UDS 330.341.1:517.956.224:663.6.001.76

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Conceptual approaches to research on innovative potential for natural sugar substitutes on example of stevia

Scientific problem. The implementation of innovative potential for scientific technical products depends on economic conditions of their market capitalization and commercialization. But frequently the requirements to quality and safety of products that influence on people health take the first place in some spheres, related to food. The production of natural sugar substitutes on example of stevia shows that the final products significantly exceed the synthetic sugar substitutes due to price (by 5 times) [8] and leave them behind due to quality and safety for health by ten times. Thus, it is very urgent to find the optimal mechanism to encourage the implementation of innovative potential for plant products, which have the double social economic importance, and to find the conditions to involve business entities into these processes.

Analysis of recent researches and publications. The essence and theory about evaluation of potential for economic entities takes the important place in researches by leading foreign and national scientists, among them M. Porter [18], M. Mescon [17], A.A. Thompson [21], V. Geyets [4], V. Yakovenko [12], N. Krasnokutska [7]. The papers by R. Brayley [19], E. G. Dolan [14], P. Drucker [15]. F. Kotler [16], G. Foster [11], V. Yakovenko [12], etc. are devoted to consideration of problems, related to innovations and investments in science-intensive sphere, and the papers by S. Volodin [1, 2], M. Zubets [6] – to research of algorithm and methodological approaches to evaluation of innovative potential for innovations in agrarian sphere.

The objective of the article – to perform the modeling of algorithm for researches to build up the chain for science-intensive economic processes on manufacture of products, in which the economic component (profitability) is not the only compulsory condition and which may be referred to "social economic important products", i.e. products of double importance. The implementation of innovative potential for these products, being necessary for society, has certain peculiarities; so these conceptual approaches are aimed to detect them.

Statement of the main results of the study. Consideration of products with social economic importance in terms of construction of economic process for their manufacture, separation and calculation of their innovative potential, abilities of promotion in the market require to regulate the conceptual apparatus, to define the direction for their further development, to detect the main factors that influence on their production and accordingly degree of provision with social needs, to clear up the mechanism for economic process in order to show the economic possibilities for provision with profitability for manufacture of products with social economic importance on example of stevia; role of state that shall solve the social issues; ways to improve the innovative potential for products with social economic importance, es-

