
FINANCIAL DESIGN OF INNOVATIVE BIOTECH PUBLIC-PRIVATE PARTNERSHIPS /THE CASE OF THE BULGARIAN UNIVERSITY PROJECT “VITA PLUS”/

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Abstract: The present paper is deemed to present investigated options to suggest appropriate financial design in setting public-private partnerships in the sector of biotechnological innovations in Bulgaria. **Financing** of this paper is provided by the project “Vita Plus” (2021-2022) – a transdisciplinary project at University level in Bulgaria. **The object** of the paper is to deliver greater understanding on the already emerged processes of introducing high-tech biotechnological solutions and innovations in the Bulgarian economy. **The focus** of this paper is centered onto previous work of researchers, based at the University of Plovdiv, streaming to investigate mainstream and critical issues in building a new generation of business and financial models, based on general or adjusted Public-Private Partnership Models /PPP-Models/ in the biotech sector, based on equity risk acquisition. **The aim** of the authors is to delve into the problem of fair introduction of working PPP Models in the Bulgarian business and financial reality, which are based on venture capital. Thus, this paper brings upfront some theoretical and methodological reasoning in search to investigate and suggest appropriate financial design for both public, and private stakeholders, interested to drive biotechnological innovations in the country.

Keywords: non-conventional methods for financing, biotechnological innovations, equity financing, venture capital, Stock and Warrant Off-Balance R&D, public-private partnership

1. INTRODUCTION

There is a plethora of new concepts, being introduced in a fast-paced mode into Bulgarian economic and financial environment since accession of the country into EU. At the beginning of the third programming period /2021-2027/ at the EU, Bulgarian entrepreneurs, as well as scientists are exposed at large to new terms and definitions, such as public-private partnership, biotechnological innovations, financial mechanisms for risk sharing, joint ventures, etc. It was as early as 2017, when the academic course “Public-Private Partnership” /PPP/ was firstly introduced and later modified bring academic standards of teaching what PPP is to interested students of economic majors at the University of Plovdiv (Vladikov, 2018). This academic course at the University of Plovdiv is offered to present theoretical framework and practical cases to future graduates and specialists in PPP, providing specialized tertiary academic education in a systematized format on the conceptual, administrative, legal, economic, financial, and organizational framework to initiate and work on public-private contracts.

It is important to substantiate the fact that public-private partnership modelling necessitates in-depth knowledge on how to establish productive public-private business relations, based on fair financial distribution of costs, benefits, and risks. We reckon that a classical PPP Model might be adjusted to serve as a platform of establishing pivotal entrepreneurial and industrial relations in the three traditional competitive industrial sectors in Bulgaria – food industry, cosmetics industry, and pharmaceutical industry, which may quickly introduce biotechnological innovations. Furthermore, it was almost at the same time when students of economic majors were offered at the University of Plovdiv another academic course of modern banking and financing (Yosifov, 2019a, Yosifov, 2017).

In addition to introduction of modern academic standards of education in doing modern business through establishment of public-private partnerships, utilizing modern banking and financing concepts, it was delivered with the expert assistance, provided by the Centre of Technologies of the University of Plovdiv – another modern academic course – Bioeconomy and Health Policies (Vladikov, 2021); this course introduced interconnectedness between biotechnologies, bioeconomy, and health policies to future economists, managers, public administrators, financial specialists and other to-be economic graduates. Thus, these new introduced academic courses are utilized to serve as a common ground to develop a special theoretical framework to investigate whether Bulgarian enterprises may sustain if biotechnological innovations are delivered through modern tools of banking and financing funneled to a special public-private contract of doing competitive biotech businesses.

