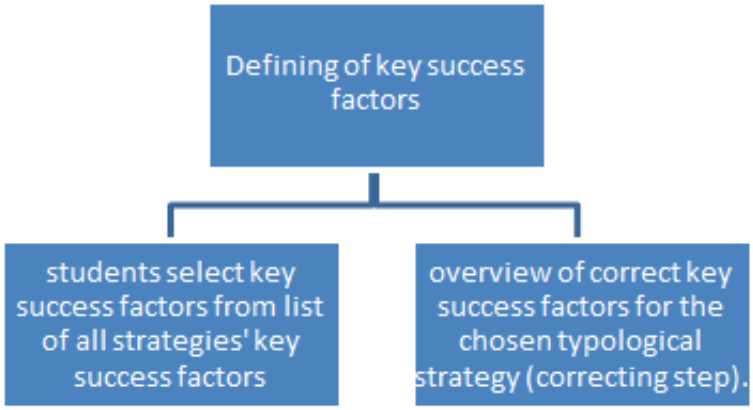

Figure 17: Defining of key success factors by students.

For each Key success factor, one or more strategic goals are defined: (see Figure 18)

Figure 18: KSF and Strategic goals relations - structure.

Defining of typological strategic goals, follows the gamification character of key success factors: (1) students select key success factors from list of all strategies' key success factors; (2) overview of correct key success factors for the chosen typological strategy (correcting step).

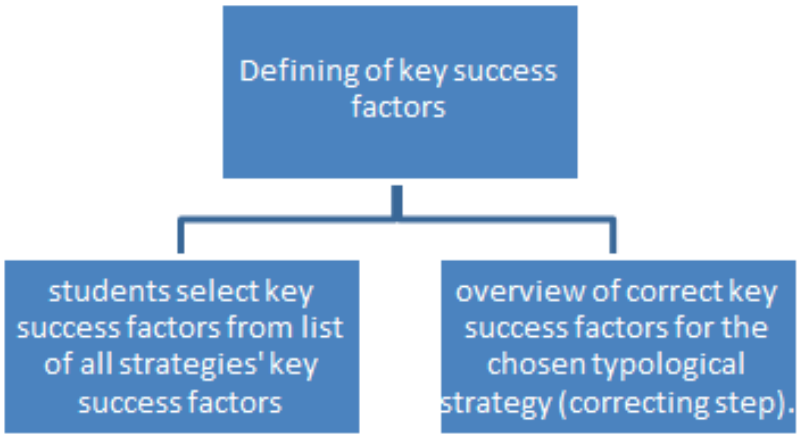

Figure 19: Defining of typological strategic goals by students.

Next step in the process is defining of Key performance indicators for measuring the progress towards achieving typological strategic goals. The key performance indicators defining for typological strategies has the following structure: (1) students select key performance indicators from list of all strategies' key performance indicators; (2) overview of correct key performance indicators for the chosen typological strategy (correcting step).

