2. World steel Association. Fact sheet: energy use in steel industry [Електронний ресурс]. – Режим доступу: http://www.worldsteel.org/dms/internetDocumentList/factsheets/fact_energy_2014/document/fact_energy_2014.pdf.
3. Верба, В.А. Проектний аналіз: Підручник [Текст] / В.А. Верба, О.А. Загородніх. – К.: КМ Академія, 2000. – 322 с.
4. Бурков, В.Н. Модели и методы мультипроектного управления [Текст] / В.Н. Бурков, О.Ф. Квон, Л.А. Цитович. – М. : Институт проблем управления, 1998 – 62 с.
5. Бусленко, Н.П. Лекции по теории сложных систем [Текст] / Н.П. Бусленко, В.Е. Калашников, И.Н. Коваленко. – М. : Радий, 1993. – 440с.
6. Новиков, Д.А. Модели и методы управления портфелями проектов [Текст] / Д.А. Новиков, А.А. Матвеев, А.В. Цветков. – М. : ПМСОФТ, 2005. – 206 с.
7. Янч, Э. Прогнозирование научно–технического прогресса [Текст] / Э. Янч; пер. с англ.– М.: Прогресс, 1970. – 568 с.
8. Большой энциклопедический словарь / [гл. ред. А.М. Прохоров]. 2-е изд., перераб. и доп. – М.: Большая российская энциклопедия; СПб., 2000. – 1456 с.
9. Markowitzб H.M. Portfolio selection [Text] // Journal of Finance. – 1952. – V. 7. – № 1. – P.77–91.
10. Молоканова, В.М. Процеси формування портфеля ціннісно-орієнтованого розвитку організації [Текст] / В.М. Молоканова // Управління проектами та розвиток виробництва: Зб.наук.пр. - Луганськ: вид-во СНУ ім. В.Даля. – 2015.– № 2(54). – С. 24–33.
11. Томпсон, А.А. Стратегический менеджмент. Искусство разработки и реализации стратегии : учеб. для вузов [Текст] / А.А. Томпсон, А.Дж. Стрикленд; пер. с англ.; под ред. Л.Г. Зайцева, М.И. Соколовой. – М. : Банки и биржи, ЮНИТИ, 1998. – 576 с.

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Rach Valentyn, Kadhem Abdulrhman Abdulsatar Kadhem

MEDICAL FIELD OF IRAQ AS AN OBJECT OF INNOVATION ACTIVITY SURVEY: SYSTEM-HOLISTIC VISION

A system of models has been developed. The models characterize the holistic vision of the medical field in Iraq as an object of innovation survey based on international methodologies. Fig. 6, tabl. 3, ref. 40.

Key words: medicine, innovation, innovation activity, model, index, innovation research, innovation survey, innovation observation.

Problem statement in general and its connection with important practical and scientific tasks. One of the nowadays characteristics is the domination of innovation in state economies. This type of economy is called innovative. For innovative economy it is typical that, above all, the main source of successful functioning and development of business entities (companies, organizations, enterprises, regions, countries) is innovations [1]. They are not single innovations, but the flow of innovations, continuous technological improvement, production, sale and export of high-tech products with very high added value of technologies in themselves. That is, we are talking about innovation activity as about "all scientific, technological, organizational, financial and commercial activities that actually lead to the implementation of innovations or were meant for this purpose" [2, c.56].

The experience of different countries shows that successful transition of national economy to the innovative model of functioning is possible only when all members of innovation process apprehend innovations [3]. Usually it is not so. It is known that in large corporations from developed countries only 5% of all innovative projects achieve business success, and 80% of failures are detected only at the stage of product's release to the market. The same impressive figures are typical for innovative IT projects [4]. All this shows that innovative activity needs to be managed at the level of different business entities [5]. This requires a deep understanding of such critical aspects as innovation activity's specifics as opposed to basic research and development, the interaction between acting objects and the relevant knowledge flows. This involves a deep study on the basis of innovative activity's analysis [6]. The task of innovative activity's survey is especially actual in the medical field in different countries. This is evidenced by periodically appearing reports, national and international conferences that cover topics of innovations in the field of medicine and public health (for instance [7, 8]).

