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Innovative Strategic Modeling E-System for Technology New Ventures

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Abstract

This work presents the final results from a research in the field of strategy modeling for technology new ventures in its final stage – presenting an innovative e-system for strategy modeling for technology new ventures developed by the author and presenting results from the approbation of the developed system. The innovative e- system for strategy modeling for technology new ventures is developed following a developed by the author innovative algorithm [7] for strategy modeling for technological startup companies and number of instruments and process modifications implemented in the system in the strategic modeling process. The algorithm and all included in the system instruments and modifications in the process, have been confirmed by a research, conducted amongst 153 participants (136 from Bulgaria and 17 from other countries). The presented system is aimed towards introducing a unified system for strategic modeling, including a smooth transition between the processes of strategic analysis, strategic formulation and strategic implementation. This is achieved by: (1) introducing an unified instrument for strategic analysis and identification of the key characteristics and competitive advantages for the companies, developed by the author; (2) application of a threedimentional framework for categorisation of the basic typological strategies for technology new ventures, together with further full development of the typological strategies, based on a modified model and process of balanced scorecard methodology, developed by the author and (3) a process guiding the entrepreneurs from typological strategies characteristics towards concrete strategies characteristics and activities for their technology new ventures, which represents a smooth transition towards the next stage of strategic management– the strategic implementation stage. All theoretical models, developed by the author, included in the development of the presented system are shown in the appendix of this article. The presented innovative e-system can be used as a basis for further development of the innovative e-system for strategy modeling towards a full strategic management e-system, specifically designed for technology new ventures, covering all stages of the strategic management process.

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

1 Introduction

This paper is presenting the results from a research on creating of an innovative methodology and algorithm for strategy modeling for technology new ventures and its realization by an innovative e-system for strategic management for technology new ventures. The paper introduces the results from the implemented research and presents the developed innovative e-system, as well as initial results from the testing of the system. This article is based on the upper mentioned previous research and is presenting the development of the innovative e-system for strategic modeling for technology new ventures. The article includes presenting of the algorithm in the system's basics, the architecture and work flow of the system, its structure and functions, modules and their interconnections, the hierarchy of users and their types, as well as the structure of the web site, screenshots presenting the system, and initial results from its testing.

2 Problem Formulation

The existing tools and instruments in strategic management [16] are having difficulties in their application for startup companies, due to the fact that (1) they are not specifically designed for such kind of companies [15], (2) there are many tools and many times the information between them is overlapping [2], (3) startup team members usually are not acquainted with all the tools and sometimes they don't find them useful. This is very true for strategic analysis tools, but also for strategic modeling tools as well. The most famous ones is Porter's Generic Forces Classification of strategies. It is true, but for technology new ventures it is not sufficient. There are currently emerging some good instruments, developed specifically for startup companies, such as Business Model Canvas[3], Lean Methodology, etc., which are parts of the overall strategic management [1] of the company, but problem with strategic modeling is still unsolved at general.

The proposed in this article e-system is based on the following results, developed by the author: (1) a research in the field of strategy modeling amongst 153 participants in the technology entrepreneurship sphere, (2) developed 3D+ strategic classification matrix (SIA Classification Matrix – Strategy identifying and analyzing Classification Matrix) with developed 10 typological strategies, based on Porter's Generic Strategies (4 typological strategies), Ansoff's Product-Market Matrix (4 typological strategies), a 3D matrix for strategic classification of S. Peng and Z. Bae [12] (7 typological strategies) and qualitative and quantitative research by the author amongst 153 entrepreneurs in the technological sphere. (3) definitions of the visions (typological) of the typological strategies, defined in step (2); (4) An innovative model of the classical Balanced Scorecard Methodology [4] with additional perspective - Product perspective, added by the author, as a result from the conducted research, (5) full developed tables of all 10 typological strategies for technology new ventures (based on research about the strategic advantages and strategic threads of the company, connected with the visions of the typological strategies). The tables are created according the Balances Scorecard methodology, with the enriched by the author model; (6) An enriched process for creating of company-specific table of strategic choices with additional categories for creating of a specific company strategy for the companies, based on the common table of strategic choices from step (5); (7) description of the

entire process of strategic modeling, offered by the author and (8) presenting of an innovative e-system for strategic modeling for technology new ventures, based on the described processes and tools. The e-system is called Strategy Identifying and Analyzing Modeling System (SIA MS), which is part of a further development of an entire strategic management system for technology new ventures. In order to test the upper described instruments, models, methodologies and classification framework, developed by the author, a need of developing an innovative e-system, integrating the developed instruments, models, methodology and classification framework is necessary, as well as a development and application of the methodology for the approbation of the theoretical developments and the system itself. This article will present also the initial results from the system's approbation.

3 Problem Solution – development of the system

The current article is based on research amongst 153 entrepreneurs in the technology sphere, and presents the outcomes and the results from this research. The results from the research were extracted by using IBM SPSS Statistics 19 and IBM SPSS Modeler 14. They include: innovative overall process for strategy modeling for technology new ventures developed by the author, which is part of developed by the author overall process of strategic management (Appendix A - figure A); research and analysis on the classical strategic management tools usage; innovative Strategic Analysis Tool for technology new ventures – SIAMC canvas developed by the author (Appendix A - figure B); innovative Typological Classification Matrix – SIA Matrix (Strategy identifying and analyzing Classification matrix) developed by the author(Appendix A - figure C); updated Balanced Scorecard Model with five perspectives (Appendix A - figure D); developed typological strategies tables of strategic choices (Appendix A - figure E); innovative process for creating company-specific strategies for technology new ventures, based on the provided typological strategies tables of strategic choices from the previous step.

3.1. Application of the system

The informational system aims supporting the process of strategy modeling for technology startup companies. The usage of the informational system will contribute to the optimization of the main processes in the strategy modeling and management. The real-world processes in the strategic management, which the system supports are the overall process of strategy modeling for technology new venture and part of the process of strategy implementation (preparation for execution).

In each one of these processes users from the following types participate: users from type "Administrator", "Company Manager" and "Team Member", which leads to developing the processes for each type of users of the system, due to the different levels of their rights and responsibilities. Further in this paper, a description of the rights and the processes of work for each type of user will be developed.

3.2. Functionalities of the system

The functionalities of the e-system are: (1) registration and management of the users of the system, (the system has three basic types of users); (2) realization of the algorithm of defining

typological strategy type of the company; (3) presenting typological strategy vision for the particular type company; (4) presenting the tables of strategic choice of the chosen typological strategy for the company; (5) presenting medium for presenting and development of the typological strategies (development is available only for administrator users); (6) presenting medium for building of company-specific strategy for the company, based editing the table of strategic choices of the respective typological strategy; (7) medium for evaluating the level of priority for the key success factors [10] and strategic actions of the company's strategy; (8) medium for updating the company strategy in the process of its implementation and execution.

3.3. Modules of the system

In order to complete the functionalities, defined in the previous point, developing the following modules in the system is necessary:

- Module „Perspectives for development"
- Module „Key success factors"
- Module „Strategic goals"
- Module „Key performance indicators"
- Module „Strategic actions"
- Module „Typological strategies"
- Module „Company's strategies"
- Module „Users"

Figure 1. Relations between the modules in the system

The described in these chapter categories are presenting also the main activities during the work with the informational system, as they capture the entire sphere of information, used in the process of strategy modeling for technology new ventures.

3.4. Roles in the system

The roles in the informational system are defined on the basis of the actual participants in the process of strategic modeling. Their division is the following:

- **User from type "Administrator"** – users who can add, edit, activate and activate users from all types. Users from this type have access to all modules of information, which are: perspectives for strategic development, types of strategies, typological strategies' visions and their main characteristics, key factors for success. strategic goals, key performance indicators, typological strategic actions, management of the company's strategies, management of the priority levels of key success factors and strategic actions, management of pages in the system.

- **User from type „Company Manager"** –users who register a company in the system and who can add and manage other participants from the company in the strategic modeling process from type Team Members users. They are the users, who are adding new strategies for a certain company. The users from type "Company Manager" have access to all stages of modeling of strategies, editing the names of the strategies, choice of typological strategy during

new strategy adding process, overview on the developed strategies, adding and editing key success factors, strategic goals, ley performance indicators, strategic actions, priority levels for the key success factors and strategic goals. Users from type "Company Manager" are the company managers of the startup companies.

- **User from type „Team Member"** – users who are members of a certain company. Users from this type have access to overview on the information for the company's strategy, but they can add and manage only the strategic actions of the company. Users from this type can edit also the priority levels of the strategic actions and their target values.

The scheme below is showing the structure and roles of the users in the system.