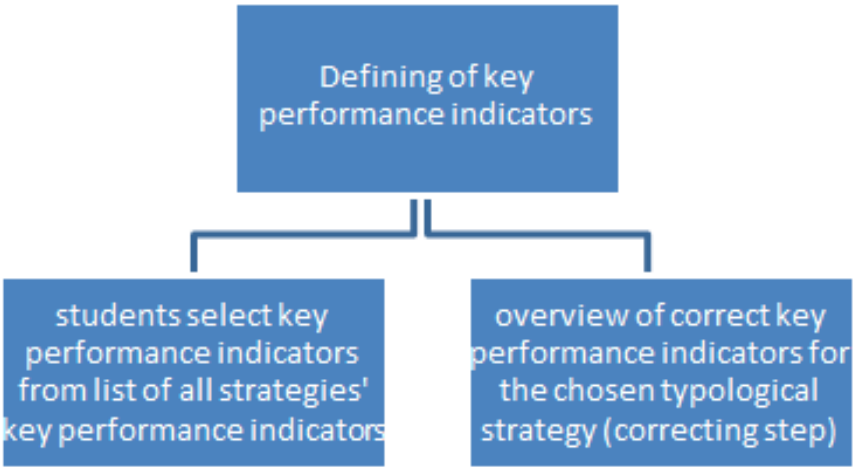

Figure 20: Defining of key performance indicators steps

The next step, defining of Typological strategic actions, is the final step from this stage of the process. For each typological strategic goal, one or more typological strategic actions are defined. The process of work is following the processes for all previous steps in this stage: (1) students select typological strategic actions from list of all strategies' typological strategic actions; (2) overview of correct typological strategic actions for the chosen typological strategy (correcting step).

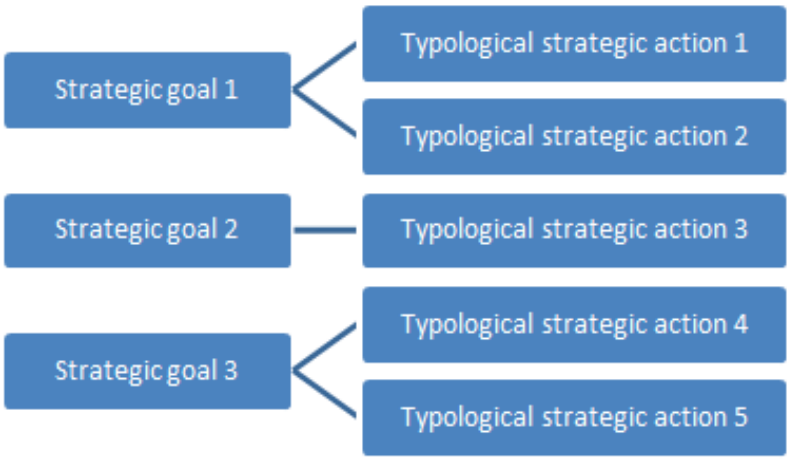

Figure 21: Strategic goals and Strategic actions relations

After implementing all these steps, a table of strategic choices for the chosen typological strategy can be formed.

3.3.3. Typological strategies table of strategic choices.

The table of strategic choices is containing all information for the developed typological strategy in the previous step and will be used further as a basis for the final company's specific strategy formulation.

The table of strategic choices consists of the upper mentioned categories: key success factors, strategic goals, key performance indicators and strategic actions, but also it applies an innovative Balanced scorecard model, also developed by the author. The model is specifically developed for technology new ventures strategic management, based on research and previous experience of the author with the model.

The research amongst 121 technology entrepreneurs showed the following level of usage of strategy modeling tools and models.

Table 7: Levels of usage of Business Model Canvas
and classical Balanced Scorecard model.

№	Research on Usage of Strategic Modeling Tools Amongst Entrepreneurs in the Technology Sphere			
	Strategic Analysis Tool	Yes, I use it.	No, I don't use it.	I am not acquainted with it.
5	Business Model Canvas	54%	3%	43%
6	Balanced Scorecard	23%	12%	64%

The low levels of usage of the classical Balanced Scorecard model, together with the Product-Market Fit focus of technology startup companies, Customer Development Model and wide spreading of Business Model Canvas, supporting the business model and Product-Market Fit development, and also the "search" mode of functioning of

the technology startup companies lead to the development of the modified Balanced Scorecard model used in the educational system (see Figure 22).

