

# Updated Algorithm of Innovative Strategic Management e-System for Technology New Ventures

Algorithm, processes, classification framework, tools and application

[ Sia Tsolova ]

**Abstract**—This work aims presenting the results from a research on remodeling the process of strategic management specifically for technology new ventures and creation of algorithm which can be used as a basis for an innovative e-system for strategic management for technology new ventures (technology startup companies). The presented algorithm of the e-system is based on research including: adaptation of the classical process of strategic management for technology new ventures, modification of the balanced scorecard model, development of strategic identifying and analyzing modeling canvas; development of an innovative detailed process for strategic modeling for technology new ventures with development of all included sub steps and tools; 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 presented algorithm for strategic management e-system gives entrepreneurs in the technology sphere the tools and process for strategy management, with corresponding developed automation and interconnections, as well as guidelines from the elaborated through the current research results for the different typological strategies for technology new ventures according the presented 3-dimentional classification. The presented algorithm follows the sequence of steps in the process of strategic management specifically redesigned for technology new ventures and is describing the developed and implemented in the e-system algorithm, underlining processes, tools and interconnections, as well as the automation principles of work of the system and its applications.

**Keywords**—algorithm; innovative; strategy; management; e-system; strategic; process; technology new ventures.

## I. Introduction

Today's rapid development of technology sphere and the growing number of emerging technology startup companies is bringing up the questions connected with the increasing the percentage of successful companies amongst the startup technology companies. According a Bloomberg research 80% percent of the technology startup companies are closing their activity in the first 18 months. According the statistics from National Statistics Institute of Bulgaria from 2012, only 8,1% of the established in 2007 startup companies are continuing their activity five years after establishment. The low results from the upper mentioned researches are just few of the examples of similar results in the research on level of successfulness of technology new ventures. These results

Sofia University "St. Kliment Ohridski" Bulgaria

confirm that further support in the process of development of technology startup companies should be implemented by researching the processes, tools, systems and algorithms supporting the processes of strategic and operational management for technology startup companies.

The developed in the classical strategic management tools and processes aim supporting the strategic management of developed companies and corporations and are not applicable directly to the technology new ventures, due to their many differences and specifics[6], difference in their focus, working mode, resources, team structure, product development processes, etc.

This article is showing the results on a research in the field of strategic management implemented for technology new ventures, which aims the creation of a supportive strategic management e-system. The need of modifying of the strategic management processes and tools for technology startup companies is based on the fact that only a successful strategy, together with successful implementation of the strategy are leading to the success of startup companies[5].

## II. Strategic management e-system algorithm, process, tools

The research on the strategic management process for technology new ventures includes all stages in the process of strategic management – strategic analysis, strategic modeling, strategic implementation, strategic execution, strategic control and evaluation[4].



Figure 1: General Strategic management process structure

The research includes: strategic management processes, together with their sub processes and steps, tools, classification, interconnections and interdependencies between the elements of their tools, unified algorithm and their application.

### A. Stage 1: Strategic analysis process

There are many strategic analysis tools in the classical strategic management[3], and they all are contributing to the formulation of successful strategies[2]. The most important tools for technology startup companies, identified in this research are: SWOT analysis, PEST (PESTEL/PESTLE)

analysis, Unique Selling Proposition analysis (USP analysis), Niche/Gap analysis, Core Competences analysis, GAP analysis, etc. According to an implemented by the author research amongst 121 entrepreneurs in the technology sphere (107 from Bulgaria and 14 from other countries), however, the levels of usage of the most wide-spread tools for strategic management is showing low application of these tools amongst entrepreneurs in the technology sphere, which brought the need of research of a suitable supportive tool for the successful strategic management for technology new ventures.