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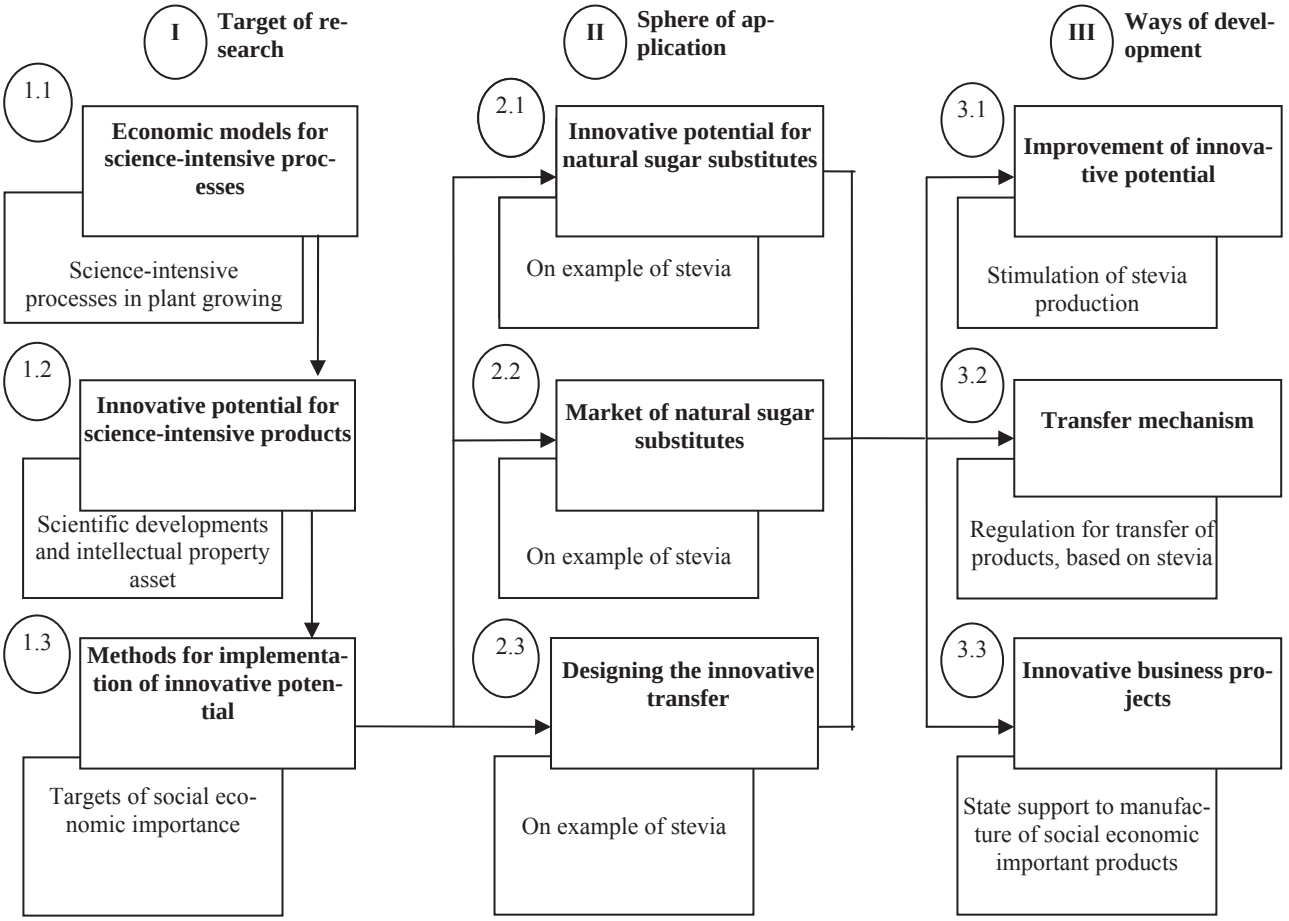
tablishment of efficient transfer mechanism that will provide with possibility to offer the concrete projects in this sphere and mechanism for their implementation. It is impossible to solve the tasks, being set, without application of modeling, i.e. researches of entities on models. As A. Ye. Konverskyy reasonably mentions "a model in logic and methodology of science is an analogue for a certain fragment of reality, generation of human culture, conceptual theoretical images etc." [10, p. 33].

The conceptual approaches to research of innovative potential for natural sugar substitutes on example of stevia were formed in three stages of work, which are schematically shown on picture.

The first stage grounds the theoretical methodological principles for science-intensive production processes for social economic important products in plant growing. This work anticipates the following researches (I):



Flow chart for research of innovative potential for stevia

Source: Developed by authors.

- *Construction of science-intensive technological processes in plant growing using economic categories and approaches,* on which basis the conditions for functions of economic manufacturing mechanism are studied, the economic model for science-intensive process in plant growing is built up, the stage-by-stage approach to motion of science-intensive product is monitored in order to achieve the economic purpose of production, being set. The formula of economic model for typical science-intensive processes is grounded using economic categories. The verification of model is carried out on example of economic processes in plant growing, if there are no such ones – the concepts, which reflect the process, being modeled, are grounded using the general categories and their transformations. The innovative approach [3, p. 158] is built up in order to study the science-intensive process with the great content of science-intensive developments, methods for their promotion, protection of interests for participants in process as the motivation of scientists, producers, businessmen, who eventually

provide with implementation of market and social oriented process of production in practice, shall be taken into consideration.

- *Grounding the methodological and analytical base to define the innovative potential for scientific technical products in plant growing.* Within this purpose firstly the base to define the innovative potential for scientific technical products is formed, its characteristics are generalized, the examples, which define the innovative potential in scientific technical development, their intellectual property assets, are mentioned. While analyzing the scientific approaches to understand the essence of concept "innovative potential", the approaches to innovative potential are grounded in terms of commercial value.

