STRATEGY FOR TECHNOLOGY VENTURES SELECTION

Petko Ruskov[1] and Kyungjin Hyung[2]

[1] *Sofia University "St. Kliment Ohridski", Sofia 1113, 125 "Tsarigradsko shose" Blvd., bl.2, Bulgaria e-mail: petkor@fmi.uni-sofia.bg*

[2] *Senior Manager at Korea Technology Finance Corporation, Certified Technology Valuation Specialist and Duke MBA, Dukehyung@gmail.com*

Abstract: *There is growing interest for investment into high-technology start-ups and spin-offs emerging from the Bulgarian universities and research institutes. But technology transfer and commercialization is risky and has been slow mainly because academic research is often too early-stage to be directly commercialized. The authors will compare the strategy with that of Korea by analyzing its venture certification practice including past performance and recent challenges. It adopts Kibo Technology Rating System (SM 2.0) in Korea for evaluating technology start-ups based on growth potential and business risk used for debt guarantee financing and certifying as 'venture'-legitimate national certificate for policy benefit. This paper aims to propose a strategy for technology ventures evaluation and selection for Bulgarian academic institutions.*

Keywords: *Technology ventures selection, Balanced Scorecards*

"It may be hard for an egg to turn into a bird: It would be a jolly sight harder for it to learn to fly while remaining an egg. We are like eggs at present. And you cannot go on indefinitely being just an ordinary decent egg. We must be hatched or go bad."

C.S. Lewis

1. Introduction

Creativity and innovation, especially in the high technology sector generally disrupt markets and the old ways of doing things. The new and most innovative ventures in the world renovate the way and environment we live, work and play. Attractive business is those that knows how to promote and support creativity and boost innovation. To prosper today, incumbents need a well-built continues innovation processes. The opportunities are to research and business develop (R&BD) inside or to merge/buy promising start-ups or spin-offs [Adner R., Rahul Kapoor, (2016)]. The superb value proposition that integrates digital technologies challenging is a must for competitors to recap. The business ability to develop or acquire innovative products and services is important factor and strategic advantage for growth. The companies must adopt innovations from internal and external sources often in the form of technological innovations to remain competitive.

When high-tech selection or evaluation happens, the judgment is better to be made and expressed in a systematic way rather than opinions out of subjective feelings or professional viewpoints that are prone to the colors and tones of the occasion or conformity of familiar field. The standardized evaluation system helps people not to fall victim to subjectivity, not to deviate from the original purpose of evaluation, and to better communicate the outcome with the entities that are to be evaluated and other parties who may use the result as critical information.

Robert Parker, famous wine judge, uses rating system for evaluation. Parker's rating system employs a 50-100 point quality scale (Parker Points®) together with his tasting notes that he uses it as primary means of communicating his judgments according to his website. His rating becomes a guideline to consumers in selecting quality wine. Although Parker uses rating system, he makes judgment by leveraging his talent and expertise which has proved its legitimacy through a long history of serving the same vocation. Wine is different from technology innovation because variations of wine taste are fewer than future prospects of innovation. Evaluating innovation requires significant degree of sophistication. It may still be fine or even better to rely on experts who are well-experienced and seasoned like Robert Parker in the innovative business domain as is the frequent case for the U.S. If such seasoned professionals in both technology and business are not easily employable, the usage of standardized rating system makes more sense. Besides the degree of sophistication of rating system, we need to pay attention to the motivation of Robert Parker to use rating system. The system in this case is for the benefit of communication with stakeholders, wineries, distribution channels and consumers.

Frequently the key to success for a technology start-up is to validate the technology and the needs of the targeted customer. It's well known that even the greatest and most innovative technology concepts will not survive unless assure others to commit the crucial intellectual or financial resources. The financing innovation is also the vital factor for the creation of value [Lo A. Gary P. Pisano, (2016)]. The effective technology ventures rating and selection is critical for all stakeholders to make sure that selected technology get the attention and funding. The keys to prospect growth in the today digital economy are opening data and business functionality. This creates new common business models and shared company cash flows. In this innovative economy there are many investors. They have the opportunity to build an open ecosystem that can offer modern financial services in various combinations which adds new value to new ventures.

Investigation and analysis on the Korean and Bulgarian research and business development (R&BD) ecosystems and technology commercialization road-maps was performed through the activities of Sofia University scientists and the mentorship of professors from Innopolis Foundation, Korea [Choi, J., Ruskov, P., Tsolova, S., (2016)]. The authors believe that there is growing need for further improvement of the local synergy that could be performed following the well-established Korean model. Based on their extensive network, technology and business expertise, they have identified several important trends/challenges in the Bulgarian R&D and commercialization.