TABLE I. USAGE OF STRATEGIC ANALYSIS TOOLS (RESEARCH)

№	Research on Usage of Strategic Analysis 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.
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 implemented research shows that the most widely used tool amongst entrepreneurs in the technology sphere is SWOT analysis, which is important, but not sufficient for formulating a successful strategy for their technology startup company. This is connected also with the fact that most entrepreneurs in the technology sphere do not have economical education and also to the fact that the wide variety of tools is too time consuming and some of the elements of the tools are duplicating amongst the different tools, while others don't have a high importance for the successful strategy modeling for the technology new ventures. Based on the research of the most important elements from the researched tools for the successful strategy modeling for technology new ventures, as well as the level of usage of the tools, an innovative unified tools was created, which consists of all important elements for the successful strategic management process for the technology startup companies. An additional process, support and sequence of work with this tool were created in the research process.

The developed unified strategic analysis tools, used for supporting the strategic analysis and identification of competitive advantages of the company is called Strategic identifying and analyzing modeling canvas (SIAMC). Its structure is chosen to be in the form of canvas, due to the presented in the next chapter high level of acceptance of this style of tools' formatting.

The presented tool has 11 areas of analysis, which are a combination of the most important elements from all researched strategic analysis tools. The categories in the canvas are: 1) Mission; 2) General goals and aspirations; 3) Market scope; 4) Customers; 5) Product; 6) Pricing and revenue streams; 7) Channels; 8) Key Resources; 9) Key Competences; 10) Key Partners; 11) Key Competitors.

Strategy identifying and analyzing modeling canvas				
Mission Mission, Vision, Priorities, Aspirations of the Company			Goals Strategic general goals, the company wants to achieve	
<b>Key Partners</b> - How do the key partners add value to our product and give us advantage? - Who are our key partners? (Suppliers, distributors, other companies), etc. - What partnerships in the channel of distribution can give us an advantage?	<b>Key competitors</b> - 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?	<b>Value propositions</b> - 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? - JTD - Design - Unique selling proposition of the product	<b>Key competences</b> - What key (core) competences do we need to have/acquire? - How do these competences raise the motivation of customers to buy our product?	<b>Customer segments</b> - Who are our checked customers? - Towards which group of customers is pointed our 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?
	<b>Key resources</b> How Key resources give us advantage? - financial - material - human - technological (innovation, patents, licenses) - What resources do we need now and in future?		<b>Channels</b> - 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?	
<b>Scope</b> - 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?			<b>Pricing and revenue streams</b> What is our price category? How our business model gives us advantage? How are our revenue streams giving us advantage?	

Figure 2: Strategic identifying and analyzing modeling canvas (Strategy modeling canvas SIAMC) developed by the author.

For each of these categories, general guiding questions were created, which to further support the strategic analysis work with the developed tool.

Additionally a three-step (A-B-C) process of usage of the tool was created, which to support the sequence of work with the 11 categories of the modeling canvas. The steps of working with the strategic modeling canvas are: (A) Defining the borders of competition; (B) Defining company's competitive advantage; (C) Defining company's needs to achieve strategic goals.

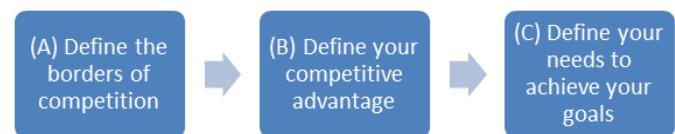


Figure 3: 3-step (A-B-C) process of work with the developed Strategic identifying and analyzing modeling canvas (SIAMC) The categories included in each of the steps are:

- (A) Step A - defining of the scope of competition includes work on the categories in sequence as follows: 1) Mission; 2) Goals; 3) Market scope; 4) Clients;
- (B) Step B - defining of competitive advantage includes work on the following categories: 5) Key competence/skills; 6) Product; 7) Key competitors; 8) Key partners; 9) Pricing and revenue streams;
- (C) Step C - defining of key elements from the strategic plan of actions (needs) includes the following categories: 10) Key resources; 11) Channels of distribution (incl. advertising activity).

The developed strategy modeling canvas is a part of the work of the future strategy management e-system for technology new ventures.

