MACROJOURNALS

The Journal of **Macro**Trends in Technology and Innovation

Algorithm of Innovative Strategic Management E-System for Technology New Ventures

SIA TSOLOVA

Faculty of Mathematics and Informatics, Sofia University "St. Kliment Ohridski", BULGARIA

Abstract

This work aims presenting the results from a research in the field of strategy modeling for technology new ventures. It is presenting the results from a research on algorithm for strategy modeling for technology new ventures, confirmed by a research among 121 participants (107 from Bulgaria and 14 from other countries). The presented algorithm is used as a basis of a strategic e-management system supporting the process of strategic management in start-up companies (technology new ventures). The presented algorithm is preceding the final step in the development of a strategy modeling for technology new ventures, which is subject of research by the author. The developed algorithm includes the following stepping stones (redesigned by the author) and their interactions and interconnections: a redesigned and optimized process for strategy management and strategy modeling specifically for technology new ventures, an updated model of balanced scorecard methodology, innovative strategic modeling canvas for strategy modeling, as well as classification of eight basic types of strategies for technology new ventures, based on three-dimensional characteristics field, which applicability for technology new ventures has been tested among 121 entrepreneurs. The presented algorithm can be used for future development of different implementations of strategic e-management systems for technology new ventures (technological start-up companies).

Keywords: *algorithm, strategic, modeling, management, e-system, research, technology new ventures, technology, entrepreneurship, strategies, canvas, methodology*

1 Introduction

The current rapid development of entrepreneurship in technology sector worldwide is bringing much stronger to the research field the questions connected with the development of strategic management systems, especially pointed towards the field of technology new ventures

(technology startup companies), and is addressing the need of change and customisation of the classical strategic management process and the traditional tools used by the developed companies worldwide. The specifics of the entrepreneurial activity [8] and process is leading to the natural modifications of the tools for strategic management and strategic modeling and is showing the need for developing up-to-date algorythms corresponding to the changed process of management in the entrepreneurial world [1]. The new business models, the small size of the entrepreneurial teams, the lack of complex hierarchical structure and the limited resources at these companies [14], as well as the new online environment and rapid development of future technologies is fostering the need for optimisation of the strategic management and strategic modeling processes and to the development of corresponding e-systems, based on innovative algorythm, suitable for the entrepreneurial needs.

The current article is proposing an innovative algorythm for developing of an e-system, supporting the process of strategic modeling for technology new ventures (technological start-up / entrepreneurial companies). The algorythm is based on a research amongst 121 entrepreneurs (107 from Bulgaria and 14 from other countries), an innovative modeling process, proposed by the author, a classification of the basic typological strategies, verified with research by the author, an updated model by the author of the balanced scorecard methodology and integration of developed by the author strategy identifying and analysing modeling canvas, as well as integration of all upper mentioned parts in the overall process of strategy modeling.

2 Problem Formulation

Strategy modeling is a question of extremely high importance for technology new ventures, due to the rapidly changing environment in the technology sphere, as well as the high level of competition on the market, the short product life-cycle periods and the high level of uncertainty in long-term prediction of the future directions in the technological development [15].

The classical tools, methods and process of strategic management and strategy modeling, developed till now, however, are pointed towards the needs of developed companies and corporations, which have a high number of employees, complex infrastructure and internal processes, complicated hierarchy, hierarchical decision making, complex operational management structures, higher level of resources – financial, human, material, technological, etc. and for these reasons are not designed to correspond to the needs of technology new ventures [12].

Entrepreneurial technology startup companies are missing almost all of the upperly mentioned features and are usually founded by smaller teams, often of technology-oriented specialists, lacking a deep knowledge in strategic management and strategic modeling processes. These processes are the ones, which are going to stay responsibility of the founders of the companies [5], even after the companies start to grow and companies start hiring specialists for the various operating management positions, such as marketing, accounting, production, law, financial management, etc. However, if a company doesn't develop a winning strategy [10] and doesn't execute it well, it probably will not be able to reach the stages of developed company, for which so many complicated and expensive systems are developed [9]. And still, even there, strategy

modeling is considered to be based more on personal skills and intuition and is lacking supportive systems for their development.

Currently most of the technology startup companies are using as their main tools for strategic modeling – SWOT analysis and business model canvas [3], which are part of strategic analysis and strategic modeling parts of the strategic management process, and although being an essential part, they are not giving the entire information for modeling of a successful and completed strategy [6].