1. Leading company's delay to prioritize internal R&D programs.
2. Lack of the increasing externalization of R&D and R&BD activity by businesses.
3. Misplaced globalization of business R&D.
4. Lack of special efforts for science and technology policy.

State of the art of technology assessment and evaluation have been investigated from many authors. Some of the results are presented in a previous article of the authors [Ruskov P., Kyungjin H., (2016)]. We have found only one generic system that systematically assesses the economic and technical aspects of technology - the KTRS (Kibo Technology Rating System). It has been developed by the Korean government funded organization - The Korea Technology Finance Corporation [Chung, M. (2015)]. Kibo's efforts engage around its technology appraisal schemes. It's a disruptive innovation of KTRS organizational shift, and its strategies. The KTRS application guarantee coverage ratio in debt-financing and the use of technology appraisal certificate in equity-financing [Hyung, K. J. (2009)].

The investigation shows that there is growing interest for investment into high-technology start-ups and spin-offs emerging from the Bulgarian universities and research institutes. But technology transfer and

commercialization is risky and has been slow mainly because academic research is often too early-stage to be directly commercialized. **The goal** of the paper is to present a strategy for technology ventures selection for the right kind of technology ventures through balanced scorecard (BSC) methodology.

2. Methodology and research design

The leading technology companies use new and cognitive technologies as artificial intelligence (AI), machine learning, Internet of things (IoT), cloud, biometrics and other exciting digital technologies. CxO at other companies touch pressure to do the same. But if they want to maximize the value from investment in high new technologies, leaders primary must make sure that their companies have a great digital strategy. The appropriate strategy development is a leading requirement. We started our study with the report of the Knowledge Sharing Program (KSP) between Korea and Bulgaria. The main theme in it was "Policy Studies for Bulgaria's Sustainable Growth: Enhancing Innovation and Accountability" [KSP (2016)]. It's described three topics:

1. Governance Innovation for SOEs in Bulgaria: Based on the Korean Experience in 31 Questions.
2. Strategies for Enhancing the Extended Producer Responsibility System in Bulgaria: The Case of WEEE.
3. Building a Strategic Model for Sofia Tech Park's Development: Strategic Issues and Planning Guidelines.

The study conclusion was that Sofia Tech Park and Technology Innovation Network (STP/TIN) is the first to be established in Bulgaria and found serious bottlenecks observed in bringing technology into the business. The report is considered the STP/TIN to be a strategic vehicle to promote technological innovation and nurture technology-based startups.

We believe that development of a strategy for the standardized and statistically sensible evaluation model for technology venture selection would make the most sense. Bulgarian and Korean research team started exploring through literature review and an Internet key-word search in order to locate possible best practices and case studies in Europe, Asia and America. The best we believe is a methodology successfully applied in South Korea – KTRS (KOTEC Technology Rating System). Fortunately, the team was able to meet a professional in the knowledge sharing program of Daedeok Innovation Park. Through a series of discussions based on comparative analysis of stakeholders surrounding innovative business ventures in Korea and Bulgaria, both came to agree that it is likely that the KTRS system is suitable for the situation in Bulgaria. The KTRS system applies a scoring model to assess technology in four categories - management competence, technical feasibility, marketability and business feasibility and profitability. At least, it deserves studies from the mutual sides. This is how authors got together, wrote a paper [Ruskov P., Kyungjin H., (2016)] and continue together with a strategy development.

Authors agreed that strategy for technology adoption and appraisal of start-ups is vital for all stakeholders, if they want to increase their chances of success. This essential validation data cannot be found in participating at different type of workshops. Stakeholders must use a proven scientific strategy to assess currently growth potential of the technology and measure risk of product development hypotheses of their potential customers [Choi, J., Ruskov, P., Tsolova, S., (2016)].

3. Technology ventures selection strategy

A great digital strategy provides road, enabling executives to lead digital technology initiatives, measure their progress, and forward those efforts as needed [Ross J.W, Ina M. Sebastian, and Cynthia M. Beath, (2016)]. In the book "Control in an Age of Empowerment" Simons explained how to give stakeholders the freedom to innovate while protecting company from loose cannons [Simons R.L. (2008)]. He presented how to define and create strategy and apply four main management "levers" to balance company autonomy with control - figure 1: 1.) Traditional diagnostic control systems - critical performance variables; 2.) Belief systems - core values; 3.) Boundary system - risks to be avoided; and 4.) Interactive control systems – strategic uncertainties. We trail these four levers without losing the creative thinking.