Figure 2. Organizational scheme of the system

3.5. Rights to access of information in the system

The rights to access of information and activities in the system are always upgrading the rights of the previous type of user, as follows: users of type "Team Member" have lower level of access, users from type "Company Manager" have all rights of users from type "Team Manager" plus additional rights, users from type "Administrator" have all rights of users from type "Company Manager" plus all other rights in the system.

List of the rights to access of information for users of type "Team Member":

- Right to access information about the typological visions and basic characteristics of the company's strategy.
- Right to receive information from the table of strategic choices of the company's strategy and to edit the strategic tasks, target values, priority of the tasks, deadline of the tasks and percent completed.
- Right to view and edit own registration data.

List of the rights to access of information for users of type "Company Manager":

- all rights from user type "Team Member", as well as:
- Right to create new company strategy and choose typological strategy
- Right to edit all information in the tables of strategic choices of the company strategy
- Right to add a new user from type "Team Member"
- Right to edit details of users from type "Team Member"
- Right to activate and deactivate users from type "Team Member"

List of the rights to access of information for users of type "Administrator":

- all rights from user type "Company Manager", as well as:

- Right to edit the information of Typological strategies – visions, main characteristics and the tables of strategic choices.
- Right to edit the perspectives of strategic development.
- Right to add users from all types.
- Right to edit information for users of all types.
- Right to activate and deactivate users from all types.

3.6. Architecture of the system

The designing of the informational system aims finding of the most appropriate way for delivering the information for the successful modeling of a strategy for a technology new venture (technology startup company) – structure, information presentation, functional specifics. In the designing of the system, the different roles and rights to access of information from the users are also taken into account.

Figure 3. Workflow of the web application

In order to meet all upper mentioned requirements to the system, the informational system will be developed as web-based system, giving access of the users after registration in the system. Each type of users will have access only to the active for his user account type informational resources and processes, and the structure of the informational system will be developed according the described in the previous chapter's requirements for rights to access to information, roles of the users and allowed processes in the work with the system.

The system is called Strategy Iidentifying and Analysing Modelling System - SIAMS. It has traditional three-tier client-server architecture, in which the information is stored in database, managed by web server and viewed in a web browser.

The basic elements in the realisation of the system are:

- Presentation layer: Internet browser (Mozilla Firefox, Google Chrome, Opera, Internet Explorer, etc.)
- Application server: Apache HTTP Server
- Database server: MySQL
- Programming language: PHP

On the next graphic, a view on the tabled and relations in the database of the system are displayed, visualised with DBScheme.com.

Figure 4. Scheme of the tables and their relations (generated with software of DBScheme.com)

3.7. Algorithm for defining of a strategy

The algorithm, incorporated in the system, for defining of a typological strategy is developed by the author and is based on the developed by the author Strategy Identification and Analysing Classification Matrix (SIA Classification Matrix) (see Appendix). The presented algorithm uses the basic characteristics of the level of innovative potential of the company, the level of market maturity, market scope and the source of competitive advantage of the company.

Figure 5. Scheme of the algorithm of defining strategy for technology new venture (EPC diagram) [7]

The process of work with the system begins with application of the algorithm for defining of a typological strategy of the company, by asking questions for identifying company's belonging to each of the different categories and specifics of the types of strategies. The next figure shows a view from the page aiming collecting of the information, necessary for application of the algorithm.

Figure 6. View of the page, gathering the basic information for collecting the basic information for applying of the algorithm

3.8. Processes in the system

The informational system supports the overall process of strategy modelling for technology new ventures and includes supporting all real processes in the process of strategic management.

The basic processes in the informational system are:

- Management of user accounts
- Management of typological strategies definitions
- Management of the perspectives for strategic development
- Management of the tables of strategic choice for the typological strategies
- Choice of a typological strategy for the company
- Management of the tables of strategic choices for the company-specific strategies for each company

Figure 7. Overall VAD diagram of the processes of the system. For each sub process, an EPC diagram is developed for the system (developed by the author, using ARIS Express)

Figure 8. Example of EPC diagram for one of the processes of the system (developed by the author, using ARIS Express)

3.9. User interface

This chapter presents view on the general parts of the system for the different users. The created interface follows entirely the upper developed and presented chapters in the system,

according the user types, structure and characteristics of each chapter, as access to all chapters is designed in a menu in the left part of the screen.

Figure 9. Welcome screen for users of type “Team Member” (www.strategy-startup.com)

Figure 10. View on typological strategy definition presentation for user of type “Company Manager” (www.strategy-startup.com)

Figure 11. View on the table of strategic choices for user of type “Company Manager”

3.10. System requirements

For the correct functioning of the system, some minimal requirements are necessary to the workstations of the users of the system. The developed informational system is presented for usage in Internet medium, where presentation layer of the system can be any type of web browser. Recommended versions of the browsers are:

- Internet Explorer 10 or newer;
- Mozilla Firefox 30.0 or newer;
- Opera 25 or newer;
- Google Chrome – all versions;
- Safari 7.0 or newer;

The informational system will present information only to registered users, after entering correct username and password. This process requires accepting of “cookies” for all types of browsers. Also activation of JavaScript content in the browser is necessary for the correct work of all functions of the system.

The described system requirements are recommended for guaranteeing full functionality of the proposed web-based informational system.

4 Approbation of the system

Approbation of the system was implemented amongst 16 representatives of technology new ventures in Bulgaria from total 15 companies. The approbation was implemented according a previously developed method of developing the approbation. This chapter presents the method and the results from the implemented approbation of the presented e-system.

4.1. Method of implementation of the approbation

The proposed method of approbation was used in the implementation of the approbation. The method of implementation of approbation included the following steps:

1. Research on the exiting software products for strategy modelling for technology new ventures.
2. Choosing existing software which is closest to the presented solution in this article, in order to implement comparative analysis between the existing and the new solution.

3. Choosing participants in the approbation of the system.
4. Preparation of approbation scenario, including giving one task to the participants in the approbation, which should be solved with both existing and new solutions.
5. Comparative analysis of the results and receiving feedback from the participants in the approbation, by a questionnaire, aiming identification through experimentation of the levels of applicability of the innovative classification matrix, models and methodology for strategy modelling for technology new ventures, as well as the levels of their efficiency, applicability, correctness of results and the levels of users' satisfaction from using the solution.
6. Making final conclusions for improving the proposed models, classification matrix, methodology of work and e-system.

Figure 12. Method of implementation of the approbation.

4.2. Researching existing software solutions and choosing solution for comparing experiment in the approbation process

The research of the existing software solutions is connected with using of the classical methodology of Balanced Scorecard, with included in it classical model of balanced scorecard, using the four basic perspectives – financial, clients, internal processes and learning and growth, developed by Kaplan and Norton. The using of the classical methodology and model, are theoretically leading to the same results and will allow comparison between the existing software solutions, methodologies and model, with the proposed in the developed e-system in their article.

In the comparison research the most popular existing software solutions for strategy modelling were included: Balanced Scorecard Software, QuickScore BSC Software, Balanced Scorecard Software - Spider Strategies, Executive Strategy Manager Balanced Scorecard Software, ClearPoint Strategy: Balanced Scorecard Software, QPR Scorecard Performance Management Software, IBM Balanced scorecard, Balanced Scorecard Software QuickScore from Intrafocus, BSC (Balanced Scorecard) Designer Pro and Light versions, etc.

	Using the classical balanced scorecard model	Complex structure and management	Web-based product	Free version availability	Hierarchical balanced scorecard structure	Created for developed companies	Specifically created for technology new ventures
Balanced Scorecard Software QuickScore from Intrafocus	yes	average	Yes	trial	yes	yes	no
Balanced Scorecard Software - Strategy KPI	yes	yes	no	yes	yes	yes and for educational goals	no
Balanced Scorecard Software - Spider Strategies	yes	average	yes	trial	yes	yes	no
Executive Strategy Manager Palladium Balanced Scorecard Software	yes	yes	no	trial	yes	yes	no
ClearPoint Strategy: Balanced Scorecard Software	yes	average	yes	trial	yes	yes	no
QPR Scorecard Performance Management Software	yes	average	yes	trial	yes	yes	no
IBM Balanced scorecard	yes	yes*(according official information of IBM)	no	no	yes	yes	no
BSC (Balanced Scorecard) Designer Light (desktop)	yes	average	no	yes	yes	yes	no
BSC (Balanced Scorecard) Designer (web based)	yes	average	yes	yes	yes	yes	no

Table 1. Comparative analysis on the most popular software solutions for strategy modeling (implemented by the author)

After implementing the comparative analysis of the existing software solutions, the most suitable solutions for implementing the comparative approbation are: 1. BSC (Balanced Scorecard) Designer, 2. Balanced Scorecard Software - Spider Strategies, 3. Balanced Scorecard Software QuickScore from Intrafocus.