After finishing work with the strategic analysis stage, a transition towards the next stage of strategic management is made: strategic modeling.

## B. Stage 2: Strategy modeling process

The second stage in the strategy's management development is strategy modeling. This is one of the most crucial stages for the success of each company's strategy[7] and for this reason, a thorough research on the most suitable supporting tools was implemented.

The researched and presented in this chapter tools, processes and unifying algorithm are: Business Model Canvas[1], Balanced Scorecard Model and Methodology[8], Classification tools (Porter's Generic Strategies, Ansoff's Product-Market Matrix, different classification models, etc.), processes of strategy modeling and finally a remodeled process, including remodeled tools and classification, specifically designed for technology new ventures.

The research amongst 121 entrepreneurs in the technology sphere also included identification on the most widely used tools in the strategic modeling process – Business Model Canvas (BMC) and Balanced Scorecard (BSC).

TABLE II. USAGE OF STRATEGIC MODELING TOOLS (RESEARCH)

№	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 research showed that currently Business Model Canvas is the most widely used tool in the stage of strategic modeling, which is a part of the overall strategic modeling process. The Balanced Scorecard Model, although very popular amongst developed companies, proved to be unpopular and unused by the entrepreneurs in the technology sphere. On the other hand, Balanced Scorecard Model, is giving very useful insights[9] and for this reason is essential for the sustainable successful development of the technology new ventures and is optimizing strategic management immensely. For these reasons, the Balanced Scorecard Model was broadened and implemented in the process of strategic modeling, described further in this chapter.

The next step in the research was towards search of strategic categorization of strategies, which to be used for creating models, which to be implemented further in the e-system for strategic management for technology new ventures.

The results from the research were identification of three basic factors for classification of the companies, extracted from Porter's Generic Strategies (regarding innovativeness of the companies and market scope), Ansoff's Product-Market Matrix (regarding market scope and maturity of the market/product). The result is a 3-dimensional classification of the typological strategies for technology new ventures, which is presented with the following two tables.

TABLE III. TYPOLOGICAL STRATEGIES FOR TECHNOLOGY NEW VENTURES – CLASSIFICATION MODEL (RESEARCH)

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

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 classification for typological strategies for technology new ventures consists of eight typological strategies according the research and verification implemented by the author based on: (1) the innovative potential of the company; (2) the market scope; (3) the maturity of the market. According the positioning of the company in one of these categories, there is a typological strategy describing the basic key factors of success, strategic threads, etc. for each strategy, developed by the author in previous researches[10]. The belonging of a company at a particular typological strategy in the classification matrix is implemented by a specific algorithm, identifying company's key characteristics at the strategic management e-system. When classification is used in paper format, companies can be classified by identifying their belonging to the values of each of the three-dimensional variables.

The strategy modeling process presented in this article is divided in two parts. First part is modeling of typological strategies, together with their developed in advance detailed characteristics, tools and remodeled processes, according the company's classification and second part is modeling of the specific for the company strategy, by modifying and adding additional data and categories to the developed typological strategy. Both steps of the strategic modeling process are presented in this article.

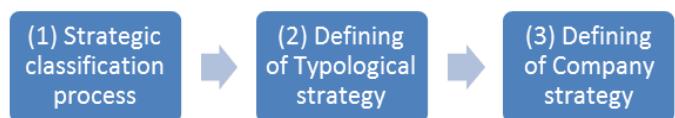


Figure 4: Strategic modeling process steps

After identifying the position of the company at the matrix, the typological strategy of the company is formed. It is based on modeling process, remodeled on the basis of classical strategic modeling process. The typological strategy modeling starts with defining a set of key factors of success, identified through the implemented amongst 121 entrepreneurs research. These key factors of success are connected with the main characteristics of the typological strategy and with the typological characteristics of that type of technology startup companies. These Key factors of success are laying the first step in the strategy modeling data. Their interconnections are visualized through strategic map of the key success factors.