Until then, innovation surveys have been more relevant for the most developed countries. However, in recent years, this problem covered other countries as well, including Iraq.

Highlighting previously unsolved aspects of the problem. Exploring innovations of certain medical subjects in Iraq, in some degree, is possible on the basis of certain study guides (also may be known as manuals), which actually characterize the innovation process (Oslo Manual [2]), researches and developments (Frascati Manual [9]), patenting results (Canberra Manual [10]) and biotechnologies [11]. However, we can not say that they fully take into account the peculiarities of the medical sector. At the same time, they reflect "best practices" of developed countries, and therefore are not applicable without taking into account the features of Iraq, require science-based adaptation. In addition, given manuals do not contain finished methods, while they must be formed based on viewing medical sector as an object of innovative survey.

Paper's aim is to explore the existing approach for studing innovation activity in the medical field of Iraq, to develop basic provisions that characterize the medical sphere of Iraq as an object of innovation survey.

Main research materials. How are innnovative surveys carried out in the medical field in Iraq? Based on the recommendations from the Guide [2], for the implementation of research we need to answer the following important questions. What is measurable in medical innovation activity? What should be measured? What should be counted, what not? How to interpret the success of innovations for the subjects of this activity? What will be the model of subject structure, etc? In addition, the key provisions of the innovation survey contain selecting statistical population, approaches and methods of measurement, development of questionnaires, processing and presentation of results, as well as determining the frequency and duration of the observation period.

Unfortunately, there are no official and available statistics of innovation in the field of medicine in Iraq these days. This gives us grounds to assume that official innovation surveys based on international methodologies have not been carried out in this area yet. The main statistical indicators, available for the study, consist of the figures presented in the annual reports of the Iraqi Ministry of Health [12] and the quarterly reports of Iraq Pharmaceuticals and Healthcare Report [13].

The Ministry of Health's reporting model involves identifying the progress on the set and achieved results. According to 2012 report, the indicators from the business direction 1 "Raise humanitarian standards", presented in tabl.1, had to be taken into account. They are difficult to be related directly with innovation activity, because

almost all of them can be the result of innovation implementation. However, we do not know wether it was exactly like that.

Table 1

Iraqi Ministry of Health's data for the detection of progress on set and achieved results

Business lines	Goals	Achievements
Business Line 1 To improve humanitarian standards	Improving leadership skills to develop and implement strategies for ensuring good performance and responsibility	Clearly defined managerial roles and responsibilities,management at all levels
		5 years strategy, which defines a clear road map for the construction of stronger, more dynamic and innovative health systems in accordance with the 2020 strategy, designed and approved by the Government Council
	To provide well-operating organizations with viable systems, procedures and personnel with the desired level of managerial and technical competences	One medical personnel's centralized computer database is installed and is functioning
		Resource (human, financial and tangible) Assessment is implemented as a database on the basis of the National evaluation system
		The humanitarian context is analyzed and identified, VCA has been conducted, DM frame has been determined
		Job descriptions for all staff and volunteers are located in the workplaces of IRCS and HQ branches
		financial management procedures and guidelines are approved as by auditors as by adopted management accounting and reporting system
		Well-functioning and compliant financial reporting system is established within the framework
		The internal communication strategy, procedures and instruments are developed and located at the workplaces; external communications' directives are developed and implemented
	Improving ability for program development and management	50 staff members and volunteers have been trained project planning, management and reporting
		50 staff members have been trained development management skills, project and program improving and reporting skills
		425 new comer young people and volunteers have been trained the principles of RC / RC movement

Pharmaceutical and healthcare reports' model includes around 50 items. However, there are only few among them that can display the state of things in innovation activity in the field of medicine (such as pharmaceutical import and export, industry trends and development, healthcare reform, intellectual property, development). It means that this report can only be used as an information support for the innovation survey of medical sphere.