4.3. Implementation of the approbation.

Choosing software tool for comparison

After implementing the research on the existing software solutions, the following solution was chosen for comparison with the presented e-system - BSC (Balanced Scorecard) Designer. The reasons for choosing this software product are: (1) the classical methodology and model of balances scorecard used; (2) availability of free desktop and web-based versions; (3) this software solution has clear and easy to use design; (4) BSC (Balanced Scorecard) Designer is one of the best evaluated solutions, according efficiency, applicability and ease of use.

Choosing participants in the approbation

The second step in the implementation process is choosing participants in the approbation. In the approbation of SIAMS e-system 16 participants took part, who are all representatives of technology startup companies in Bulgaria, members of total of 15 technology startup companies.

Approbation task introduction

Before implementing the approbation, the approbation task, existing and developed instruments, models, matrices and software systems were presented to the participants.

Approbation task

Approbation task is creating a strategy for the technology startup company, from which the participants in the approbation are with the two available instruments – the existing instrument BSC DSC Designer BSC Balanced Scorecard Designer (http://www.bscdesigner.com или http://www.webbsc.com) and Strategy Identifying and Analyzing Modeling System – SIAMS e-system. After implementing the tasks, a questionnaire is filled in by the participants, in order to identify the results from the approbation. The next chapter shows the results from the approbation for the SIA Matrix, the updated model of Balanced Scorecard, the developed models of typological strategies, the methodology of strategy modeling and the developed SIAMS e-system.

4.4. Results from the approbation.

After the approbation, the questionnaire data was processed with IBM SPSS Statistics 19 and this chapter is showing the results.

The age distribution of the participants is presented at the following figure.

Figure 13. Age distribution of the participants

31% of the participants are representatives of small companies, which are at stage of their development “Business starting” and 69% of the companies are at stage “New working business idea”. 94% of the participants have former education in the field of entrepreneurship and equal percent usually apply the methods of strategic planning in the management of their companies.

Only 6% if the participants have stand-alone education on entrepreneurship and such percent are only sometimes applying methods of strategic management in their companies.

The approbation aims identification of the efficiency, applicability, exactness of results, usefulness and ease of use of the following elements: (1) the developed by the author SIA Classification Matrix, (2) the developed by the author models of typological strategies for technology new ventures (including vision, main characteristics and table of typological strategic choices), (3) the developed by the author updated model of Balanced Scorecard (with 5 perspectives – financial, clients', product, internal processes and learning and growth); (4) the methodology of strategic modeling of company strategies proposed by the author and (5) the described in this article SIAMS e-system for technology new ventures strategy modeling.

Results on the updated BSC model developed by the author (having five perspectives)

81% of the participants in the approbation evaluate the proposed innovative model of balanced scorecard as applicable, exact and useful in high degree and 88% of the participants are evaluating it as easy to use.

Figure 14. Level of applicability of the updated BSC model (developed by the author) in comparison

The level of exactness of results from the usage of the updated BSC model is shown on the figure below. The outer circle is showing the data for updated BSC model, while the inner circle is showing the results for the classical BSC model with four perspectives.

Figure 15. Evaluation of the exactness of results from using the model

Results on the developed by the author SIA Classification Matrix for technology new ventures

The results from the applicability of the developed by the author SIA Classification Matrix are showing highest level of applicability of the new strategy classification matrix from 75% of the participants in the approbation.

The levels of usefulness of the proposed SIA Classification Matrix are shown on the next figure:

Figure 16. Level of usefulness of the proposed SIA Classification Matrix (developed by the author) in comparison

Results on the developed by the author detailed models of typological strategies according the SIA Classification Matrix

75% of the users are also evaluating the developed typological models as giving exact results in highest degree and 19% - in high degree. Also 81% of the participants in the approbation are evaluating the developed detailed models of typological strategies according the innovative classification matrix as easy to use.

Figure 17. Level of exactness of the results for the developed by the author detailed models of typological strategies according the innovative SIA Classification Matrix and the updated BSC model with five perspectives

Results on the developed by the author methodology of strategy modeling, including the innovative SIA Classification Matrix, developed detailed models of typological strategies by using the updated BSC model with five perspectives and the development of company-specific strategy, based on the developed detailed typological strategies models

The results connected with the applicability of the methodology are showing in high degree of applicability of the innovative methodology for strategy modeling of technology new ventures, incorporated in the developed SIAMS e-system

Figure 18. Level of applicability of the proposed methodology of strategy modeling

The level of usefulness of the methodology is evaluated from totally of 94% of the participants in the approbation as “useful in high degree” and “useful in highest degree”.

Figure 19. Level of usefulness of the proposed methodology for strategy modeling

The evaluation of the levels of ease of use of the methodology from the participants is 63% evaluate it as “easy in high degree” and 25% evaluate it as “easiest from the tested methodologies”. The outer circle is showing the results for the methodology proposed by the author with the SIAMS e-system, and the internal circle is presenting the results from using the classical methodology with classical balanced scorecard model [14], incorporated in the classical software solution included in the approbation BSC Designer.

Figure 20. Level of ease of use of the methodology proposed by the author (comparison)

The results for the level of exactness of the results for the application of the methodologies for strategy modeling are presented in the next figure.

Figure 21. Level of exactness of the results by the using of the proposed by the author methodology (comparison)

4.5. Analysis of the model and improvement of the SIAMS e-system with the methodology which it represents

The analysis on the results from the implemented approbation of the developed by the author SIA Classification Matrix, updated model of BSC, developed detailed models of typological strategies, innovative methodology of strategic modeling and the presents SIAMS e-system are showing high levels of applicability, exactness of the results, usefulness and ease of use by the participants in the implemented approbation.

The BSC model is evaluated by 75% as applicable, 81% of the participants are confirming the usefulness of the model and 94% are evaluating the results of using the model as exact. Based on the implemented approbation, a conclusion that further usage of the updated by the author model of balanced scorecard in the process of strategy modeling for technology new ventures is

justified and it can be subject of further incorporation of software solutions for strategy modeling for technology new ventures.

The developed by the author detailed models of typological strategies, including the typological strategies visions, main characteristics and table of strategic choices are of essential importance in the proposed methodology. 81% of the participants are evaluating the presented innovative models of typological strategies as applicable in highest degree in the strategy modeling process, 81% are evaluating them as useful in highest degree and 81% are evaluating them as easy to use in highest degree. 75% of the participants are also evaluating them as giving exact results in highest degree. All these results are confirming the applicability, usefulness and exactness of results of the proposed models, which gives a basis for their further application in the methodology, their development and improvement in the future.

The presented methodology, incorporated in SIAMS e-system is evaluated from 75% of the participants as high, 69% consider it applicable, and 63% consider the presented methodology as easy for use and totally of 94% consider its results exact.

The implemented approbation and results for the used methodology and developed SIAMS e-system are basics for concluding that the methodology and system can be further used for strategy modeling for technology new ventures and can be subject for further experiments and improvements in the field.

5 Conclusion

The rapidly 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, models, classification models and supportive e-systems is even more necessary than ever.

This article is presenting the final stage in the creation of an informational e-system, based on developed by the author, strategic identifying and analyzing classification matrix (SIA Matrix), updated model of balanced scorecard, detailed models of typological strategies for technology new ventures, according the matrix and overall methodology of strategy modeling of technology new ventures. The presented e-system was described, as well as its processes, architecture, modules, user types and their roles, the algorithm of its strategy defining process, system requirements and design. Further the system was tested amongst 16 participants from the technology startup companies sphere from total of 15 companies, making a comparison experiment for approbation of the developed system, including the mentioned tools and models. The results from the approbation are also presented in this article and are used as a basis for concluding the applicability and usability of the model. The proposed methodology and SIAMS e-system for strategy modeling for technology new ventures is a subject of further research and experimentation by the author and is connected with the further improvement of the methodology, tools and SIAMS e-system, supporting the process of strategy modeling for technology new ventures.

Acknowledgements:

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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 Modelling Implemented by e-Governance System,* VI International Scientific Conference "E-Governance" 2014, ISSN 1313-8774, pp. 224-232, 2014.

[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, *Strategic management: Awareness and change*, Cengage Learning EMEA, 2005.

[11] *Harvard Business Essentials: Strategic management* Harvard Business Press, 2006.

[12] S. Park, Z. Bae, *New venture strategies in a developing country: Identifying a typology and examining growth patterns through case studies*, Journal of Business Venturing 19, p. 81 – 105, 2004.