3 Problem Solution

The current article is proposing an algorythm for the development of an e-system, supporting the strategic modeling process for technology new ventures, which is based on an implemented research amongst 121 entrepreneurs and is showing the place and importance also of the upperly mentioned tools, currently most known and most frequently used by entrepreneurs.

3.1. Overall process

The strategic modeling process is part of the basic strategic management process for developed companies [11], which is generally applicable also for the technology new ventures:

1. Defining Mission and basic values of the company.
2. Defining Vision for the future development of the company
3. Strategic analysis – analysis of the micro and macro environment – tools: SWOT, PEST, 5 Porter's Forces, Unique Selling Proposition, Core Competences, Niche/Gap analysis, etc.
4. Strategy formulation/modeling (at all levels and according the sub-divisions for developed companies, which is different for technology start-up companies due to their different organisational structure) - key factors for success, strategic goals, target values, etc.
5. Strategy implementation and strategy execution.
6. Strategy control and evaluation.

See Figure 1.: Strategic management process

The focus of this article is the process of strategic modeling which is between Strategy analysis and Strategy implementation steps. For this reason we are going to offer an easy transition between these steps and present the structure of the process of strategic formulation itself [2].

The algorythm presented in this article is based on the classical strategic management process, but is completely designed towards the needs of the technology new ventures.

3.2. Initial steps in the proposed algorythm

The algorythm starts with defining the mission and vision of the company, aiming answering the questions – "Why does this company exist?" and "How do you see the future of this business sphere and your place in it?". This initial step also includes defining the basic values of the

future company, which stay almost unchanged in its existance. Answering all this questions supports the further strategy modeling and definition of the key factors of success for the technology new ventures. The key success factors are derived directly from the vision of the entrepreneurs for the company and the business sphere they are into, but also from the typological strategy of the company.

3.3. Typological strategies

There are eight basic typological strategies for technology new ventures, verified through a research by the author, amongst 121 entrepreneurs, which are divided based on three dimensions – the level of innovativeness of the company, the scope of the market they are operating on and the type of the market (new market – existing market). All these typological strategies have common directions of development, common key success factors and common strategic threads in front of their development. These factors are included in the algorythm, based on the results of the implemented research and are showing results, confirming the suitability of the chosen dimensions[1] [7].

The algorythm starts with defining the place of the startup company according the typological strategies classification by asking questions in order to define the capabilities of the companies according the three dimensions – innovativeness, market scope and market stage of development, as well as by showing the different types of companies according the classification to the entrepreneurial team as second step of confirmation of the correct choice of typological strategy for the company and giving chance of the entrepreneurs to check and correct if necessary their position in the classification table. The correct choice of company's typological strategy is of essential importance for the proposed algorythm. This is in fact shaping the key success factors, strategic threads and their level of importance, derived from results of the implemented by the author research, which is an essential part of the following stages of the process.

3.4. Using an updated balanced scorecard methodology

After defining the typological strategy of the company, the entrepreneurs are moved to the next section, which is defining of the strategic goals in front of their company, their strategic advantage and choosing the steps they are going to take in order to reach their goals.

This step is a combination of the categories of: 1) updated by the author balanced scorecard methodology, and 2) developed by the author strategy identifying and analysing modeling canvas.

The updated balanced scorecard methodology includes the following perspectives: financial perspective, customer perspective, internal processes perspective and learning and growth

[1] The full results are published by the author at 6 International Scientific Conference "E-Governance" – June 2014, Sozopol, Bulgaria.

perspective, which are the classical perspectives in the balanced scorecard methodology [13], as well as added by the author product perspective.

The Product perspective connects on one side - how the company is answering to Clients needs with its product and on the other - how the company will optimise its internal processes to meet the clients' needs by improving the offering of this product. The information filled in the Product perspective is largely connected with what is developed in the value proposition segment of the business model canvas development.

The updated balanced scorecard methodology has the following order of the perspectives: 1) financial perspective, 2) customer perspective, 3) product perspective, 4) internal processes perspective and 5) learning and growth perspective. For each of these perspectives the key success factors, strategic goals and actions for achieving these goals should be defined.