The fact that innovations are being implemented and yield results the following way. There are many medical annual international exhibitions and conferences, taking place in Iraq. One of such events is Iraq Medicare-Erbil. It is an International Exhibition of Medicine and Health and it is known as the central event enhancing Iraqi Healthcare's image [14]. It sets high industry standards, offering professional settlement that allows companies from Iraq and other countries to exhibit the latest health products, equipment and services. Its second purpose is to convey information about the updates to doctors, hospitals, customers and professionals in the health sector of all Iraq's regions. Iraq Medicare-Erbil attracts up to 9,000 visitors each year. It satisfies the critical need in business networking platform, which gives an opportunity to discuss the future possibilities of Iraqi medical market for responsible government employees and professionals in the health sector. Iraq Health Expo is also deserves attention. It is an International exhibition of medical equipment, medical services, medical industry and a Conference [15]. This exhibition is held in Baghdad since 2010.

In general, Iraq can hardly be called a country with high innovation activity. This conclusion is based on the analysis made using a number of the world's generally accepted indicators. Let us consider them further in details.

BCG International Innovation Index: It covers 24 indicators, combined into six groups, which are divided into two sub-indices: the conditions of innovation development; the innovation development results. The group of "innovation development results" consists of:

- Display of innovations through the light of society, which contains such elements as: employment, investments, business mobility and economic growth;
- Business efficiency includes economic export, productivity and market capitalization;
- Investments in research and development (R&D), intellectual property (patents), knowledge transfer and publications, commercialization of innovations as R & D results.

The group "Conditions of innovation development" consists of:

- Innovative environment (contains following elements: education, skilled labor force, the quality of infrastructure and business environment);
- Policy in other areas (education, trade, intellectual property and infrastructure policies, as well as immigration policy);
- Fiscal policy (tax financing for research and development, the level of taxation and government funding for R&D)

The share of expenditure on research and development in GDP: the percentage of the country's expenditures on research and development in GDP.

The current index of competitive growth GCI (The Global Competitiveness Index): GCI consists of 12 elements of competitiveness that characterize in details the competitiveness of countries of different level of economic development. They are quality of institutions, infrastructure, macroeconomic stability, health and primary education, higher education and training, goods and services market efficiency, labor market efficiency, financial market sophistication, technological level, size of domestic market, companies' competitiveness, and innovation potential.

The share of high-tech products in merchandise exports: the percentage of high-tech products in merchandise exports

Share in global export of informatization equipment: information and communication technologies for telecommunication goods export, audio and video, computer and related equipment, electronic components, as well as other information, communication technologies and products. Software is excluded.

*Index of innovative potential ICI (*National Innovation Capacity Index). This index identifies more than 60 factors that will affect the country's ability to create an environment that encourages innovation. This includes national institutional environment, human capital, the availability of social integration, regulatory frameworks and infrastructure for research and development, as well as the adoption and use of information and communication technologies.

GII (The Global Innovation Index). The index represents the ratio between costs and effects, allowing to make objective assessment of efforts' effectiveness concerning the development of innovations in different countries. The index is calculated as a weighted sum of the scores of two groups of indicators:

1. Resources and conditions' allocation for innovations (Innovation Input) (Institutions; Human capital and research; Infrastructure; Internal market development; Business development).

2. Achieved practical results of innovations (Innovation Output) (Technology and knowledge-based economy development; creative activity results).

KEI (The Knowledge Economy Index). It is a comprehensive indicator, which characterizes the level of knowledge economy development in different countries and regions of the world.

HDI (Human Development Index). It is a cumulative indicator of human development level in a country. That is why it is sometimes used as a synonym for terms such as "quality of life" or "standard of living". It consists of life expectancy; level of education; standard of living.

Intelligence quotient and national wealth IQ (Intelligence quotient). It is a quantitative assessment of human intelligence level: intelligence level compared to an average person's intelligence level of the same age.

The index for measuring country's involvement to the international trade GETI (The Global Enabling Trade Index). This index measures the state policy and the efficiency of institutions in the field of international trade and economic cooperation development. Key indicators of national economies' openness for the international trade are internal market access, administrative borders control, business climate, transport and communication infrastructure. Based on these indicators the final ranking of international trade involvement is made.