[13] Steve Blank and Bob Dorf, *Startup Owners Manual: The Step by Step Guide to Building a Great Company*, 2012.

[14] R. Kaplan and D. Norton, *The Balanced Scorecard: Translating Strategy into Action*, Harvard Business School Press, 1996.

[15] M. Panova and T. Panov, *Strategic management*, 2008.

[16] Jeffry Timmons, *New Venture Creation: Entrepreneurship in the 21st Century*, 2006.

Appendix

Appendix A: Figures from text.

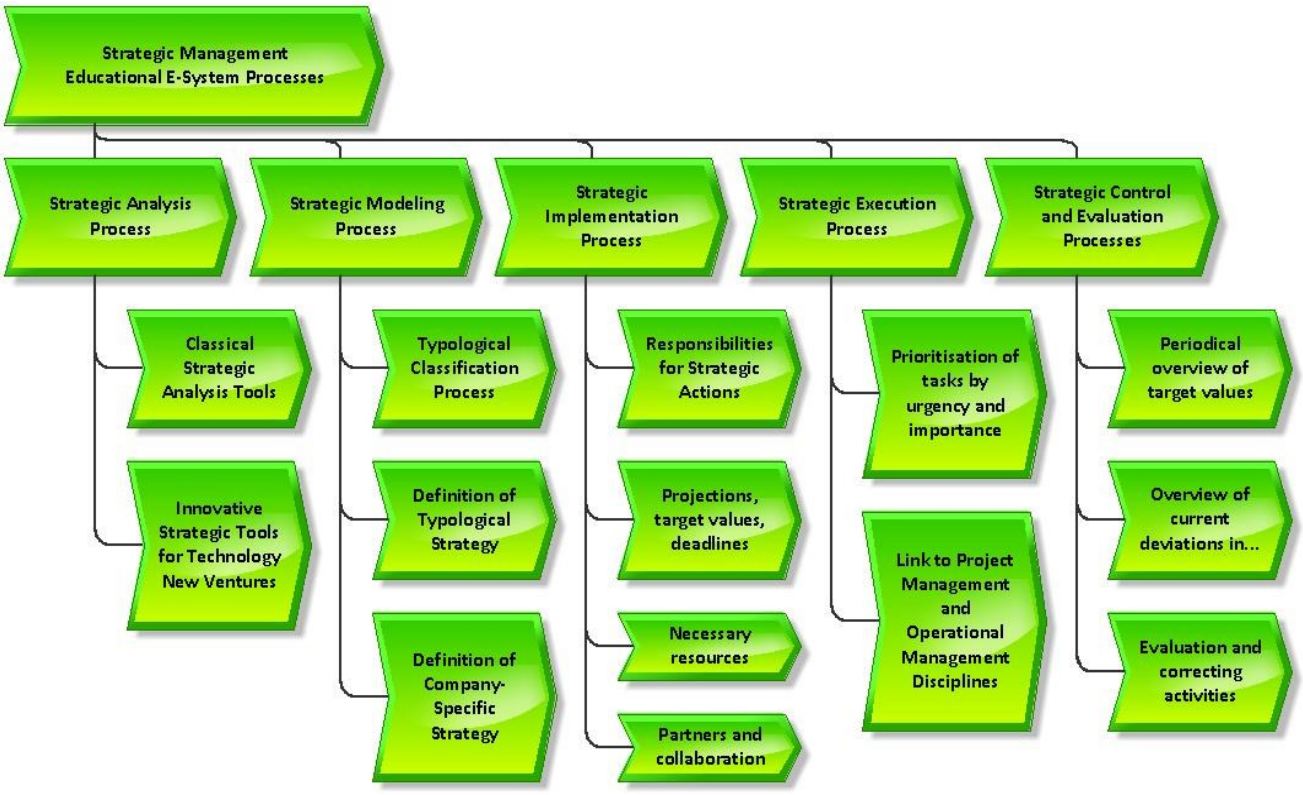


Figure A. Overall process for strategy management for technology new ventures developed by the author

<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

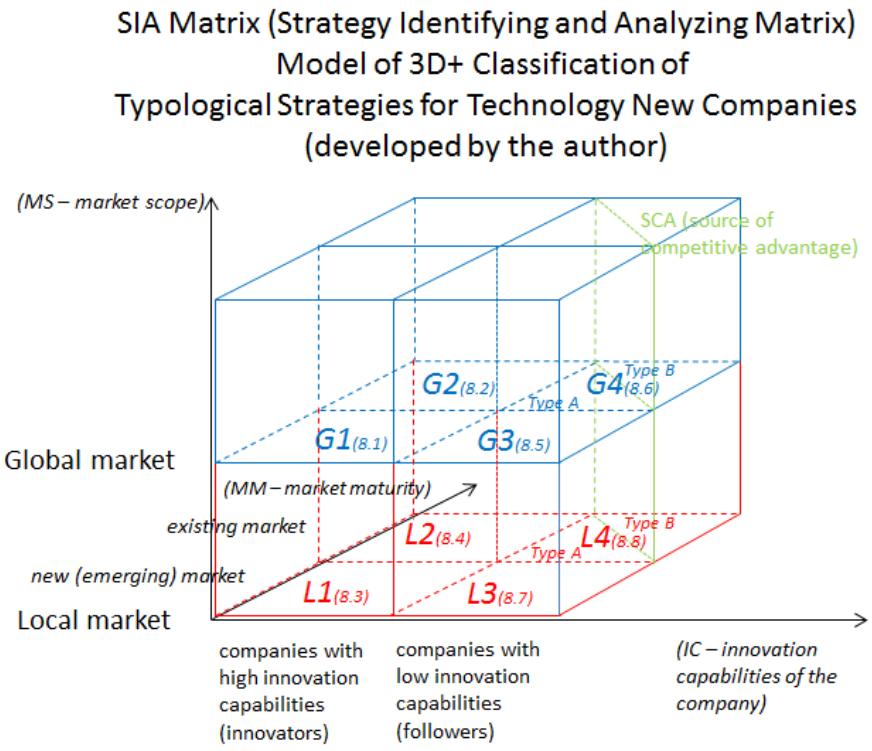
- What key (core) competences do we need to have/acquire?

- 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 B. Strategic Analysis Tool for technology new ventures – SIAMC canvas developed by the author



*NVTS = f(IC, MS, MM,SCA)
**Visions and abstract strategies are developed by the author, using the innovative BSC model, described in this article.

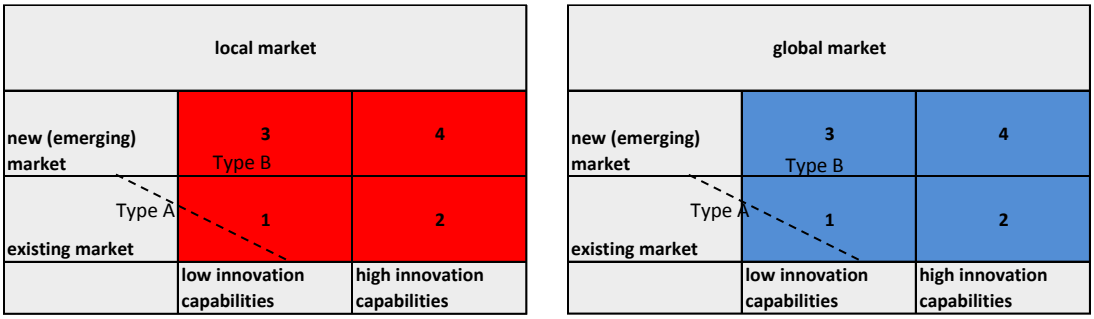


Figure C. Innovative Typological Classification Matrix – SIA Matrix (Strategy identifying and analising Classification matrix) developed by the author

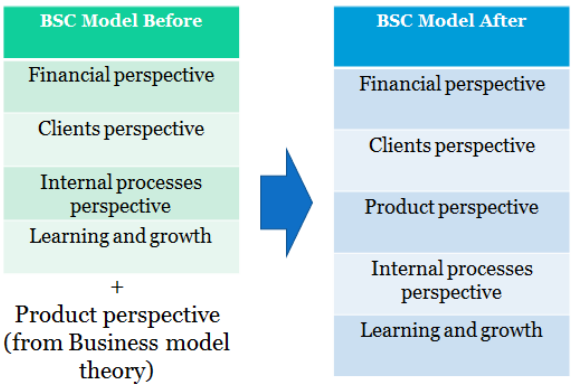


Figure D. Updated Balanced Scorecard Model with five perspectives developed by the author

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.							