It should be mentioned that the attempts to present the scientists, scientific developments and research site in production structures, etc. as features for "innovativeness" prevail in works by many scientists. The research compares the interpretation of categories "scientific process (product)" and "innovative process (product)". It is proved that we cannot follow to fixed approaches: "the more scientism, the more innovativeness" because the innovative activity is to a large extent the entrepreneurial but not scientific activity [1, p. 114]. The practical experience testifies to the fact that the interesting products and schemes for their promotion, which provide with innovative process for establishment and sales of scientific-intensive goods/products, cannot be found without participation of scientists.

The research on intellectual component of innovative potential proves the difference in approaches, incomplete understanding how the intellectual component becomes the economics of knowledge, into which products it is embedded and moves in science-intensive economic process. Thus, the comparison of economic categories that disclose the mechanism for science-intensive process allows finding the points, in which the intellectual component is shown, which takes part in economic process at the level with other components and establishes its innovative component. While considering the intellectual property assets it is necessary to make the delimitation in relation to the fact that not any scientific technical development may have the intellectual property asset and on the contrary – an intellectual property asset cannot be a direct consequence from scientific technical research or development.

The analysis of scientific and innovative products allows forming the requirements to transfer objects, i.e. those components, thanks to which an object can move in the market. And as not each scientific technical development and not each intellectual property asset is directly the commodity, it is necessary to find their market qualities and to form the commodity package, having defined the place for scientific technical development of intellectual property assets in it. The basis for this is the formula by scientific school from Institute of innovative providing, which works out the systems of new formations and innovations due to entrepreneurial principles that aim to receive profit [2, p. 95]. The innovations are considered as novelties, which can be capitalized and commercialized, i.e. transform into assets of market and take part in abovementioned formula for science-intensive economic process. It is reasonable to perform the analysis pursuant to methodologies on capitalization and commercialization of innovations, developed by Institute of innovative providing at NAAS and approbated in projects of science-intensive business, in order to research the innovative products and to define their peculiarities as transfer objects.

- *Formation of methodological approaches to implementation of innovative potential for products from plant growing with social economic importance.* Further theoretical analysis of innovative potential anticipates detecting the disagreements that are reduced to typical defects in construction of science-intensive processes, their overcoming due to innovative providing system [3, p. 99-100] with detection of novelties and their intellectual property assets that can be capitalized and commercialized. The research on economic components of knowledge but not the knowledge in the whole allows detecting and classifying their peculiarities for products with social economic importance. The aspirations to receive profit, including due to innovative providing system, stipulate market entities to seek for the ways to reduce expenses and to increase income. However when an element with social importance

appears in consumer's sector, the system of indices that characterizes the capitalization and commercialization does not operate in full. If the state or individual social groups are interested to receive certain products, which, for example, influence on public health and at the same time the advantages in manufacture and promotion of such products, the pursuit for profit enters into contradiction with social necessity. This condition requires agreeing the system of indices and induces to find the mechanism for implementation of innovative potential for components of economic process taking into consideration the conditions for successful promotion of products with social economic importance to end users. Without finding the mechanism for implementation of innovative potential for products with social economic importance it is impossible to build up the economic process of production, which brings less profitability in comparison with synthetic and other analogues. In this connection, if an innovative product has the social economic importance, its production shall be encouraged using the state during all or some phases of production: from establishment of intellectual product to its transformation into competitive commodity, its promotion in transfer networks to the market through the projects or other ways. Thus, this approach enables putting the suggested formula of economic process to peculiarities for establishment of social economic important products and detecting the points in science-intensive process, which require the impulse, support and further the process with be developed due to pendulum principle. The mechanism shall anticipate the compensation of income deficiency for business.