Usually, reports containing such data are published with a delay for approximately two years, since they require an international comparison, after the publication of data by national statistical offices.

Today, however, there is a problem of data access in Iraq. As a rule, Iraq is not present in the list of countries for which calculations are done. This has already been mentioned above. The reason for that is various negative social and political events that are taking place in this country for quite a long period. Because of them, it is impossible to provide reliable statistical data on the index components. This situation is reflected in the tabl. 2.

As we can see, Iraq has relatively low innovation activity indicators in the overall picture of the world. After comparing this conclusion with information about the annual medicical and public health international exhibitions, it could be stated that medicine exactly is the most advanced field from the point of view of innovative development in Iraq.

According to the national development plan for 2010-2014 [24] and 2014-2017 [25], medicine is one of the priority development sectorsf in Iraq. The most important landmarks correcpond with such latest global trends as ensuring the quality and accessibility of medical services for different population segments, innovative nature of industry development in general [26]. At the same time, Iraq demonstrates the willingness of governmental financial support for innovations, both as in public as in

private sectors of economy. It is promoted by a relatively stable GDP growth [27] and the high interest of foreign investors for the national economy.

Table 2

Innovation activity Indicators in Iraq

№	Indicator	Year	Value
1	The International Innovation Index BCG [16]	2012	Iraq is not mentioned among 130 countries
2	The Global Competitiveness Index GCI according to the World Economic Forum [17]	2012-2013, 2013-2014	Not mentioned among 144 countries
3	The share of high-tech products in merchandise exports	2007	0,1%
4	T share in global exports of informatization equipment	No data	
5	Innovation Capacity Index ICI [18]	Calculated for Europe	
6	The Global Innovation Index GII [19]	2013, 2014, 2015	Iraq is not mentioned among 143 (141) countries
7	The Knowledge Economy Index KEI according to World Bank [20]	2012	Not mentioned among 145 countries; indirectly has 6th place out of 8 regions of the world, and 3rd place out of 4 groups of countries by income
8	Human Development Index HDI [21]	2014 2015	120th out of 187; the group of countries with an average level of the index: 121st out of 188 countries
9	Intelligence quotient IQ [22]	Research in 2002, 2006 yy	Not mentioned among 81 countries
10	The Global Enabling Trade Index [23]	2014	Not mentioned among 138 countries

In 2013, Iraq adopted a series of policy documents. These include the National Health Policy (for 2014-2023), the National Development Plan (for 2014-2017). The Ministry of Health is working to develop a strategy associated with program-based budget. The last round for National Health Accounts' development has finished in Iraq. Iraq is one of the sourses of human resources for countries with healthcare crisis and with a large shortage of healthcare workers. The lack of ability to forecast and predict the need in desired labor force, the quality of health workers' education, especially nurses, paramedics' regulation and medical staff management are big problems today.

The main reform initiatives in Iraq are implemented under the program aimed to modernize public health sector by WHO (World Health Organization), and the project aimed to strengthen healthcare system, which is funded by the European Union. The private health sector is growing in terms of investments, the number of facilities and personnel, and is becoming an important player in the market of medical services.

Taking into account the real present-day socio-economic and political conditions, Iraq aims to achieve its goals in cooperation with international organizations. A number of international, bilateral, multilateral organizations and non-governmental organizations offer services and support the government in the health sector in Iraq. The key cooperation of Iraq and the WHO is as follows:

- Other U.N.O agencies in various multilateral cooperation funded by the Trust Fund UNDAF;

- The Iraqi government promotes some projects through co-financing;
- The World Bank funded by the Iraqy Trust Fund at the World Bank;
- Bilateral donors, mostly EU;
- GFATM (Global Fund): support to stop tuberculosis, together with U.N.O., Ministry of Health and non-governmental organizations.

Active partners in the working group of the program “Health and nutrition priority” are WHO, Unicef, United Nations Fund for Population Activities, UNDP, IOM, UNIDO, UNEP, UNIFEM, OCHA, ICRC and non-governmental organizations, including “First necessity”, Doctors Without Borders, International Medical Corps and others [28].