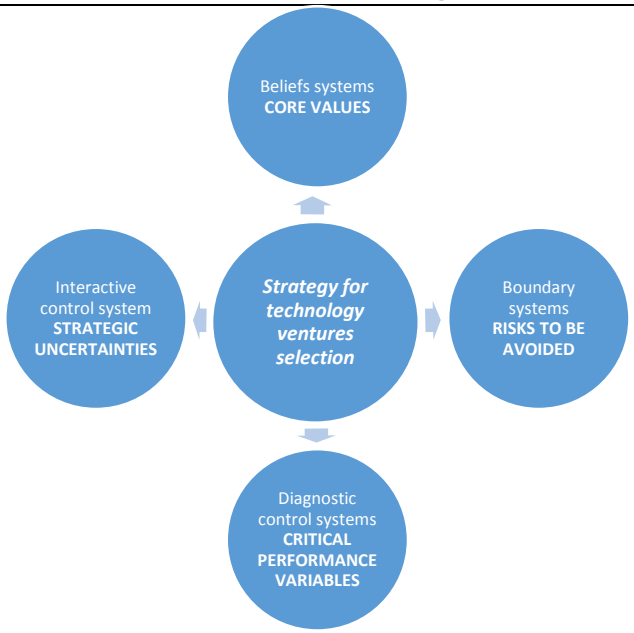

Figure 1. Strategy with four levels of control (Adopted by Robert L. Simons, Control in an Age of Empowerment, Harvard Business Press Books, 2008, Product #: 2672-PDF-ENG

Technology ventures selection strategy depends on our existing capabilities and the way we want to compete. When selecting start-ups and spin-offs for numerous purposes, a team of experts gather together and judge applicants by listening and asking questions to short pitching after taking a look at written documents highlighting the merits of technology or business ideas on evaluation. Such expert committee method has a pitfall of being subjective. Although it is composed of different people, they are still exposed to anchoring and group thinking. Innovation-based business ideas are quite a puzzle that groups often go wrong by receiving incorrect signals from the members with high authority, high academic degree or simply who spoke first. The members also may be prone to reputational pressures that make them avoid disapproving others' judgment. To make matters worse, there are not really many people who understand both technology aspects and commercialization potential.

Technology ventures selection strategic planning starts with formulating and translating the vision and strategy. We follow the best practice and benchmarking of the university and business leaders. In particular, the strategy plan is defined following Hamel and C.K. Prahalad and Kaplan and Norton strategy maps and balanced scorecard methodology [Hamel G. and C.K. Prahalad, (2004), Kaplan R., Norton D., (2004), Palladium, (2017)].

Vision: To establish a web platform and standard for technology ventures rating and selection.

Mission: To research and develop an innovative technology ventures selection on-line system that can support research institutions - industry technology transfer and commercialization processes.

Strategic objectives: The mission and vision reflect on taking more stakeholders oriented conscious decisions about a scoring model to assess technology in four categories - management competence, technical feasibility, marketability and business feasibility and profitability. We can clarify our vision and mission in next strategic objectives:

- Co-design valuable model leads to improved innovation processes and supports the technology transfer at stage R&D and R&BD;
- Evaluate technology businesses and provide guarantee to VC and bank loans directly;
- Better serve technology-driven SMEs whose technologies are either invented on their own or transferred from elsewhere to sustain the early stage of venture and cross the "Valley of Death" area;
- Co-create value for all stakeholders at innovative technology transfer processes by system opportunity for signaling and leading;

- Transform stakeholders mind into digital strategic thinking and coordinated action for technology evaluation and commercialization.

Values: The main values of the system include evaluation of technology businesses and provide guarantee to venture capital and bank loans directly.

Goals: The major goals are - identify and evaluate relevant technology through a scoring model in four categories - management competence, technical feasibility, marketability and business feasibility and profitability; eliminate technology transfer process barriers between partners, empower creation of new open and disruptive technology start-ups and spin-offs.

Strategies: Specific strategies how to reach the goal will be defined for each goal and their cause-and-effect relationships and illustrated within the all perspectives as well as those going beyond the perspectives.

Measures: Once the strategic objectives are identified and established, group managers can measure performance in terms of how well is executing that strategy over a time. Key performance indicators (KPIs) allow the management team fast and complete overview of the efficiency of processes. Therefore KPIs help the managers to define and measure progress toward the university goals. Some of metrics concerning technology ventures selection are technology and risk grades.