The application of developed methodological approach **at the second stage of work** allows analyzing the process for science-intensive manufacture of products with social economic importance in the sphere of low-calorie natural sugar substitutes, which market is now actively developed but loses in economic attraction to artificial sugar substitutes, which seized the market. The chemicalization in manufacture of food products under modern conditions, which is caused by low prices for artificial sugar substitutes and is accompanied by negative influence on public health that is confirmed by numerous researches in various countries in the world that sets economically not simple question. What to manufacture? On the one hand, there are natural sugar substitutes that are grown in natural conditions, on the other hand – cheap artificial sugar substitutes make harm to public health. The method, offered in the research, allows seeing how to take decision about profitability in manufacture of product not only due to margin, profit but how to develop the direction, in which there are other advantages, including the ones with social importance, in this case economic losses, income deficiency shall be compensated. As a result, the analytical data are formed and the evaluation of innovative potential for natural sugar substitutes on example of stevia, the demand on which quickly grows, is carried out.

Due to assessments by International Sugar Organization (ISO) the world market of high intensive sweeteners (HIS) recently grows quicker than the market of sugar in terms of white sugar equivalents (wse) (table 1).

1. World market of sweeteners (wse)

	1985		1990		1995		2000		2005		2009		2010		2011	
	mln. tons	%	mln. tons	%	mln. tons	%	mln. tons	%	mln. tons	%	mln. tons	%	mln. tons	%	mln. tons	%
Sugar	91,5	86,8	101,5	85,9	108,9	83,3	117,2	82,2	136,4	82,3	148,4	83,2	151,6	82,7	154,9	82,5
HIS	7,2	6,8	8,5	7,2	11,5	8,8	12,9	9,1	16,4	9,9	17,0	9,5	17,6	9,6	18,1	9,6
Other	6,7	6,4	8,2	6,9	10,4	7,9	12,4	8,7	12,8	7,8	12,9	7,3	14,1	7,7	14,7	7,8
In total	105,4	100	118,2	100	130,8	100	142,5	100	165,6	100	178,3	100	183,3	100	187,7	100

Source: Formed by authors pursuant to [13, p. 2].

After receiving the legislative permits for sweeteners, based on stevia, in particular in 2008, FDA (USA) gave GRAS status, Food Standards Australia New Zealand (FSANZ), governmental authorities of Switzerland, in 2009 – French agency for safety of food (AFSAA), in November 2011 – permit from European Commission for sale of substances from diterpene glycosides, the activity of stevia world manufacturers quickly grows. Thus, stevia in the USA is used in manufacture of over 6.000 products [20]. According to researches

by consulting agency of food products and drinks "Zenith International" the volumes of stevia world sales in 2010 were 3.500 tons (875 ths. tons wse) and were increased by 27% in comparison with 2009 and in 2014 they will achieve 11.000 tons (2.75 mln. tons wse) [13, p. 44]. Due to assessment by World Health Organization the stevia-based products may substitute up to 20% from sugar consumption.

As stevia itself is one of popular widespread products – products with social economic importance, we can trace the main idea of paper on its example.

The main components in the second (II) stage of the research are:

- *Analysis of characteristic peculiarities for stevia as a natural sugar substitute and evaluation of its innovative potential.* In order to draw the conceptual approaches more clearly it is reasonable to specify the characteristics of product, to compare its peculiarities with other natural sugar substitutes that will enable proving the advantages for this product, being characteristic for chosen direction, (natural, low calorie) for human health with high sweetened qualities. The mechanism for promotion of such products that have double, i.e. social economical importance is shown. As a result from research it was found and proved that stevia-based products are the commodity that has the additional social advantages and is of high demand. There are countries-leaders, which form the proposals for stevia-based products, although they are economically inferior to more efficient, i.e. more profitable offers of artificial sugar substitutes. It becomes possible to assess the innovative potential for stevia on example from comparison of those products. The contradiction of products with social economic importance is found on example of stevia. Such approach allows analyzing and accompanying the system of indices of innovative potential for stevia-based products with social economic importance and evaluation of their commercial qualities in all phases at economic process of production, processing, trade.