Thus, today there are prerequisites for the development of innovation activity in the field of medicine in Iraq. On the one hand, there is an urgent need for rapid development based on qualitatively new modern medical technologies, products and equipment, and on the other hand, there is willingness and ability to invest in this development, both from the government and international organizations from private sector. The effectiveness of such a development can only be achieved by focusing on systematic innovation activity. The first step for its successful implementation is creation of well-grounded policy. However, such policy should be based on innovation survey.

Let us consider the experience of other countries in conducting similar surveys. First, it is important to know how innovations are understood in the field of medicine and what innovation activity’s indicators are usually used in this area.

In particular, the approach for innovation surveys in pharmaceutical industry, as described in [29], is focused on the results of innovations. It is based on the following ideas. An innovation always contains new or improved attributes, buyers’ readiness to consume it and to pay for it, and at the same time a consumer is always seen as the main appraiser of innovation’s value. Novelty is what the final consumer, patient finds more useful, everything that was not available before.

However, it was emphasized that novelty in pharmaceutical products can not be described unambiguously, binary, as black or white. Novelty is not limited to a narrow number of aspects, it may include everything that people find useful, evolutionary, not duplicated. Who are these people? These are patients who take medications; payers who feel financial costs; doctors who do prescriptions and decide which drugs to use; nurses who support patients. Therefore, novation in medicine must be considered as a multidimensional concept with these positions.

For this reason, pharmaceutical R&D is a risky process with unpredictable results. A full medical novation’s assessment is possible only after its consumption. Many therapeutic benefits are not appreciated for a long time after treatment. This means that if medications are not producing or used, then many of additional benefits are not understood. From available literal sourses, it is known that dynamic R&D competition between organizations enhances the effectiveness of R&D and productivity, it also creates potential for establishing competitive prices, reducing waiting time of patients for available new technologies, as well as differentiates medicine by the criterion of better matching the needs of different patients.

From this perspective, the characteristics of innovations are suggested to be groupped by such attributes: health outcomes; benefits to patients and physicians; other social benefits, including cost savings.

According to the author [26], the potential characteristics of innovative pharmaceutical products are as follows: description of a new disease; health outcomes (quality of life, life expectancy); more rapid treatment; safety (adverse effects, tolerance); interaction with other drugs; the convenience of doctors / patients; productivity gains; release of other health resources; release of resources which are

not directly connected with healthcare of patients and doctors; other social benefits, including cost savings.

The characteristics of health benefits may be following:

- new disease and / or new indicator detection;
- health-improving results in comparison with existing methods of treatment;
- faster health-improvement, for example, recovery time reduction from weeks to days can be valuable for a patient, even if this health-improvement is not significant from the standpoint of traditional estimates;
- side effects' reduction and / or tolerance increase (which leads to better patient health, both directly and indirectly);
- reducing negative interactions with other medications;
- the possibility of better treatments for one or more subgroups of patients, despite the fact that patients are less susceptible to the universal approach;
- others [29].

According to [30], there are post-research effects, such as a best use of original indication or additional indications; unexpected new therapeutic use, detected mainly by chance; expansion of therapeutic use areas through the application of well-known effects; new formulas, new dosage, new forms of administration. Any definition of innovation for medicine needs flexibility in order to cover expected benefits after usage.

As we can see, today there is no clear and generally accepted understanding of innovations in medicine. Certain attempts to list types of innovations within the conventional segmentation of product, process, organizational and marketing innovations exist in pharmaceutical industry, in particular. However, there is no any classification of innovations, which would more clearly describe medical and healthcare scope precisely. The key terms "innovation", "innovation activity", "innovatively active institution" require clearer definitions taking into account the peculiarities of medicine as a field of activity. All this makes it difficult today to answer the questions "what is measurable?" and "what to measure?" while conducting innovation surveys in medical sphere.