2. NATURE OF THE RESEARCH AT THE UNIVERSITY OF PLOVDIV “VITA PLUS” PROJECT

This paper is deemed to explain our intention to test in the next two years of the University of Plovdiv “Vita Plus” project whether the introduced theoretical concepts and academic paradigms, delivered in the academic courses of Public-Private Partnership, Banking and Financing, Bioeconomy and Public Health, and other economic and financial courses – are to work in the Bulgarian economy. We plan to research professional and entrepreneurial perceptions for their level of readiness how to transform in an appropriate way EU and global standards of business in Bulgarian financial and business reality. Some of our early researches will be extended as follow-ups into the “Vita Plus” project to test for financial sustainability different economic and financial parameters, such as the net present value (NPV), net future value (NFV), internal rate of return (IRR%), weighted average cost of capital /WACC/, for example, through conducting sectoral and entrepreneurial surveys and delivering Cost-Benefit Analyses (CBAs), What-if Analyses, and other types of analyses to demonstrate the validity of our academic reasoning. Our scientific hypothesis is that modern banking and financing tools must be adjusted to the nature of innovative biotech business, as Bulgaria is just forming its first generation of young professionals exposed both to new biotechnologies, new equipment, and new business and financial tools. We plan to scan, diagnose, and deliver pragmatic PPP-model to Bulgarian public and private stakeholders, which are based on risk financing with equity acquisitions, private business stakeholders are unaware to the nature and specifics of new biotechnological solutions, on the one hand; and public stakeholders are non-familiar to the new business, financial and economic reasoning, valid for market economies, on the other hand.

3. IMPORTANCE OF THE SCIENTIFIC PROJECT

Favorable business and financial environment are a prerequisite for establishment, development, and excellence of joint public-private projects in the field of biotechnological innovations. In general, building a successful public-private partnership model /PPP-model/ is associated with the search and investigation of sufficient number of mainstream and alternative sources for financial and technical provision of the business deal. Availability of such fin-tech opportunities and especially when it comes to time and cost management – is crucial for setting the planning horizon for innovative business mapping solutions at enterprise level. We reckon that public-private partnership is a possible mechanism for leveling-up the standards of supply of special-class services and end-products, which contained greater than average value added by the special supply chain, constructed to deliver premium products and services. Henceforth, application of PPP modelling shall be subject to certain parameters and conditionalities when it comes to biotechnological innovations. It is a great range of considerations and constraints, such as defense of the public interest, defense of the right of fair business return from an investment, observation and/or establishment of new rules and regulations, risk sharing, cost splitting, returns negotiating, and numerous others. The very popular “copy/paste” technique of a PPP model and its introduction in biotechnological innovations shall not work (Vladikov & Radeva, 2016). It is imperative to follow certain professional and ethical standards of work, which shall be subject to longer periods of business partnership, to a managerial approach in the overall cycle, to different approaches of fair split of costs, benefits, and risks. Extended research on public-private partnerships in the region of South East Europe (Vladikov et al., 2017) demonstrate that not only the Bulgarian economy is not yet fully transformed to adopt new biotechnologies and new financial models, but also it is the case for other neighboring economies, as well. Speaking narrowly, the process of financial provision of biotechnological innovations is imperatively pegged to the very commencement of a bio-tech project. The general model is that risks, pertaining to a bio-tech project – are divided approximately equally. Illustration of the classification characteristics of venture capital schemes, utilized in the Bulgarian market is provided in Table 1.

Table 1: Classification of Risk Financing of Biotechnological Innovative Projects in Bulgaria

Registered Economic Course of Development of the Enterprise	Investment Goal	Degree of Risk for Risk Investors
Newly starting enterprises / Start-ups / Micro Biotech Enterprises	Seed Financing to Commence	High Investment Risk
Enterprises in a Process of Market/Product Expansion (mainly Biotech SMEs)	Financing for Business Expansion	Relatively Lower Investment Risk
Market/Product distinct Enterprises (prevailing Biotech SMEs)	Financial and Consulting Support for Abridged Financial Development	Low Investment Risk

Source: Yosifov, 2016, p. 71; and in T. Yosifov's PhD Dissertation: "Venture Capital Funds – a Factor in Accelerating the Process of Innovation by Small- and Medium-sized Enterprises (SMEs) /The Case of Bulgaria/", May, 2017

In our opinion, crucial decisions in early stages may be vehicled to scale a bio-tech project in time at a later stage with subsequent development and expansion of business initiatives and a public-private enterprise. Henceforth, the issue of fair distribution of the equity risk through selecting proper financing tools, on the one hand, and the degree of risk aversion for the pool of investors (both public, and private) comes to be the bottleneck for such kind of a PPP Model. The results of the study (Yosifov, 2016) suggest several main conclusions, which are itemized below:

- Firstly, the initial research expectation was confirmed that the risk – inherent in investments related to the implementation of innovations, and more specifically – in biotech innovation is potentially high in the country. The main explanation, given by the questioned participants in the survey – is that the degree of uncertainty that accompanies innovative activities of enterprises in Bulgaria is high.
- Secondly, the risk of conducting biotechnological innovation in Bulgaria depends on the availability of sufficiently accurate information and knowledge that such kind of biotech innovations are necessary for the successful business performance of an enterprise, to market end-products, resulting of biotech innovations. The interviewees defined that the information security of an innovation process in the country as insufficient. In combination with the lack of sufficient experience of project teams, financing of innovations in Bulgaria is insufficient.
- Thirdly, participants in the study determined that there is a great risk in startin-up a biotechnology company. The main reason for this is primarily due to the fact that Bulgarian companies are situated at a very early stage of their biotechnological development and do not managed to generate enough revenues on regular basis. This has its bi-focal structure of the investors' risk behavior. On the one hand, risky investors have difficulties in determining the overall amount of an asked investment; and on the other hand – in an event of a market failure of a new product released, their investment may be treated as completely loss-incurring.
- Fourthly, interviewees determined that there is a low risk in investing in well-established markets and products of different enterprises. It is clearly stated in the survey that investments in innovative projects implemented by companies with market history and business experience are often being upgraded, that is – the company advances in different stages of introducing a business innovation to the market; hence, more risk financing is needed to complete the innovation. Also, it is worthnoty, that companies with a market history and business experience are not restricted to receive financial support for fueling their innovation processes. Furthermore, such companies use consulting services offered by risky investors. For example, one of the Risk Funds, operating on the Bulgarian market – which contributes to deliver favorable financial conditions to companies, streaming to produce and market innovative products and services – arranges the option for the most successful innovative Bulgarian companies to present their projects to potential investors in organized investment meetings in the City of London and in the US Silicon Valley.

Having said all these findings for the Bulgarian financial reality, it is necessary to point out that the most frequently used sources for funding and financing biotech projects and innovations – is based on the share acquisition of an enterprise through the following modes: SWORD financing; financing through business angels; and financing provided by specialized venture capital funds. Presented in a systematized form (Yosifov, 2020, pp. 68-86), each of these forms is distinguished and characterized by certain specifics, as it follows:

3.1. SWORD Financing / Stock and Warrant Off-Balance R&D in Bulgaria

This is a relatively new form of capital provision of research and development (R&D) for biotech-based projects. And, as far as we are aware – there is a lack of information on significant successful practices related to this funding in the Bulgarian business and financial environment. However, to us, this stands to mean that there is significant untapped potential for introducing biotech innovative enterprises, based onto public-private partnership, as there are favorable climatic conditions in the country, which may evolve their business on sustained bio-geographic areas and attach an R&D department to industrialize biotech products, processed new biotechnological solutions, and equipment, which start to accumulate in Bulgaria – particularly after accession of the country to EU. Thus, the main purpose of SWORD-funding in the case of Bulgaria may be channeled to subsidize activities and entrepreneurial initiatives in the field of biotechnology, where the country is bio-geographically endowed. Such regions are the region of Plovdiv, Pazardzhik, Haskovo, and others in the Thracian Valley, as well as the Danube Valley. In theory, primarily, SWORD financing is created to serve joint-stock companies /JSCs/. In Bulgarian business reality JSCs are considered "big" companies and contrast to the SMEs initiatives and streaming to get involved into the biotech sector. Our suggestion is that SWORD financing shall be adjusted as a financial vehicle to serve the greater needs of

the Bulgarian SMEs and be a successful pivotal tool to pair biotech entrepreneurs with the potential biotech investors. In general, biotech investors are institutional stakeholders, such as public pension or public investment funds, or private stakeholders, such as insurance companies, investment banks, wealthy individual investors (business angels).