- *Market analysis of natural sugar substitutes and tendencies for its innovative development*. According to research on world market of natural sugar substitutes the market tendencies are distinguished, the countries, which take protectionist decisions about development of production and consumption of natural sugar substitutes, for example, USA, Japan, France, Brazil, Chile, China, Australia, are shown [9, p. 195]. Thanks to protectionist policy, the state-manufacturers of stevia-based products have the possibility to receive the compensation or other encouraging forms for this production and to struggle to occupy the market, pushing out the competitors from it, as well as to enter to the markets of other countries and, thus, to promote their intellectual product, creating the new economic niches. Already now the largest manufacturers of beverage in the world, in particular, Coca-Cola, PepsiCo, started using food sweetener – stevia in manufacture of soft drinks with zero or reduced caloric value [5]. This experience is very useful for potential manufacturers of stevia in Ukraine. At the same time it serves as a warning as large system manufacturers, on the one hand, enlarge the possibilities for promotion of their products, and, on the other hand, - find the weak foreign markets and enter to them thanks to protectionist policy. Having displaced the competitors from them by lower prices, they will later increase the prices as they are not interested in development of national manufacture.

- *Evaluation of possibilities for capitalization and commercialization of stevia-based products in the format of innovative business projects in Ukraine.* In order to implement the innovative potential for stevia-based products through project mechanism, first of all, it is necessary economically to ground the possibilities to produce stevia, based on application of efficient selection achievements, intensive technologies of their growing, processing, promotion and sales in the market that will allow developing the system with peculiarities for pre-project researches, creating scientific technical products, which are used at manufacture of stevia, protection of participants' interests.

At present moment in Ukraine despite all favorable climatic conditions and high innovative potential for stevia, the manufacture of natural sugar substitute is slowed down, thus it is necessary to clear up the reasons for this slowing down and to find the ways to overcome with it. The design system shall show the way to support the manufacture and to involve business-

men into cooperation; however it is necessary to solve the issue about economic profit, without which the manufacture of stevia within commercial scopes will not be developed in Ukraine.

The research demonstrates that Ukraine has the possibility to act not only as a raw-material appendage but to produce science-intensive, innovative products, being of high demand in world market, and within this purpose it is necessary to be able to define, economically to ground and to take into consideration that stevia has the high specific weight of product yield per hectare of land (including processing) and does not farm out.

The ways for implementation of innovative potential for stevia-based products are defined **at the third stage;** the proposals for improvement of innovative potential and implementation of innovative projects for stevia-based products with social economic importance are formed. This stage of researches (III) anticipates the following:

- *Grounding the methodological and organizational approaches on encouragement for improvement of innovative potential for stevia-based products.* The analysis for process of science-intensive manufacture of stevia-based products, mentioned above, allows grounding the approaches and measures, which shall assist to form and to finance the establishment of science-intensive stevia production technologies at scientific establishments, selective developments, their transformation into market proposals and protection of intellectual rights. The products with social economic importance shall have the initial support at establishing of plantations, their promotion and guaranteed procurement of finished product. As the manufacturers of stevia in Ukraine state, it is the absence of procurements within the corresponding volumes (commercial volumes) that slows down its manufacture. At commercial use of natural sugar substitutes it is necessary to solve the question about long-term procurements (contracting) that in its turn requires to solve the question about processing, i.e. availability of processing complex, which manufactures the final stevia-based products. This production may be within the system of complex on processing of biomass from plants of essential oil group and in this case the purpose of such factory is not restricted only by stevia processing. The Institute of innovative providing together with the Institute of agriculture in the Crimea develops the investment project for factory on processing of essential oil cultures, medical plants, including stevia, with state and investment support. The natural climatic conditions of the Crimea, southern regions of Ukraine allow growing stevia and the available processing complex will guarantee the payment due to forward contracts to farmers, spot (upon receipt of goods) of necessary raw materials with scientific support on industrial basis and receipt of finished product, accordingly. It will allow struggling for the niche in the market of Ukraine and its expansion, as well manufacturing the products for export, involving foreign partners.