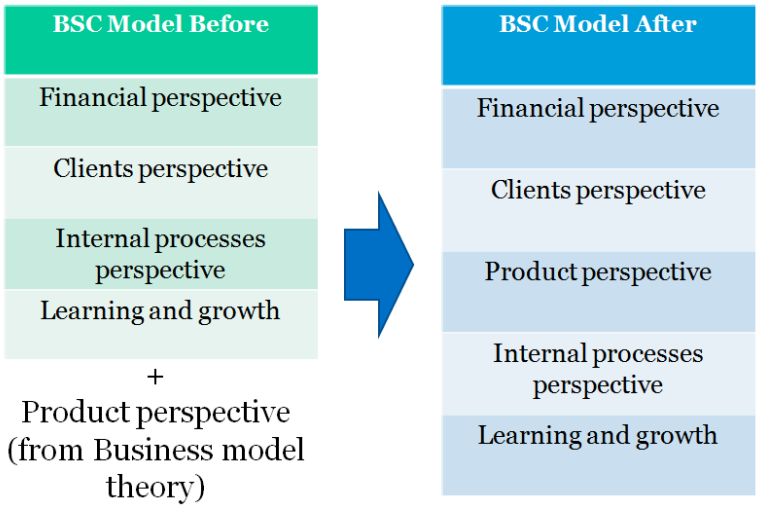

Figure 22: Modified Balanced scorecard model developed by the author.

The model was presented to the 121 technology entrepreneurs, participating in the research. The results are confirming the suitability of the model.

Table 8: Modified Balanced Scorecard Preference
from entrepreneurs in technology sphere (research).

№	Research on Preference of Type of Balanced Scorecard Model Amongst Entrepreneurs in the Technology Sphere	
	Balanced Scorecard Model	Preference results
7	BSC without Product perspective	15%
8	Balanced Scorecard with Product perspective	85%

Using the modified Balanced Scorecard model, a presentation on the table of strategic choices can be made. Categories in the table are: (1) key performance indicators; (2) typological strategic goals; (3) key performance indicators; (4) typological strategic actions. The Perspectives from the modified Balanced Scorecard model are: (1) Financial perspective; (2) Clients perspective; (3) Product perspective; (4) Perspective Internal processes and (5) Perspective Learning and Growth.

Table 9: Table of strategic choices – typological strategy (categories).

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 the Balanced Scorecard Model

Table 10: Table of strategic choices – typological strategy (categories and modified BSC model).

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

After overview on the ready table of strategic choices for the typological strategy, a next step towards the defining of company-specific strategy can be implemented. And while the process of defining of typological strategy was based on gamification educational method, the process of defining of company-specific strategy is a creativity process in the education on strategic management in its second stage – strategic modeling.

3.3.2. Defining of Company-Specific Strategy process

The process of defining of company-specific strategy consists of the following five steps (see Figure 23).

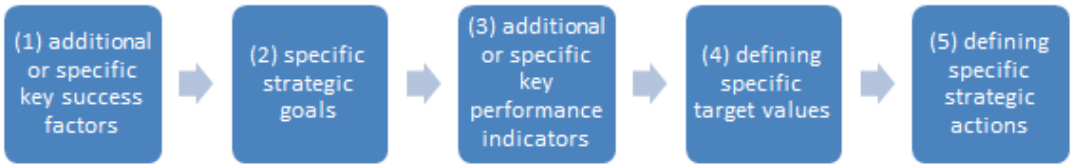

Figure 23: Company-specific strategy modeling steps.

The students follow again the steps of strategic modeling process for the typological strategy, but this time they create content, not only choose. They add or modify specific key success factors, key performance indicators and specify more detailed and corresponding to the company they are using in the process of education - strategic goals, specific actions for reaching the specific strategic goals of the company, as well as, they prepare for specifying of target values at the next step of the process – transition to strategic implementation stage.

As a results from this creative process, a table of strategic choices for the company-specific strategy is created. It consists of the following categories (see Table 11).

Table 11: Table of strategic choices – company-specific strategy (categories).

Research on Preference of Type of Balanced Scorecard Model Amongst Entrepreneurs in the Technology Sphere				
Key success factors	Strategic Goals	Key performanc e Indicators	Target values	Specific Strategic Actions
Data*	Data	Data	Data	Data

* Data is ordered according the modified Balanced Scorecard Model.

Table 12: Table of strategic choices – company-specific strategy (categories and modified BSC model).

Key success factors	Strategi c goals	KPIs	Target values	General typological actions	Specific strategic actions
Financial perspective					
data	data	data	data	data	data
Clients perspective					
data	data	data	data	data	data
Product perspective					
data	data	data	data	data	data
Perspective Internal processes					
data	data	data	data	data	data
Perspective Learning and Growth					
data	data	data	data	data	data

After specifying the strategy of the educational company, a smooth transition can be made to the next step of strategic implementation, by continuing the development of the presented table of strategic choices.