Figure E. Developed typological strategies tables of strategic choices

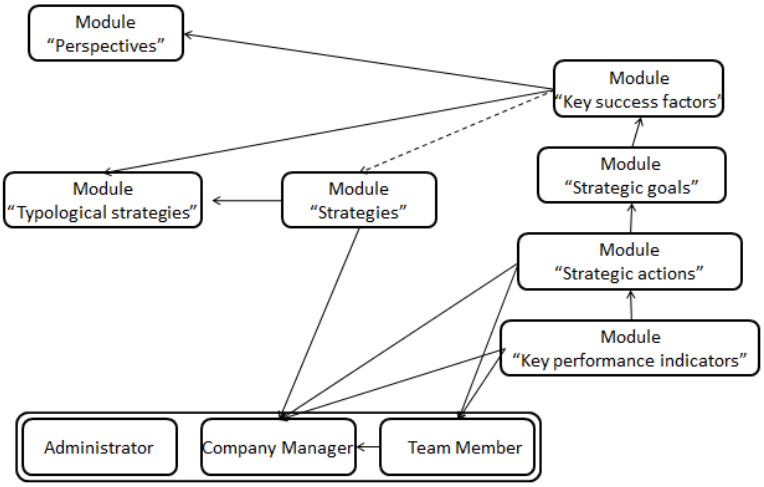


Figure 22. Relations between the modules in the system

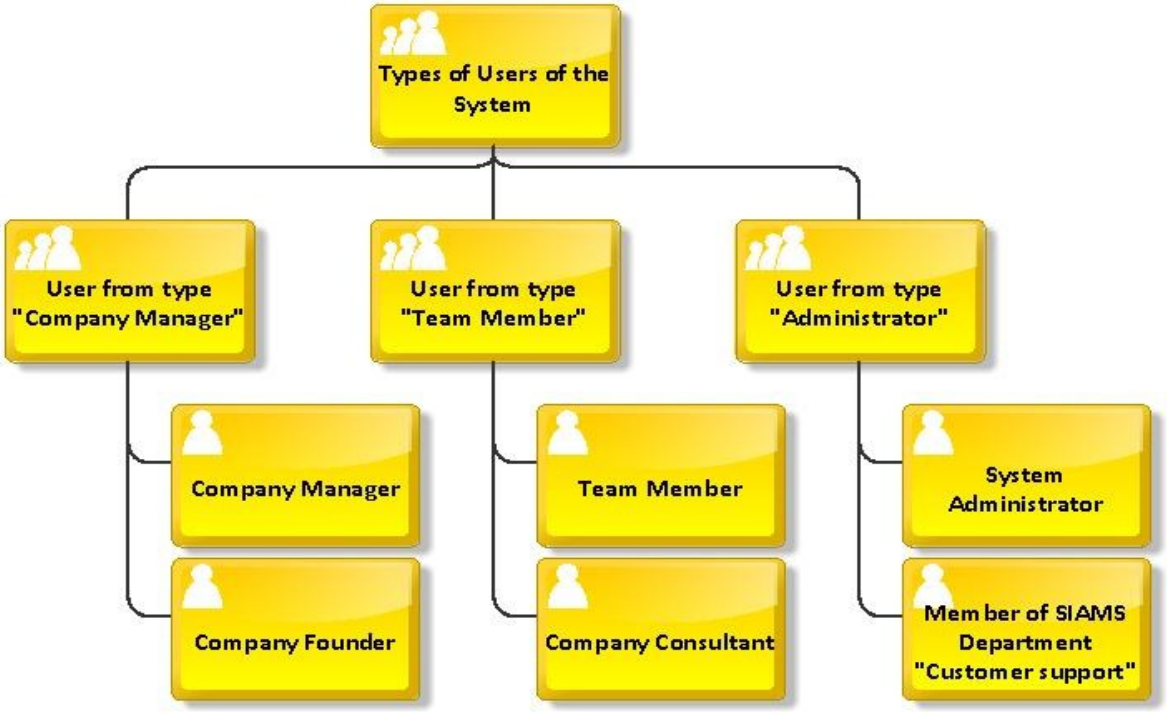


Figure 23. Organisational scheme of the system

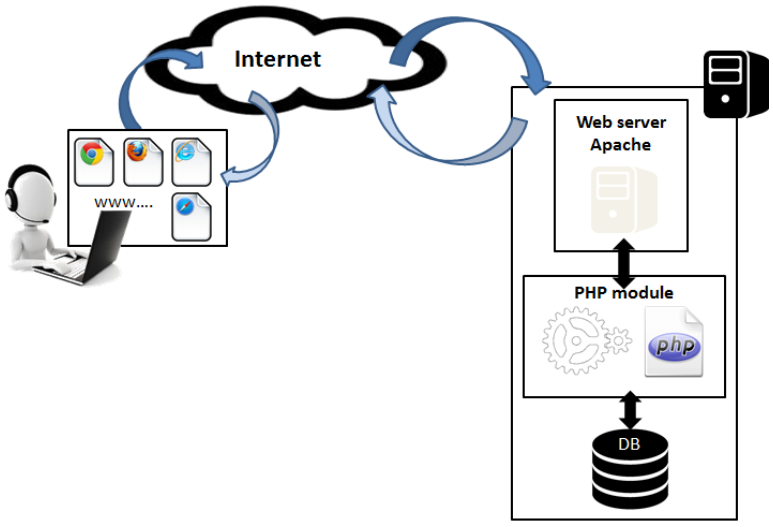


Figure 24. Workflow of the web application

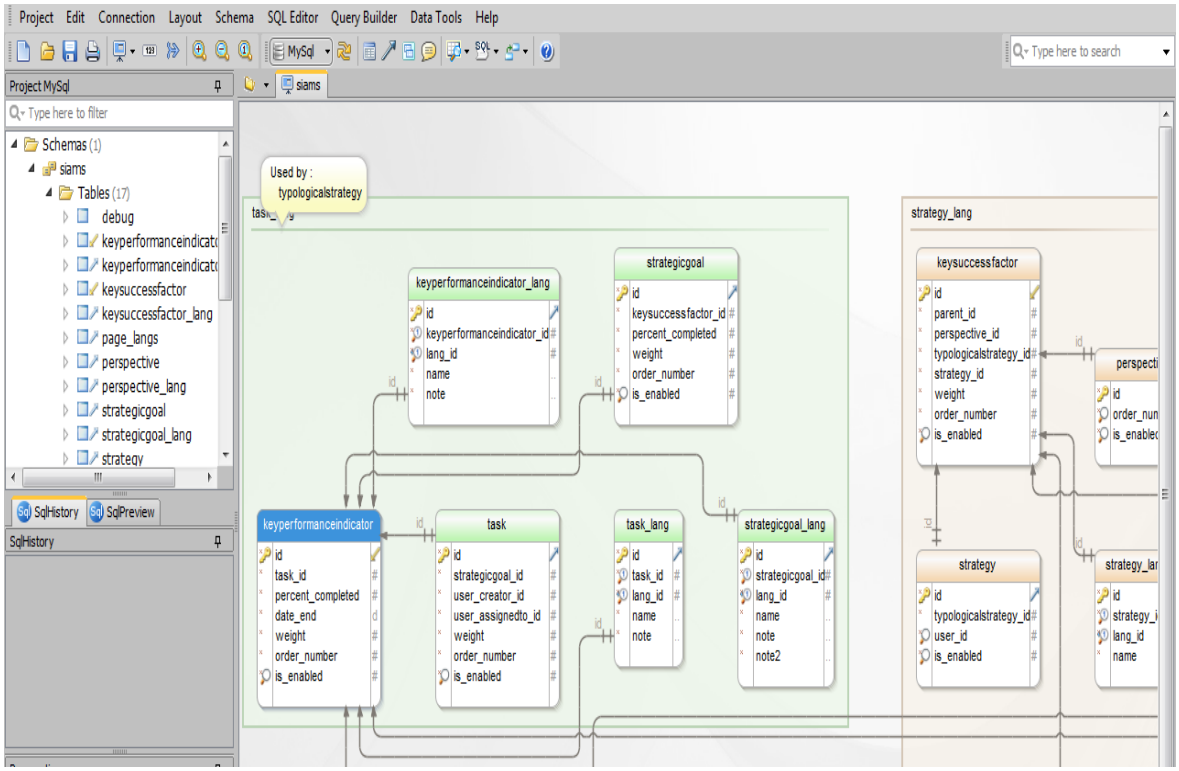


Figure 25. Scheme of the tables and their relations (generated with software of DBScheme.com)