- *Research on mechanism that regulates the transfer market of innovations in manufacture of low-calorie sugar substitutes on example of stevia.* Grounding possible formats for regulation, in particular establishment of transfer technological infrastructure within the system of National academy of agrarian sciences of Ukraine, will assist to enlarge the cooperation with cooperated partners, for example by agricultural enterprises from Agrarian union of Ukraine, in high technology agrarian business. The cooperation will enable reaching the batch production and industrial volumes, which surely provide the processing complexes, as well as creating competitive transfer mechanisms (storage, drying, supply of finished products, advertising, etc.). Such approach to research allows forming the ready infrastructure for various projects, including the manufacture of innovative stevia-based products. The developed project mechanism is based on the fact that the motion of innovative product is created, found and analyzed at all stages due to formula of science-intensive economic process. The system points, which require the financial support, are also found and the final processing enters to economically stable positions and profitable level. The production shall be stimulated until this phase, the processing phase in fact repays the expenses, thus, the state shall give a push, play the role of driving force at initial phases of science-intensive process.

When the production reaches the industrial volumes: a part is exported, a part is supplied to national re-processors, and already the reprocessing complex itself becomes a forward contractor as to ordering, payment and flow of products to consumers.

Thus, the system approach, applied in the research, allows stating: if a product has the innovative potential, so it is necessary to have the commercial project with support for social component, which is the peculiarity of mechanism for implementation of innovative potential for products with double social economic importance, to which stevia is also referred to.

The presented conceptual approaches to research of innovative potential for natural sugar substitutes on example of stevia are based on results from researches by the Institute of innovative providing in 2011-2015 due to the following directions:

- Fundamental research on topic "Methodological and organizational provision with integration of agrarian science into innovative investing environment of science-intensive agrarian market" (Innovative providing). These researches anticipate the development of scientific methodological and organizational provision with transformation of innovative potential for developments of agrarian science into competitive business proposals, methodological and organizational accompaniment of investment provision for facilities of top-priority innovative development in AIC, grounding and organizational methodological accompaniment of innovative transformations, integration development and investment provision of experimental production base in agrarian science. The developed scientific base grounds the economic approaches to manufacture of products with double social economic importance, proves that all necessary conditions for motivation may exist in integrated scheme on promotion of economically demanded intellectual products in the form of innovative product with investment support, i.e. with partial or temporary support of state to occupy the niche and to enter to the stable business (concern that brings in the income) in such important spheres as ecology and public health.

- Applied researches on topic "Scientific peculiarities for efficient use of innovations in agro-business taking into consideration the zonal peculiarities for regions" (Transfer of innovations) allows performing a number of applied researches in project format, including the development of scientific methodological approaches and sets of organizational informative provision with experimental production and sales of competitive science-intensive and commodity products, methodologies and sets of organizational tools on provision with research on optimal conditions and project accompaniment for transfer of innovative proposals to agrarian market, system of automatic designing and business planning to finance the projects in top-priority spheres of AIC and food provision.

These developments confirm the conceptual approaches to implementation of innovative potential for natural sugar substitutes through transfer mechanism for science-intensive agrarian market, which are presented in this paper. The implementation will be carried out together with the chain of scientific innovative centers at NAAS on the base of regional research units, including through establishment of industrial stock to invest processing logistics complex for manufacture of essential oil products, including natural sugar substitutes, based on stevia.

Conclusions. This research proves that the implementation of innovative potential for products with social economic importance, on example of natural sugar substitute – stevia – is the urgent question of nowadays in relation to public health and ecologically clean products. The economic science-intensive process, in which the social component shall receive the state support through stimulation of production projects, provision with compensation of credits, rendering the warranties for credit facilities to establish the conditions for top-priority development of manufacture of social important products, is built up on example of stevia as a direction. Further economic attractiveness in process for treatment and promotion of this product in the markets will lead to its payback, the additional resource to self-finance further stages of project appears, as well as the stable availability of integrated manufactures, who are guaranteed with ordering, sales of products due to fixed prices, i.e. the stability in economic relations "developer – manufacturer – reprocessor – consumer" is assured. The presented conceptual approach may be used at re-

search on innovative potential for essential oil, medical and other cultures of vegetative origin, on which basis the products with social economic importance, being necessary for society, are created.

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The article has been received 08.04.2014

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