3.4. Strategic implementation process

The strategic implementation process is divided by the author in two stages. The first stage is initial preparation for the work distribution from the second stage of the strategic implementation process.

The first stage, consists of the following three steps (see Figure 23).

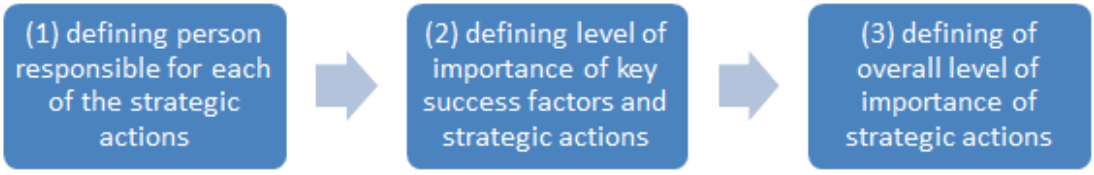

Figure 24: Company-specific strategy transition to strategy implementations steps – stage 1.

After defining one person from students' team responsible per strategic action, a distribution of the responsibilities in the team is easily implemented. The next stage is defining level of importance for key success factors and strategic actions. These levels of importance are defined by the strategic team. A check on the levels of importance for key success factors is possible for the defined key success factors, only in the process of typological strategy creation.

The ranking categories which are used in the system are: (1) low importance = 1 point; (2) average importance = 2 points; (3) above average importance = 3 points; (4) high importance = 4 points; (5) very high importance = 5 points.

After defining levels of importance for the two categories, an overall ranking by importance is implemented by multiplying the digital expressions of levels of importance of the key success factors and strategic actions. This ranking allows easier prioritization of tasks during strategy execution stages.

The second stage in the process of strategic implementation consists of the following four steps (see Figure 25).

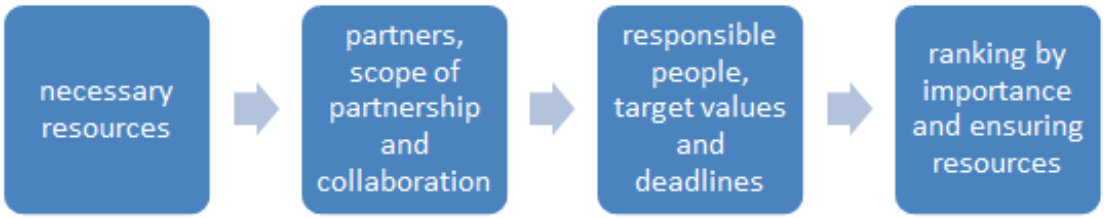

Figure 25: Strategy implementation process – stage 2.

Working on the steps in stage 2 of the process by the team aims preparation for the next stage of strategic execution. By following these processes, an easier transition from strategic modeling to strategic execution is implemented. Students learn team working basics, responsibility and prioritization techniques, as well as the general steps in preparing for strategy execution process.

The information, connected with organization on the strategic implementation process is also included in the table of strategic choices.

Table 13: Table of company-specific strategic choices in strategy implementation.

Key success factors	Strategic goals	KPIs	Target values	General typological actions	Specific strategic actions	Overall level of importance	Responsible person
Financial perspective							
data	data	data	data	data	data	data	data
Clients perspective							
data	data	data	data	data	data	data	data
Product perspective							
data	data	data	data	data	data	data	data
Perspective Internal processes							
data	data	data	data	data	data	data	data
Perspective Learning and Growth							
data	data	data	data	data	data	data	data

After finishing both stages of the strategic implementation process, students are ready for the next stage of strategic execution process.