We reckon this adjusted tool may be utilized in Bulgarian financial environment and serve as an appropriate leverage for bio-based enterprises, or even whole industries, such as the cosmetics industry, food industry, or pharmaceutical industry, for instance. Henceforth, to ensure attractiveness and economic efficiency for interested stakeholders, a biotech company may provide equity against R&D financing and split the ownership fairly by splitting the financial burden. Transforming a JSC or a SME into a Venture (public-private partnership) may turn into facilitator and legal owner, entitled to hold patent rights not only in present, but also in future research. Figuratively speaking, a SWORD-ed company may mitigate the bulk of the investment risk, splitting it to a greater number of stakeholders, which believe into their joint biotech path. There could be a buy-back clause for the acquired shares at a fixed price and other conditions of the deal. This financial product may also allow to take an insurance out – in case a project contractor does not comply to the commitment to buy the agreed shares within a specified period. These two options provide risk coverage for investors in the biotech company, thus – increasing the attractiveness in this form of venture capital. In addition to favorable prospects for development of high-risk biotechnology projects, SWORD funding allows for split of a project R&D costs from the total production costs of the enterprise-innovator. In this way, the expenses part of the balance-sheet of a bio-tech company is safely managed, providing transparency in spending the funds invested. In summation, the technological drive of the SWORD-financing has a double effect: on the one hand, it positively affects the Biotech Entrepreneur through Technology & Service Agreement with the Special Purpose Entity (SPE), which provides the financing against a callable option; and on the other hand – Biotech Investors are entitled to receive SPE Equity & Warrants against their funding in the SPE (Yosifov, 2019b, p. 69).

3.2. Business Angels Financing in Bulgaria

Broadly speaking, Business Angels are wealthy individual investors who – entirely at their own expense and risk – invest capitals in starting and developing certain business ventures and acquire rights of ownership in an enterprise for their capital contributions. As a rule of thumb, their investments are aimed at start-ups, mainly in the micro and small market segments, providing quick and defined financing conditions. These investors include a limited number of people with specific professional competencies and expertise, who are often organized into formal or informal groups or networks for information exchange, while pooling their capitals. In practice, this allows for development of a larger entrepreneurial initiative, which significantly increases the prospects for successful implementation of an innovative privately financed project venture. It is crucial, when searching success of an investment – to build and maintain personal relations with the Business Angel, executing fiduciary duties in doing the business. Business Angels may bring various practical benefits to a company, which streams to innovate. In addition, such an investor can strengthen a business and compensate for the lack of experience of the project team with external professional contacts and expertise in the relevant field of business. To win the interest of business angels, entrepreneurs must demonstrate convincingly that they know in detail the nature of the business they run. Therefore, a good starting point in the relations with individual investors is provision of a professionally developed business plan, supported by detailed and comprehensive market research or feasibility study. It should also contain information about the investments made so far, and for business ventures at the start-up stage; it is necessary to provide an estimate of the expected funds that a company will invest during project implementation. Another essential element of the business plan is provision of data on the management structure, including professional competencies and experience of each of the partners. Having into consideration all these elements of a specific relation to Business Angels, we think that it shall be underlined that biotech innovative enterprises shall communicate straightforward to Business Angels three core elements of their business intentions:

- the type of financing, which shall significantly strengthen the accounting balance of an innovative enterprise; the amount of such an investment in Bulgaria varies in the range from 5 to 250 thousand Euros;
- the proof of a good credit history of the enterprise, in order to raise additional financing, including banking in medium and long-runs;
- the managerial approach, which could be adapted to meet the requirements of Business Angels to return their investments and build a sustainable innovative business by introducing biotechnological solutions.

3.3. Biotech Project Financing by Risk Capitals Funds in Bulgaria

The main definitions of equity financing are attained to the leading role of venture capital funds for innovative biotechnological development. The reason for this is that they have key contributions to development of high-risk innovative projects. Indicative in this direction is the fact that in addition to financing, some funds may provide access to high quality know-how and expert support in implementation of innovative biotech projects. Thus, their

leading role is further strengthened by the overall opportunities offered by equity financing for development of an innovation, also referred to as “equity financing” (Stevenson, et al, 1999).