However, such studies are carried out of course. Not so long ago (2012), Poland showed its approach for innovative medical researches [31]. The report, which is publicly available, contains micro and sector analysis, as well as the list of the most innovative healthcare enterprises with detailed descriptions. The survey is based on traditional medicine related positions, including R & D (research and development), according to Frascati Manual (special section about research and development indicators that are focused on medical field):

- medical and healthcare expenses in various aspects, both domestic and in relation to other countries. That allowed to show good national position and relevant perspectives;
- market structure of private medical insurance;
- import / export of esthetic medical services;
- examples of product, process, organizational and marketing innovations in medical tourism;
- innovation activity results within the pilot project "Foresight health and life";
- innovative activity's financing features implemented by EU funds, including educational institutions - universities and institutes;
- R&D investors' weak points in pharmaceutical companies;
- barriers for innovative activities' implementation, such as financial, knowledge (qualification and competence of professionals), marketing;

- one of the leading medical universities was reviewed as an innovatively-active organization;
- family owned and controlled innovative companies;
- the list of the largest R&D investors in medical sphere (36 investors);
- thelist of the most innovative companies in the field of medicine (100 companies), the criteria by which they were selected, as well as brief information on some of them;
- medical field's accepted activity (sector) classification;
- the family of reports on innovations in the field of medicine, including investors;
- the network of research institutions in the field of medicine as for R&D and innovation influence evaluation on social and economic development of the country.

Other medical surveys's analisis in different countries [32, 33] show that they are based on similar indicators, including the analisis of share and structure of medicine and healthcare costs, investments. At the same time, each country understands differently as for what medical improvements could be considered innovations, what companies could be considerd innovative, etc.

In other words, today it is possible to assert that each country generates its vision of the medical sphere as an object of innovation survey.

In our opinion, this kind of modeling should be based on the following features of the medical sector.

The main feature of the medical field as an object of innovation survey is that it must be considered on different levels and, at the same time, as a medical sector actually, as a sphere of services, sector of economy, as well as innovative economy's sector. Today, however, the public sector, which includes medicine and healthcare, is not in the subject field of the existing Guidelines. The same applies to industry-level surveys (mostly, they are oriented to organizational and company levels), as well as to detailed consideration of innovation activity's features in the service sector (except of two types of innovations that are specific for it, such as organizational and marketing). In addition, existing Guidelines are oriented to developed countries as an innovation survey's environment. While today Iraq belongs to the group of oil-producing (neither developed nor developing) countries, all this generates numerous features of innovation survey of the medical sphere in Iraq and confirms the relevance of a specific system of indicators and its development. Its central point should be indicators that characterize the relationship between different aspects of the medical sector, as well as holistically characterize the effectiveness and efficiency of innovation activity of medicine as a whole.

This extends the range of issues that must be taken into account when modeling the innovation survey of the medical sector in Iraq. It also specifies the type of models that should be applied. They should be conceptual models that allow imagining anything holistically. A product of this modeling is a system of models using which allows forming indicators, choosing methods of measurement, developing rules of interpretation of survey results.

On this basis, our modeling will be based on key positions of the system-holistic approach and appropriate conceptual models will be used. Their use allows to represent something as a whole, as well as to identify weaknesses of the current system state. We will use the four-element model [34] and the model of concentric project environment [35, pp.22-23].

Four-element system model makes it possible to represent the structure of something in the form of elements, co-interacting (mutually assisting and interacting) to achieve a common goal and the result, while taking into account the peculiarities of the environment of co-interacting elements.

The concentric model allows us to visualize anything as an element of systems of a different nature at the same time. As an example of such a model, we use the model of concentric project environment, which is described in [35]. The "core" of the model is a project that is a temporal activity aimed to create value due to a unique project product within the scope of socio-economic system's mission. Project environment contains such four socio-economic systems as organization, region (country region), state (country), and civilization. They all affect the project, but the effect is different. Each system of a higher level influences a project by changing the state of a lower-level system. Moreover, these changes can be clearly formalized for the past and the present, but it is more uncertain for the future. In the context of the knowledge economy, prediction and forecasting are much more difficult and do not give the expected results. Each socio-economic system from the model has its level of social, economic and cultural development. The lower the level of system development is, the more difficult it comprehends innovations implemented in higher-level systems. Consequently, there is a large gap between the cultural project environment and the cultural level reached in the most developed countries, which are "the epicenters" of civilization. Therefore, project management is often compared with the art of solving problems that can not be resolved.