The list of key success factors is specific for the particular typological strategy. In order to improve the sustainable strategic development of the technology startup companies, the identified Key factors of success are organized according a modified Balanced Scorecard model.

The modified model of balanced scorecard includes the basic perspectives – financial, client, internal processes and learning and growth perspectives, with additional product perspective. The modified BSC model has the following perspectives: financial, client, product, internal processes, learning and growth perspective.

The modification is based on the startup companies “search mode” connected with product-market fit[11], business model development focus and the experience of the author on working with balanced scorecard methodology.

TABLE IV. 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 <b>without</b> Product perspective	15%
8	Balanced Scorecard <b>with</b> Product perspective	85%

After the modification of the Balanced scorecard model, entrepreneurs in the technology sphere showed higher preference towards the modified model with product perspective.

Using the modified Balanced Scorecard model, a typological strategy is implemented, following the process: (1) identification of Key success factors; (2) identification of typological Strategic goals for each of the Key success factors; (3) identification of Key performance indicators; (4) identification of typological strategic actions for reaching the typological strategic goals.



Figure 5: Typological Strategy Modeling Process

All upper mentioned Key Success Factors, Strategic goals, Key Performance Indicators and Typological actions are previously developed by the author and their content is described as research outcome. The resulted table has the following structure:

TABLE V. 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			
Key success factors	Typological Strategic Goals	Key Performance Indicators	Typological Strategic Actions
Data*	Data <sup>a</sup>	Data <sup>a</sup>	Data <sup>a</sup>

a. Data is ordered according the modified Balanced Scorecard Model.

After presenting the developed typological strategy to the entrepreneurs by the e-system for strategic management, next step in the process is modification and upgrading of the

typological strategy table towards a specific company's strategy.

The modeling of company's specific modeling strategy is connected with updating the table with company specific data in the upper mentioned four categories, as well as adding an additional data categories in the following directions: (1) specifying category “target values”, which shows the different for each company target values for reaching in achieving the strategic goals; (2) specifying specific actions for each group of typological actions, in reaching the strategic goals. The table of modeling of specific company's strategy has the following structure:

TABLE VI. 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				
Key success factors	Strategic Goals	Key performance Indicators	Target values	Specific Strategic Actions
Data*	Data <sup>a</sup>	Data <sup>a</sup>	Data <sup>a</sup>	Data <sup>a</sup>

a. Data is ordered according the modified Balanced Scorecard Model.

Next finalizing step in the process of strategy modeling is implementing ranking by importance for each key success factor, as well as for each specific strategic action. This step can be implemented in the development of typological strategy and the results is formulation of overall ranking, which supports the process of strategic implementation and execution. Overall ranking (low=1, average=2, above average=3, high=4, very high=5) is formed by attaching quantitative expression to this qualitative indicators and by multiplying the level of importance of the key success factors and the specific strategic actions. The result is an overall ranking by importance of the strategic actions for the technology startup company.

The next step in the process is adding category for person responsible for the implementation of each strategic action and defining of deadlines for its achievement.

In this way the information in the strategy table is containing all strategic choices of the technology startup company and further with ranking by importance and urgency, this table will be very useful in the processes of strategy implementation, execution and control.

The next step in the strategic management is strategy implementation, which is preparing the technology new ventures for strategy execution stage.

### C. Stage 3: Strategy implementation process

The strategic implementation process is the process of preparation for strategy execution stage. In the stage of preparation for strategy execution the technology entrepreneurial team has to consider all resources necessary for the successful implementation of the strategic choice and prepare for strategy execution. All previous tools and processes from the strategic analysis and strategy modeling stages are used in this stage.

The identified main steps in the strategy implementation process for the technology new ventures are: (1) considering necessary resources - financial, human, technological and material; (2) considering partners, scope of partnership and specific actions with partners; (3) considering deadlines, responsible people and target values to achieve; (4) ordering the table of actions by level of importance and ensuring necessary resources.