See Figure 2.: Updated Balanced Scorecard model

The formulation of the classical strategy maps according the balanced scorecard methodology includes finding the interconnections and dependabilities between the factors and strategic goals in all perspectives, for each of the eight typological strategies. After the development of the main characteristics of the eight typological strategies, and building the strategic maps, an interactive opportunity for choice and adjustment of the strategies for the particular technology new ventures will be offered to the entrepreneurs through a system, developed according this strategic modeling process and algorythm. In order to make easier gathering the huge amount of directions, included in the strategic thinking and strategy modeling, the main categories of the developed by the author strategy identifying and analising modeling canvas will be used.

3.5. Strategy identifying and analising modeling canvas

The developed strategy identifying and analising modeling canvas is developed by the author as a tool supporting the strategic research and analysing process through a combination of the most important categories from strategic point of view from the different strategic analysing tools. The relevance and importance of these categories were also tested through the implemented research by the author. The categories from the strategy modeling canvas are: 1) Mission, Vision, Values, Priorities and Aspirations of the Company; 2) Goals – What the company wants to achieve; 3) Value Proposition of the product; 4) Customer segments; 5) Scope of the market; 6) Channels; 7) Key Partners; 8) Key Competitors; 9) Key Resources; 10) Key competences; 11) Pricing and revenue streams.

See Figure 3.: Strategy identifying and analysing modeling canvas

Additional section is 12) Advertising, which is following all other mentioned categories, but it will be placed further in the algorythm description.

3.6. Three steps of strategy modeling

After defining the typological strategy for the particular company, using the system, an introduction to the general key success factors for this typological strategy will be made and the different categories from the strategy modeling canvas united with the different perspectives according the balanced scorecard methodology will be offered to the entrepreneurs. The

combination of categories includes all important steps, which should be taken into account from the entrepreneurs in the process of strategy modeling.

For the easier and more efficient work with the many categories in the process of strategy modeling, a three step process is proposed in this article, dividing the steps according their most important features.

The first step from the proposed in this article algorythm in this three-step modeling process is defining the scope and borders of company's activity and it includes the following categories: 1) Mission, 2) General goals and aspirations, 3) Scope; 4) Clients segments; 5) Product perspective.

For each of the categories, there are key success factors, goals and activities proposed, which are aiming at defining answers of the questions: 1) Category Mission – Questions: Description of the Mission, Vision, Values, Priorities and Aspirations of the Company; 2) Category General goals and aspirations – Questions: What are the Strategic general goals, the company wants to achieve?; 3) Category Scope of the market – Questions: 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?; 4) Customer segments – Questions: 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? 5) Category Product perspective – Questions: What are the product groups with which the company will enter the market?

The main goal in answering to these questions is setting the frames and scope of business for the company and start modeling the particular strategy for success for the company. The e-system, based on the proposed algorythm, has outline of the typological strategy from the implemented by the author research, and with these steps we are trying to create the specific strategy for the company, which will be using the e-system with corresponding algorythm.

The second step from the algorythm for strategy modeling is aiming to define answers to the questions about the key competitive advantage of the company with its product. This is also the place, where the business model gets clarified. The categories included in this stage are: 1) Category Value Propositions – Questions: 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? What is the actual "job to be done"?; Design; Unique selling proposition of the product; Which level of quality is enough to gain competitive advantage?; 2) Category Pricing and revenue streams – Questons: What is our price category?; How does our business model give us advantage?; How are our revenue streams giving us advantage?; 3) Category Channels – Questions: What channels are we going to use? What are preferred by the clients?; Which channels are giving us higher advantage – own or foreign? How used channels of distribution are giving us advantage? The goal of answering these questions leads to clear image of the company's competitive advantage.

The third step in the process aims defining answers to the questions on implementation of the outlined strategic plan of the company. Its categories are: 1) Category Key Resources – Questions: How Key resources give us advantage? -financial; material; human; technological (innovation, patents, licenses); What resources do we need now and in future? What are the techno-logical capabilities of our company?; 2) Category Key competences - Questions: What key (core) competences do we need to have/acquire?; How do these competences raise the motivation of customers to buy our product?; 3) Category Key Partners - Questions: How do the key partners add value to our product and gives us advantage?; What partnerships in the channel of distribution can give us an advantage? Who are our key partners? (Suppliers, distributors, other companies), etc.; 4) Category Key Competitors - Questions: Who are our competitors/substitutions?; How competitors are threatening our success?; Is this the core competence and key reason for customers to buy such a product? In what field are they better at?; 5) Category Advertisement – Questions: What is the most suitable advertising tactics for our product to reach our clients? With this third step the entrepreneurs will answer questions aiming defining the necessary tools and steps for achieving their goals.