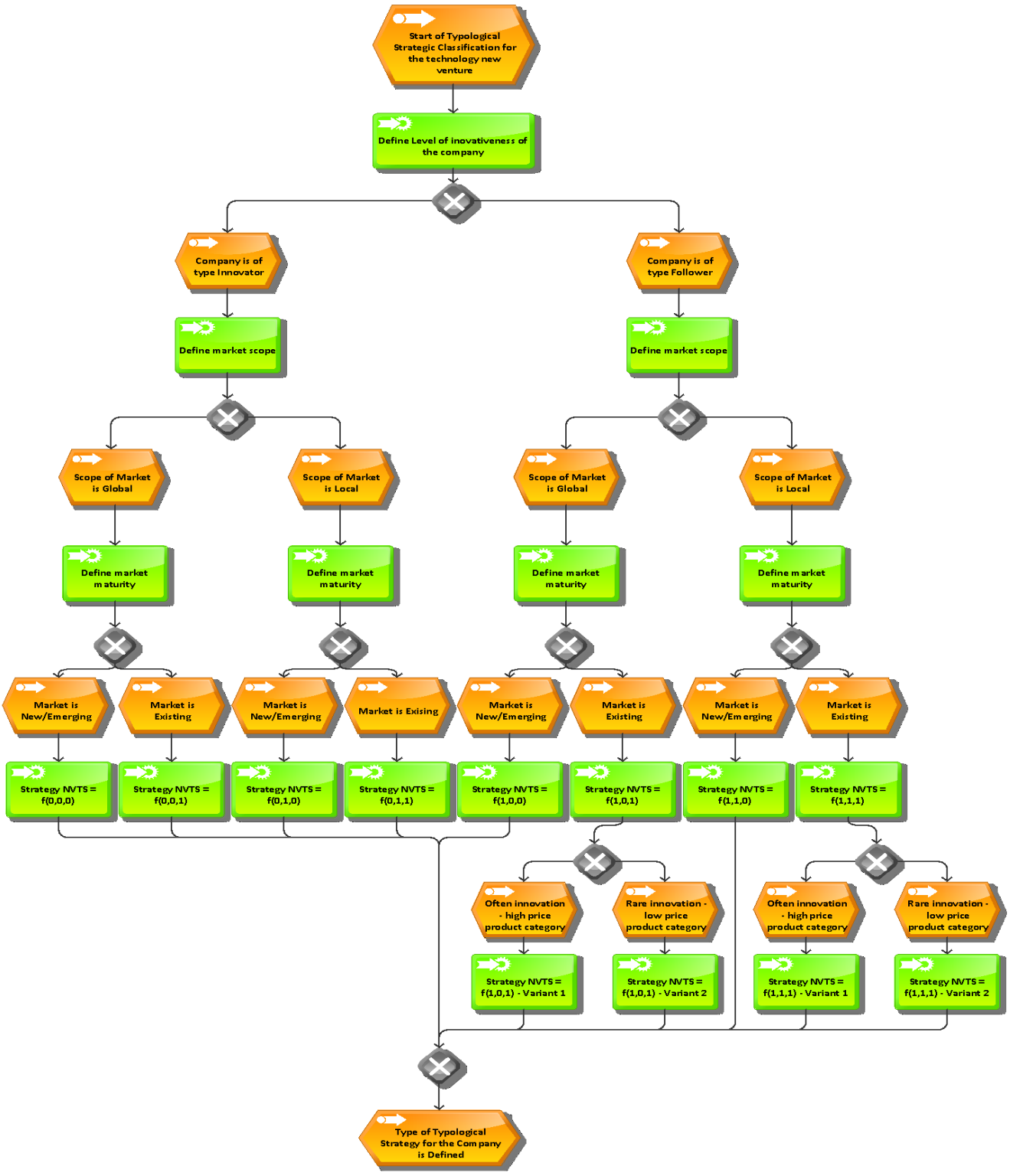


Figure 26. Scheme of the algorithm of defining strategy for technology new venture (EPC diagram) developed by the author [7]

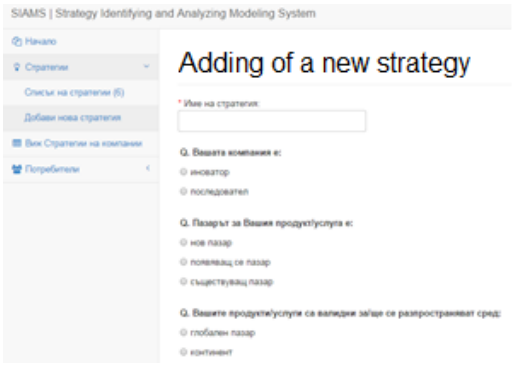


Figure 27. View of the page, gathering the basic information for collecting the basic information for applying of the algorithm

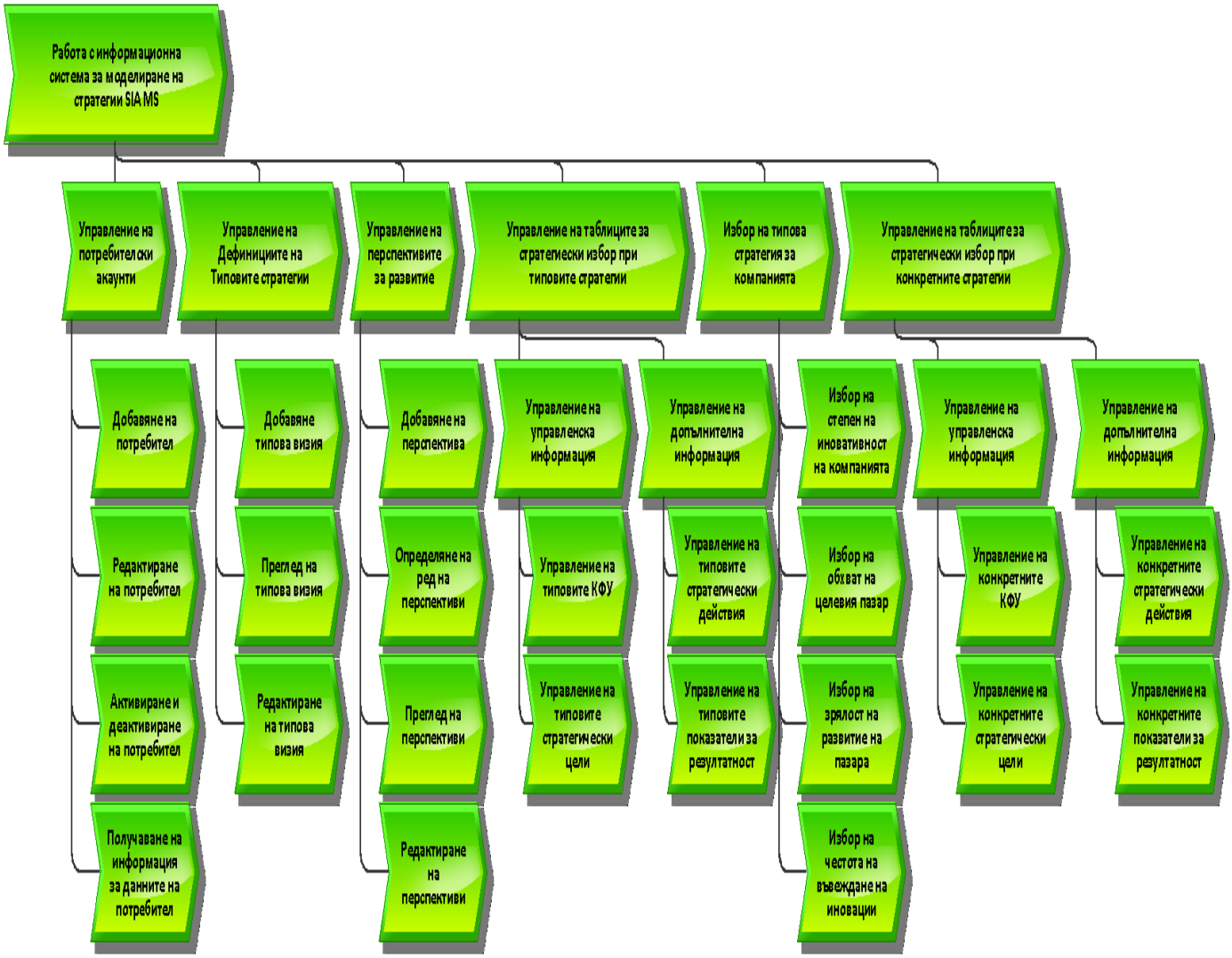


Figure 28. Overall VAD diagram of the processes of the system. For each subprocess, an EPC diagram is developed for the system (developed by the author, using ARIS Express)