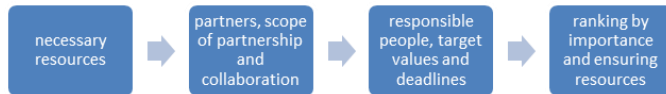


Figure 6: Strategy implementation process

After considering all data and taking actions for preparation for strategy execution, the technology new venture team is ready to initialize the company's strategy execution.

#### D. Stage 4: Strategy execution process

The strategy execution process main goal is achieving the strategic goals of the company. For this process, the strategic table usage is essential. It provides guidelines on the actions, responsible team members, importance (through ranking) and urgency (through deadlines) for the tasks. The presented algorithm for e-system includes at this stage a model for prioritizing tasks during their execution process.

TABLE VII. PRIORITISATION OF STRATEGIC ACTIONS DURING STRATEGY EXECUTION PROCESS (RESEARCH)

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

After the strategic execution process is managed with the support of the e-system, providing overview, sorting tools and automatic ordering of the actions, a transition to the strategy control and evaluation stage can be implemented.

#### E. Stage 5: Strategy control and evaluation process

The strategic control and evaluation stage is aimed towards discovering at earliest possible point deviations from the planned results and undertaking of correcting actions and measures for successful reaching of the targeted goals. In the process of strategy control and evaluation for technology new ventures, a simplified process, containing all basic steps in the control process is developed. The developed process contains: (1) periodical overview of the chosen target values of KPIs; (2) overview of the current deviations from the projected target values to be reached for each of the smaller periods the team has made predictions for; (3) evaluation of the results from the control implementation and undertaking of correcting activities for managing and diminishing of existing deviations.

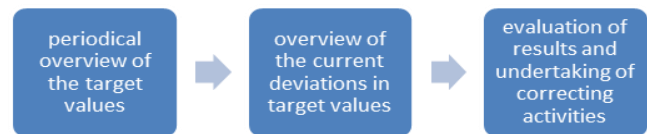


Figure 7: Strategy control and evaluation process

With this finalizing process, the algorithm of the presented e-system is offering a complete strategic management support system, which is oriented entirely towards the needs and specifics of the technology new ventures.

### III. Conclusion

The presented algorithm for innovative strategic management e-system includes all stages in the classical strategic management process. The algorithm follows the sequence of steps in the process of strategic management, including the underlining processes, tools and interconnections, as well as the automation principles of work of the system and its applications. The presented algorithm is specifically designed for technology startup companies and is corresponding to the specifics and needs of the technology new ventures strategic management process.

#### Acknowledgment

This work was supported by the European Social Fund through the Human Resource Development Operational Programme under contract BG051PO001-3.3.06-0052 (2012/2014).

#### References

- [1] A. Osterwalder, I. Peigner (2010), Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers, Wiley, John & Sons Inc.
- [2] A.Haberberg, A.Rieple (2008), Strategic Management: Theory and Application, Oxford University Press.
- [3] Harvard Business Press (2005), Strategy: Create and Implement the Best Strategy for Your Business, Harvard Business Press.
- [4] Harvard Business Press (2006), Harvard Business Essentials: Strategic management, Harvard Business Press.
- [5] J. Thompson (2005), Strategic management: Awareness and change, Cengage Learning EMEA.
- [6] J. Timmons (2006), New Venture Creation: Entrepreneurship in the 21st Century.
- [7] P. Ruskov (2009), Strategic Model and Framework for IT/IS Graduate Education.
- [8] R. Kaplan, D. Norton (1996), The Balanced Scorecard: Translating Strategy into Action, Harvard Business School Press.
- [9] R. Kaplan, D. Norton (2001), The Strategy-focused Organization: How Balanced Scorecard Companies Thrive in the New Business Environment, Harvard Business Press.
- [10] 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.
- [11] Steve Blank, Bob Dorf (2012), Startup Owners Manual: The Step by Step Guide to Building a Great Company.