3.5. Strategic execution process

Strategic execution is connected with various skills, learned from subjects Project Management and Operational Management, which are not subject of this research and for this reason the system will make a link to these subjects and their systems, but since educational process may also be only simulative in the strategic execution stage, not only these subjects are included, but also skills on strategic prioritization according overall level of importance of the strategic actions, defined in the previous stage and the urgency of the strategic actions, defined on the time available to the deadline of the strategic action. The prioritization matrix, which is included in the system, as a tool with theoretical explanation and guidelines for practical exercises is described on Table 14.

Table 14: Prioritization of Strategic actions during strategy execution process (Research) – scale: 1-highest priority; 4-lowest priority.

Strategic actions prioritization modeling during strategy execution stage		
	Tasks with High level of strategic importance	Tasks with Low level of strategic importance
Tasks with High level of urgency	1	2
Tasks with Low level of urgency	3	4

The educational management strategic e-system includes gathering of performance data on day to day basis and allows strategic execution control and evaluation processes during the execution stage (see Table 15).

Table 15: Table of company-specific strategic choices in strategy implementation.

Key success factors	Strategic goals	KPIs	Target values	Current values	General typological actions	Specific strategic actions	Overall level of importance	Responsible person
Financial perspective								
data	data	data	data	data	data	data	data	
Clients perspective								
data	data	data	data	data	data	data	data	
Product perspective								
data	data	data	data	data	data	data	data	
Perspective Internal processes								
data	data	data	data	data	data	data	data	
Perspective Learning and Growth								
data	data	data	data	data	data	data	data	

The next stage in the educational e-system for strategic management is Strategic control and evaluation.

3.6. Strategic control and evaluation processes

The control and evaluation process shows to what degree the current results and actions are corresponding to planned results and chosen goals. It aims noticing at the earliest possible stage any existing deviations and their correction as quickly as possible. For this reason, it will use as a basis the deviations between target and current values and the prioritization model from strategic execution stage.

The process of strategic control and evaluation processes in the system are shown on Figure 27.

Figure 26: Strategy control and evaluation process.

The educational strategic management e-system at this stage is offering a supportive tool in a simulation environment on strategic control and evaluation processes and is providing a field for different scenarios games, led by an lecturer, teacher or assistant.

With this stage the strategic management process is complete and the system is covering all strategic management stages.

4. Conclusion

The presented algorithm of work of an innovative educational strategic management e-system includes all stages from strategic management process and is developed based on research amongst 121 entrepreneurs in the technological sphere. The developed system is aimed towards education on strategic management, specifically for technology new ventures and is designed using the tools of: theoretical preparation (knowledge gathering), gamification principles (knowledge checking) and creativity application of the knowledge (knowledge applying). The presented system can be applied in all types of education: traditional education (face to face learning), blended e-learning and distance e-learning. The presented system can be used as a basis for further development for strategic management systems for other types of companies and education and training applications.

References

A. Osterwalder, I. Peigner (2010), *Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers*, Wiley, John & Sons Inc, 2010.

Cabrera A. (2009), *The Online Education Revolution*.

Chesbrough, W. V. (2006), *Open innovation: researching a new paradigm*.

Conole, G. (2008), *International perspectives on e-learning, mapping strategy to practice*, The Open University, Canada.

Ines Kuster, N. V. (2006), *Comparison of marketing teaching methods in North American and European universities*, http://www.emeraldinsight.com/10.1108 /02634500610672071.

Kaplan, R.S., Norton, D.P. (1996), *The Balanced Scorecard: Translating Strategy into Action,* Boston, MA: Harvard Business School Press.

Kevin Rudd, S. (2007), *A Digital Education Revolution*, http://www.alp.org.au/download/now/labors_digital_education_revolution_campaign _launch.pdf.

Randal Hansen, P. (2008), *Distance Learning Pros and Cons*, http://www.quintcareers.com/distance_learning_pros-cons.html.

S.Tsolova (2014), Results from Research on Algorithm for Strategy Modeling Implemented by e-Governance System, VI International Scientific Conference "E-Governance" 2014, ISSN 1313-8774, pp. 224-232.

Contact email: s.valentinova@gmail.com