See Figure 4.: Basic steps in the strategy modeling process

The proposed process is part of the algorythm, using the qualitative data and discovered interconnections as a results from the implemented research in the formulation of summarised strategic plan and table of activities.

3.7. Automated plan of action and classification by importance

The implemented steps from the upperly mentioned process are the first step in creating the strategic plan of actions of the entrepreneurs. After defining answers of the questions, a set of proposed activity groups, derived from the research for the particular typologic strategy, are going to be proposed to the entrepreneurs and they are going to choose general activity groups and fill in the specific activities they are going to implement.

For each chosen activity, additional information will be requested: 1) performance indicators for tracking a successful achievement of the goals; 2) target values, showing the desired levels to be achieved by the company and 3) name of person responsible for the implementation of the particular activity.

With this step, the system supports further the process of strategy implementation, which is followed by the process of strategy execution, according the general strategic management process, applicable for all types of companies.

After specifying all the actions and choices by the entrepreneurs for their strategy, an automated evaluation of the importance of the chosen actions is implemented and a table of action is automatically formed.

3.8. Table of strategic actions

This step is creating an automated table from all chosen actions, including the automatically attached to the different groups of answers and pre-defined: 1) key success factor; 2) typological strategic goals; as well as the specific, chosen by the entrepreneurs: 1) specific

goals; 2) specific actions for the achievement of the specific goals; 3) key performance indicators; 4) target values; 5) level of importance and 6) person, responsible for the implementation of the corresponding action.

See Figure 5.: Structure of the table of strategic choices

The table is deriving automatically also the level of importance for the particulat actions, again from the implemented amongst 121 entrepreneurs reseach, and is makinf a prioritisation of the tasks in the strategic plan, according to their importance, connected with the key performance indicators.

Further an indicator about the progress of implementatio for each task (or indicator for completed task) can be added to the table.

This is the last step from the strategy modeling algorythm and process, which is naturally followed by the next step in the strategic management of the company – the strategy implementation process, which is a preparation of the team for execution of the strategic plan.

With this step the strategy formulation process is finished and an easy transition towards the strategy implementation is made.

At this stage of strategic modeling and strategy management the technology new ventures will have available all necessary information for entering the next step of the strategic management process, which can be a subject of research in future in connection with creation of optimised algorythm and e-system, supporting this process.

The process of strategy modeling is of key importance for every company, specially for technology new ventures. A good strategy, combined with a good implementation is an essential part of the success of startup companies and in technology sphere often competitive advantage come from better strategy and better execution. For this reason, the questions connected with improving further the process and algorythm of strategy modeling are an important topic for development in future.

4 Conclusion

The quickly changing environment in technology sphere is making the task of creating a successful technology new venture even harder. This, together with the specifics of the startup companies is leading towards the development of many new tools, supporting the success of startup companies. Strategy management is one of the most important activities of the company, and for this reason, the development of suitable methodologies, algorythms and supportive e-systems is even more necessary than ever.

The proposed algorythm is uniting suitable measures from many different tools and methods, some of them developed, other verified or changes by the author. As a results an algorythm for strategic modeling is proposed, which can be used as a basis for creation of supportive strategi modeling e-systems for technology new ventures. The algorythm is based on the classical strategic management process, strategy modeling canvas, developed by the author, updated by the author balanced scorecard model, verified by the author classification of basic typological strategies, results from a research, implemented by the author and a process and algorythm for

strategy modeling, which can be applied in a strategy modeling e-system, developed also by the author.

The proposed algorythm for strategy modeling is subject of further research and experimentation by the author and is connected with the further development of an e-system, supporting the process of strategy modeling for technology new ventures.

Acknowledgements:

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.Haberberg, A.Rieple, *Strategic Management: Theory and Application*, Oxford University Press, 2008.
[2] *Harvard Business Essentials: Strategy: Create and Implement the Best Strategy for Your Business*, Harvard Business Press, 2005
[3] A. Osterwalder, I. Peigner, *Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers*, Wiley, John & Sons Inc., 2010
[4] R. Kaplan, D. Norton, *The Strategy-focused Organization: How Balanced Scorecard Companies Thrive in the New Business Environment*, Harvard Business Press, 2001.
[5] M. Hitt, R. Ireland, *Competing For Advantage*, Cengage Learning, 2008
[6] *Strategy: Create and Implement the Best Strategy for Your Business,* Harvard Business Press, 2005.
[7] S.Tsolova, *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
[8] Steven Gary Blank, *The Four Steps to The Epiphany – Successful Strategies to Products that Win*, 2006.
[9] B.Yankov: *Research of Success Factors for Start-up Companies*, Doctoral Conference in Mathematics, Informatics and Education, MIE 2013, ISBN 978-954-07-3596-2, pp. 119-124 (2013)
[10] J. Thompson (2005), *Strategic management: Awareness and change*, Cengage Learning EMEA, 2005.
[11] *Harvard Business Essentials: Strategic management*, Harvard Business Press, 2006.
[12] Steve Blank and Bob Dorf, *Startup Owners Manual: The Step by Step Guide to Building a Great Company*, 2012.
[13] R. Kaplan and D. Norton, *The Balanced Scorecard: Translating Strategy into Action*, Harvard Business School Press, 1996.
[14] M. Panova and T. Panov, *Strategic management*, 2008.
[15] Jeffry Timmons, *New Venture Creation: Entrepreneurship in the 21st Century*, 2006.

Appendix 1: Figures from text.

Figure 1.: Strategic management process (below)

Figure 2.: Updated Balanced Scorecard Model (below)

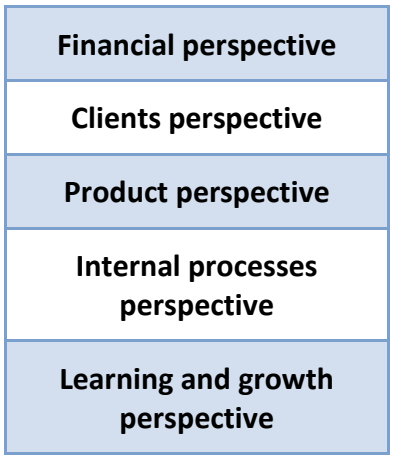

Figure 3.: Strategy identifying and analysing modeling canvas (below)

<table>
<tr><td colspan="3">Mission
Describe the Mission, Vision, Values, Priorities and Aspirations of the Company</td><td colspan="3">Goals
What are the Strategic general goals, the company wants to achieve</td></tr>
<tr><td rowspan="2">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?</td><td>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?</td><td rowspan="2">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?</td><td>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?</td><td rowspan="2">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?</td></tr>
<tr><td>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?</td><td>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?</td></tr>
<tr><td colspan="3">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?</td><td colspan="3">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?</td></tr>
</table>

Figure 4.: Basic steps in the strategy modeling process(below)

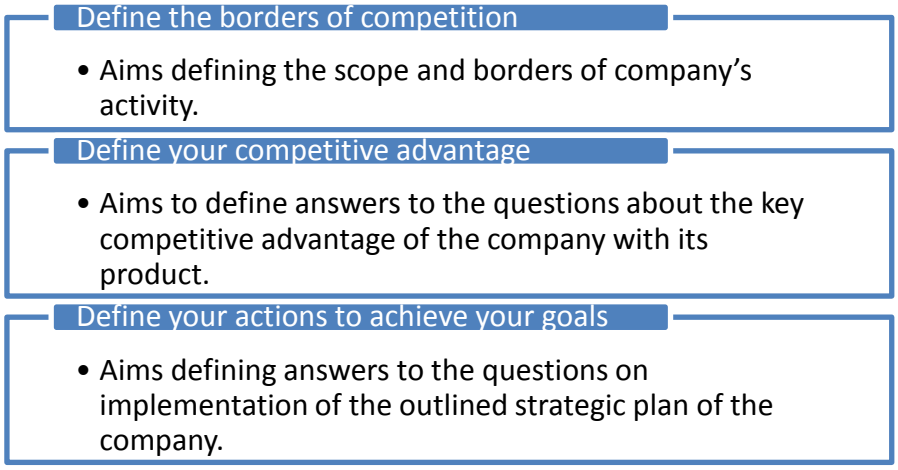

Figure 5.: Structure of the table of strategic choices

key success factor	typological strategic goals	specific goals	specific actions for the achievement of the specific goals	key performance indicators	target values	level of importance	person, responsible for the implementation of the corresponding action
Table will be filled with company's strategy specific data with automated matching of key success factors and the corresponding level of importance with measures based in implemented research implemented by the author amongst 121 entrepreneurs.							