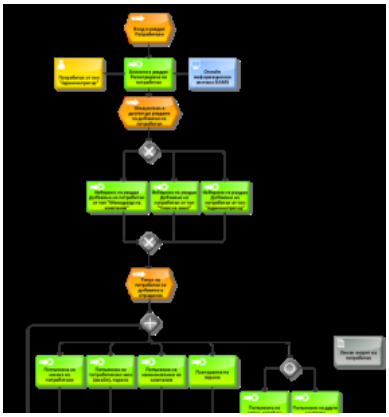


Figure 29. Example of EPC diagram for one of the processes of the system (developed by the author, using ARIS Express)

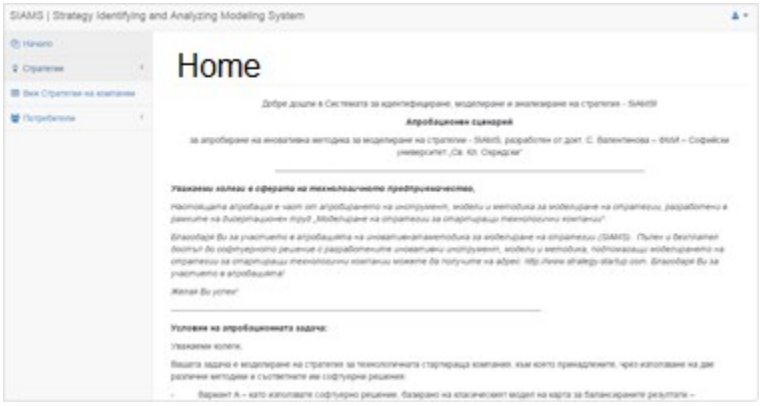


Figure 30. Welcome screen for users of type “Team Member” (www.strategy-startup.com)

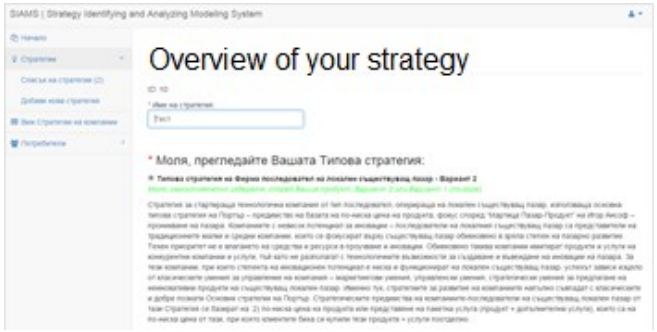


Figure 31. View on typological strategy definition presentation for user of type “Company Manager” (www.strategy-startup.com)

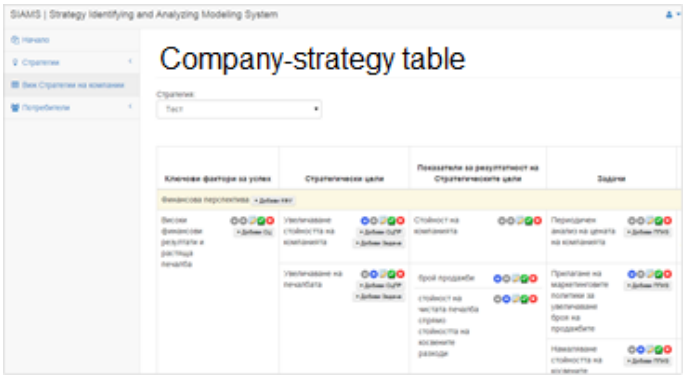


Figure 32. View on the table of strategic choices for user of type “Company Manager”

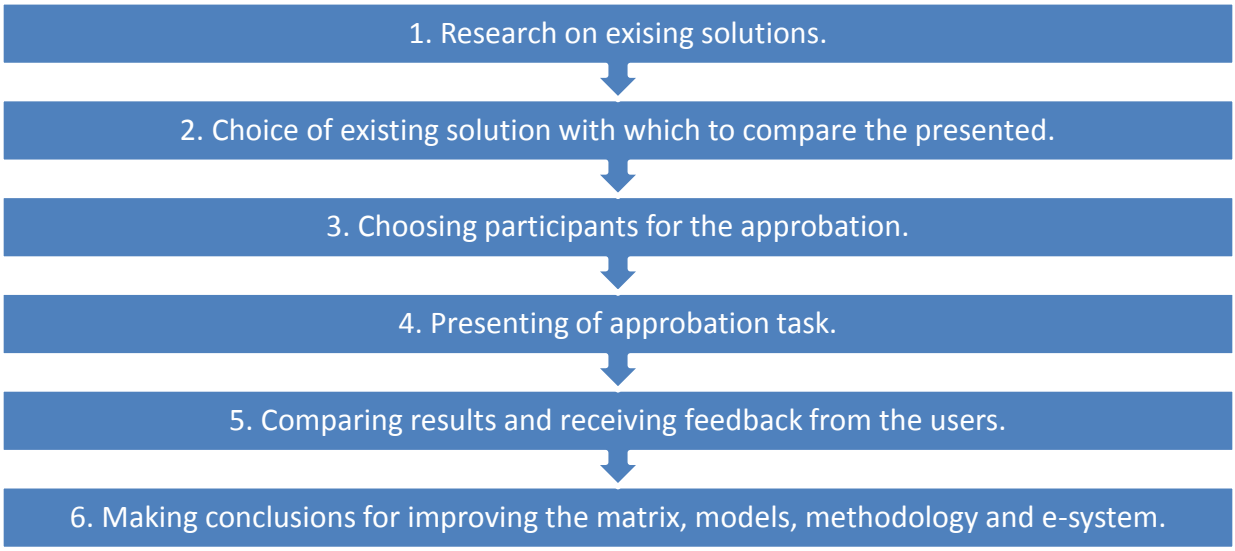


Figure 33. Method of implementation of the approbation.

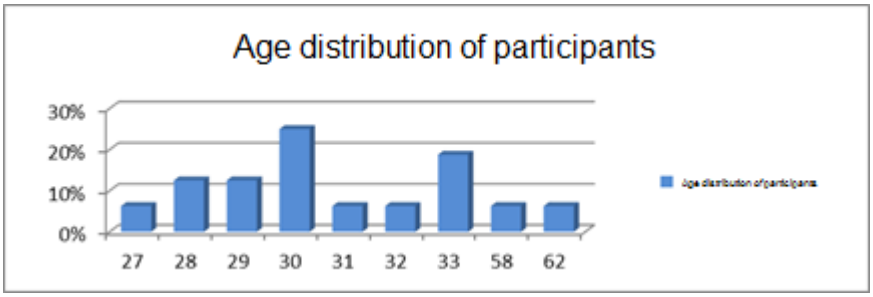


Figure 34. Age distribution of the participants

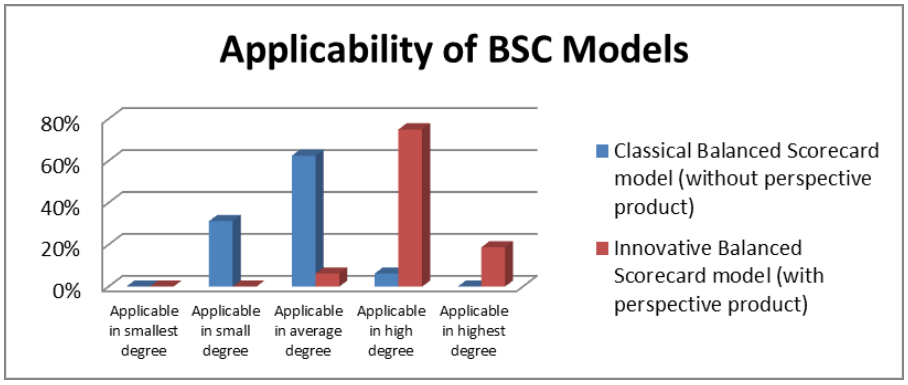


Figure 35. Level of applicability of the updated BSC model (developed by the author) in comparison