Venture capitals provided by specialized investment funds are deemed to serve as a source of funding for biotechnological innovative potential of an enterprise, which are mainly involved into development of products with high added value. In leading innovative countries, business activities of enterprises make an innovation possible, based on employing highly professional and strongly extensive scientific capitals. It is a matter of no coincidence that countries, which allocate significant amounts of public and private financial capitals for creation and development of innovations happen to be economically leading countries. This is paired to implementation of extensively reasoned and applied innovative public policies, which create favorable conditions for R&Ds in applied sciences. Here again, the University project of the University of Plovdiv – “Vita Plus” stands out as an example in Bulgarian economy, which demonstrates how to lay foundations for a comprehensive and extensive future scientific activities, based on public-private partnerships between Bulgarian businesses and Bulgarian scientists.

In summation, project financing in biotech innovations through Risk Funds in Bulgaria is non-existent at this stage of time.

4. METHODOLOGY

Methodologically speaking our accumulated research and early findings for Bulgarian economy are subject to special research in “Vita Plus”, which is to investigate what is the applicable PPP Model for Bulgarian public and private stakeholders, interested to enter doing biotechnological innovations for profit.

Our research design, which shall evolve in the following 2 research years is built upon three interrelated research segments. The first panel of data is to accumulate into one database our early findings for the biotech innovations and economic models, applied in Bulgarian economy since accession of our country in the EU. The second panel of data is planned to come from online questionnaires and in-depth interviews with different public and private stakeholders, particularly in the cosmetics industry. And the third panel of data is subject to ongoing transdisciplinary activities with other participants of the “Vita Plus” project.

Once completing our datasets, we are to enter processing of data and testing the validity of our hypothesis that EU and global modes and standards in doing public-private partnerships, and biotech innovations must be adjusted to Bulgarian standards of business and scientific work.

And finally, we plan to provide a verifiable PPP Model, appropriate to introduce biotech innovations into the Bulgarian business sector of cosmetics, supported by both Bulgarian scientists, and public stakeholders. This will be reasoned in a forthcoming series of publications, funded by the University project “Vita Plus”.

5. CONCLUSION

This paper discussed our vision to discuss openly our intention to investigate whether a modern PPP model may be applied in Bulgarian economy by pairing Bulgarian scientists and Bulgarian enterprises under the interest of defending sustainability of Bulgarian cosmetics sector. We base our scientific viewpoint on three main factors, which we consider could be the driving forces for the cosmetic sector: bio-geographical endowment of the country, new biotech equipment and research configurations, located in publicly funded stakeholders, and innovative will and risk capitals of private stakeholders to enter the biotech market of innovations. “Vita Plus” project will help us to screen and diagnose business capacity of entrepreneurs in the cosmetics sector, on the one hand, and scientific capacity for delivery of advanced biotech solutions as patents, licenses, and/or useful models to assist business competitiveness of SMEs of the cosmetics sector of Bulgaria. Here is why, establishing and contracting through a PPP model requires adequate financial reasoning, arguments, figures, and provision of sound data to substantiate business sustainability and profitability of such long-run business relations.

Furthermore, our intention in doing the “Vita Plus” project is to demonstrate fair modes of public and private defense of interests. In this sense, financial design of a PPP model relates to a series of research procedures to supply an adequate corporate assets appraisal, cash flow evaluation, adequate forms of management, including due-diligence, options to maximize profits, and others. However, it has to be defined the new institutional, regulatory and legal framework, which shall guide fair, proper, and for-profit business relations, defending the interests of general public for safety and awareness.

In conclusion, we reckon that “Vita Plus” may demonstrate which elements may be incorporated in the first generation of PPP models, utilized in fostering biotech innovations in different industrial sectors of Bulgarian economy. Although, PPP, biotech, innovative, financial, and banking expertise in the region of South East Europe, and in Bulgaria – in particular, is not adjusted to the leading global and EU standards, it is worth paving the road towards thinking of joining efforts into delivering new working solutions both for the businesses, and public stakeholders – institutions, and publicly funded scientific structures and organizations.

To the best of our knowledge, our research is first of its kind in Bulgaria since accession of the country to EU, and may turn into a good benchmark for further research.

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