We created the balanced scorecard system as value-added chain process – figure 2.

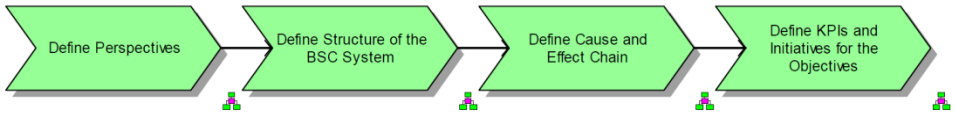

Figure 2. BSC value-added chain diagram

We used the BSC Designer PRO software and created the following standard BSC perspectives and the structure and cause and effect chain is shown at figure 3 [BSC Designer PRO].

- Financial
- Customer
- Product
- Internal processes
- Learning and growth

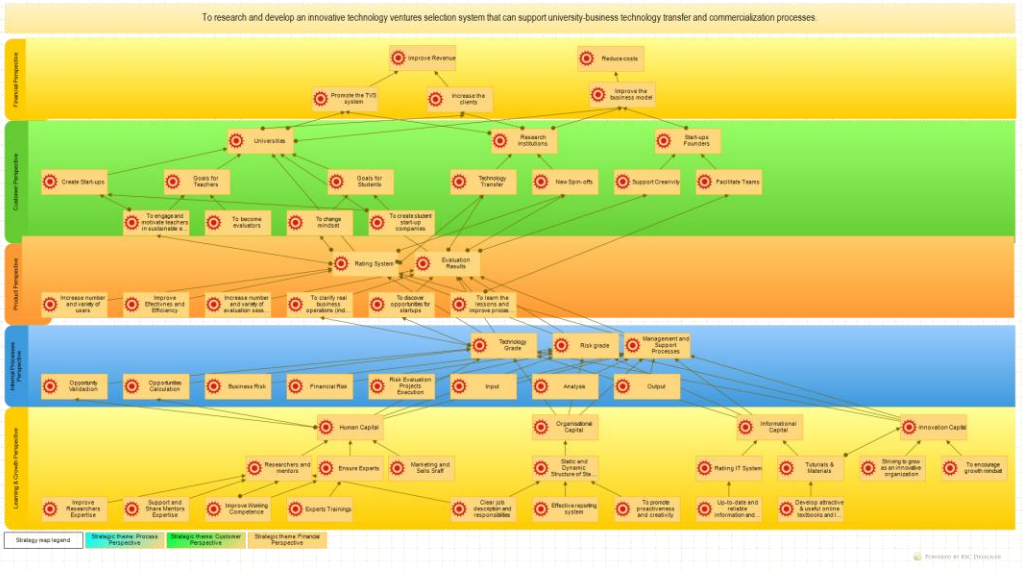

Figure 3. BSC structure and cause and effect chain

The strategy presents a set of interconnected strategic goals and objectives, which are allowing reaching of the primary strategic goal - identify and evaluate relevant technology through a scoring model.

4. Conclusion and future work

The great possibilities are around us, but to realize the advantage, companies must have a plan, an innovative business model and strategies for how they will co-design the organizations and business processes to take benefit of the capabilities and to act on the new eco system.

The paper attempts to discuss answers to questions about strategy for technology ventures selection such as: think strategically for new technology ventures evaluation, recognize opportunities and challenges, develop a workable progression of action, formulate and communicate a successful strategy among all stakeholders. We use the critical analytical thinking for the analysis and formulation of our strategy and we hope the strategy to help innovative stakeholders and executives to make decisions in a fact-driven, collaborative and logical manner. As a result, if the selected innovative technology does not need a diverse ecosystem to support it, then the adoption and the implementation can be rapid and easy. But if a new environments are needed, then the process will slow until those ecosystems are resolved. Change can take even longer time when the existing technology gets a boost from developments in its own ecosystem. [Adner R., Rahul Kapoor, (2016)].

We do know that it is a big challenge executing of the strategy and finding a way to effectively measure performance for technology ventures selection. Our future work includes activities to close the gap between strategy creation and execution. It includes the following four guiding principles:

- Build a strict roadmap - and stick with it, not lose sight of our strategic goals;
- Empower our team with the right skills and recruit experts that are moved by the items on the roadmap;
- Describe the results to drive stakeholders expectations;
- Communicate evaluation priorities and verify why they are priorities

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