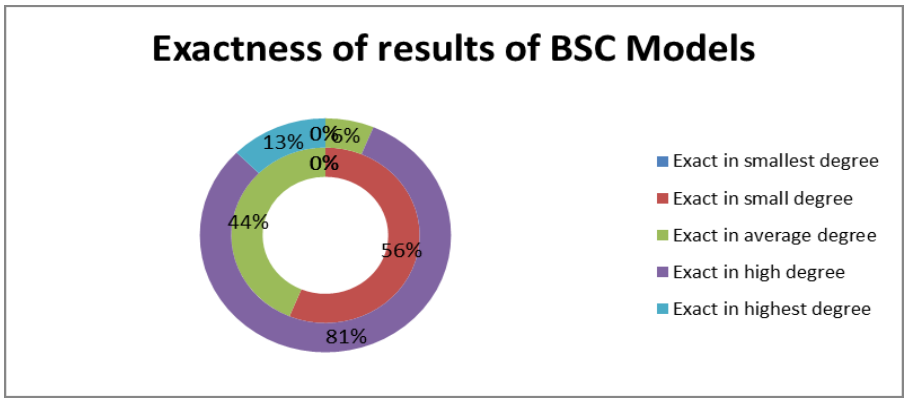


Figure 36. Evaluation of the exactness of results from using the model

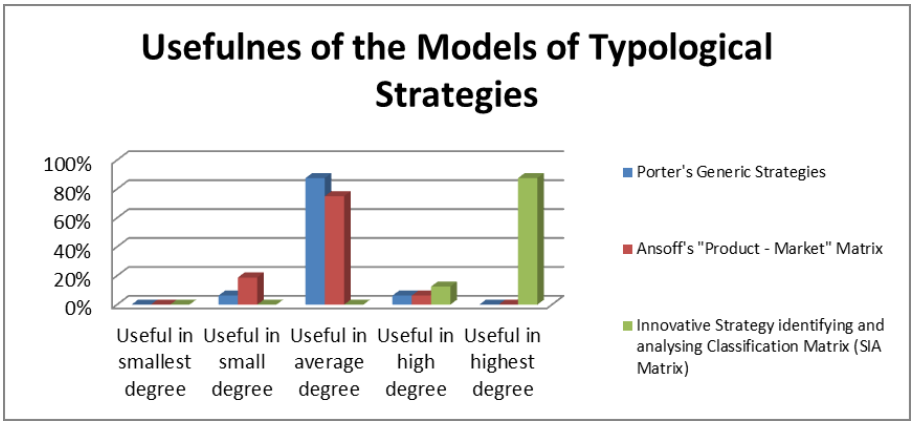


Figure 37. Level of usefulness of the proposed SIA Classification Matrix (developed by the author) in comparison

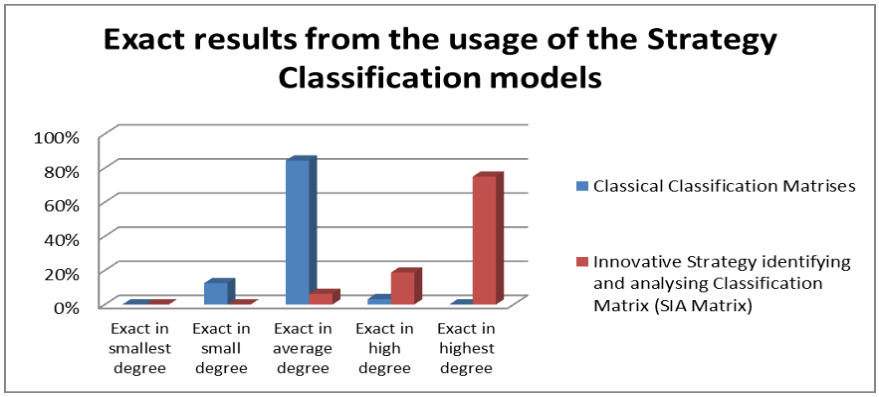


Figure 38. Level of exactness of the results for the developed by the author detailed models of typological strategies according the innovative SIA Classification Matrix and the updated BSC model with five perspectives

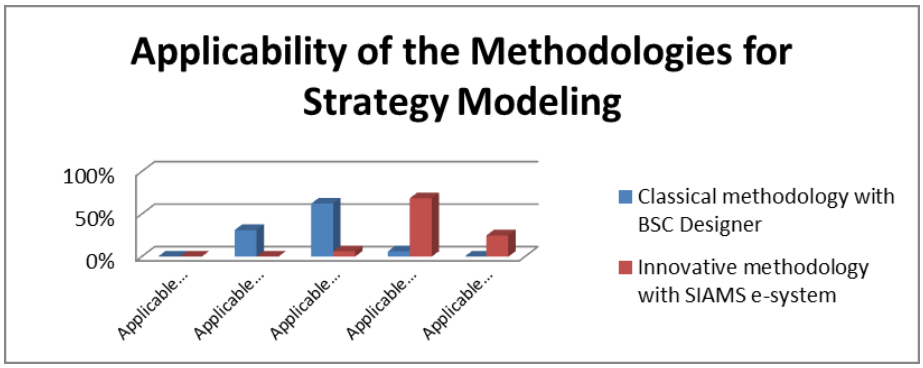


Figure 39. Level of applicability of the proposed methodology of strategy modeling

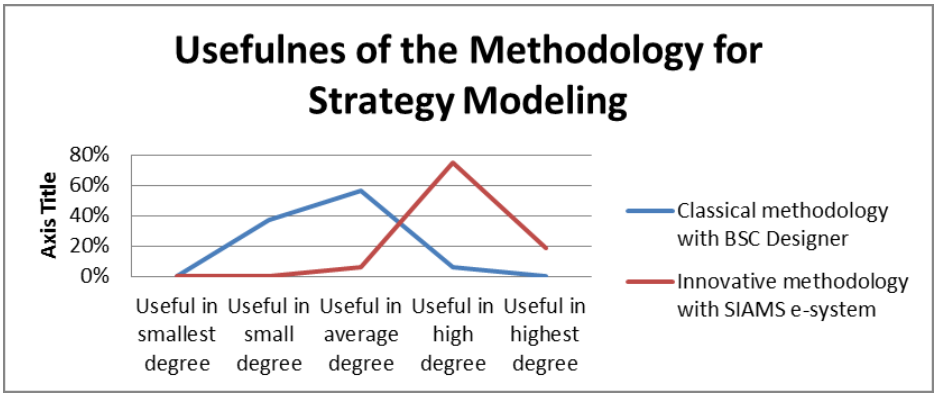


Figure 40. Level of usefulness of the proposed methodology for strategy modeling

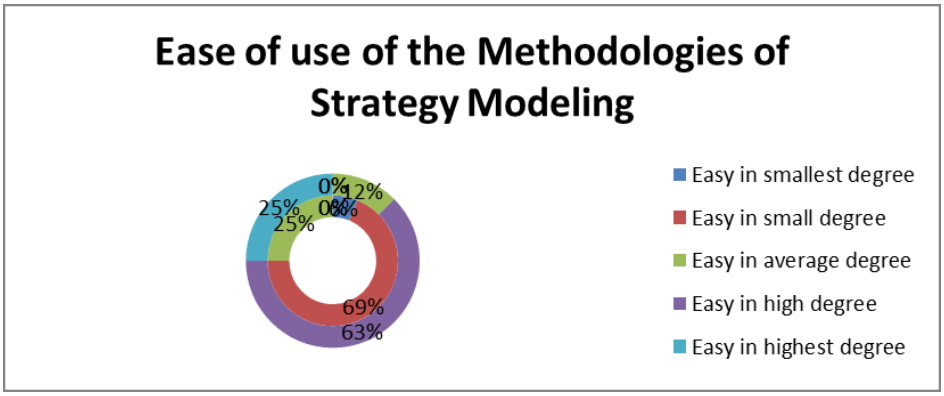


Figure 41. Level of ease of use of the methodology proposed by the author (comparison)

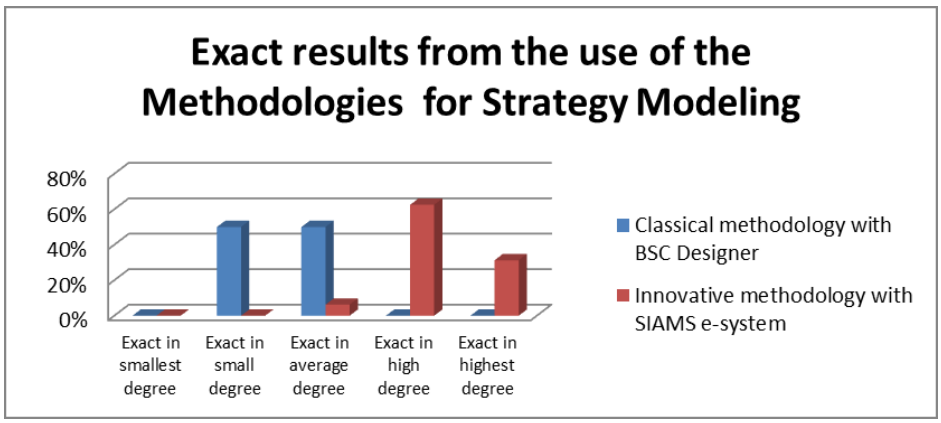


Figure 42. Level of exactness of the results by the using of the proposed by the author methodology (comparison)