Both of the selected models are universal, as well as they provide an opportunity to describe a survey object at a high conceptual level. That is to say, the task of modeling of innovation activity's survey in the field of medicine will be solved, despite of the absence of such key items as the terminology and principles of innovation activity in this specific sector.

Based on the expected result of modeling, it is based, in its turn, on the system model of innovation activity. The goal and the result of the system (which are rational indicators for a holistic view of innovation in the medical field as a specific sector of Iraq) have determined the choice of co-interacting elements, such as subjects, main point (essence), environment and area (space) of innovation activity (fig. 1).

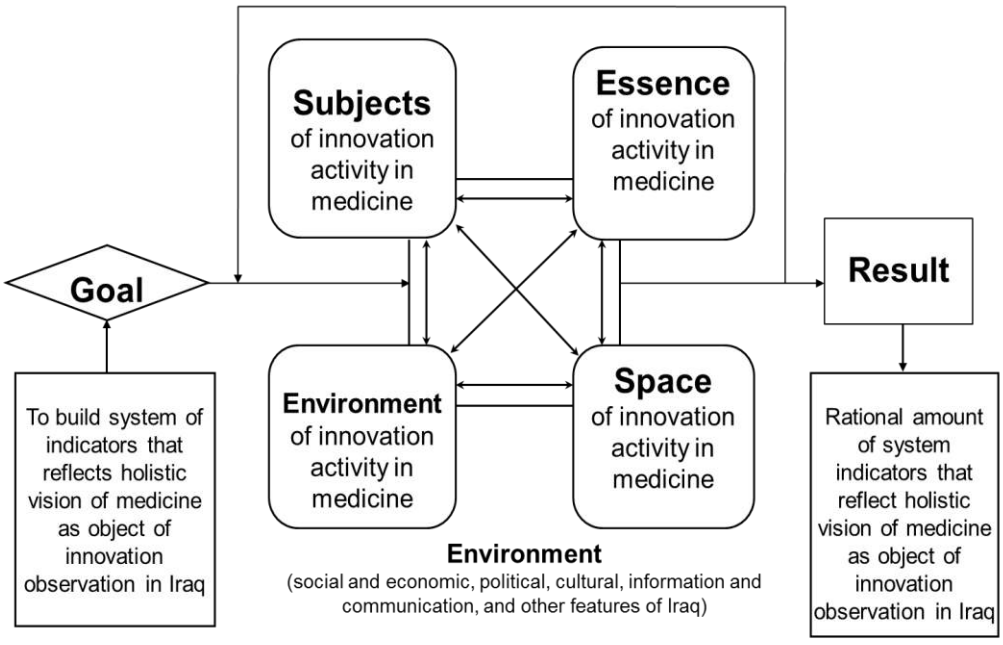

Fig. 1. The system model of innovation activity's survey in medical sphere (MS)

Generally, the choice of elements is based on the concept of activity as a set of actions that are implemented in time and space, in particular environment, have a target, a result for the acting subject.

The environment of the proposed system is presented by Iraqi specifics as far as Iraq is a country in which innovation activity in the field of medicine is surveyed. Those specific features of Iraq essentially include complex political situation, which recently was continually aggravated by the military confrontations and terroristic aatacks. It is a powerful factor. On the one hand, the acute political situation slows innovation activity, the ability and willingness of the state to invest in innovations. But, on the other hand, exactly medicine requires an active innovation activity in order to urgently increase its efficiency in severe restrictions that armed conflicts bring there.

This is confirmed by the expert opinion. According to [36], after many years of economic sanctions and wars, Iraq's health infrastructure varies in indicators of development, but it remains interesting for investments.

Thus, during the first three days of the 38th Arab health exhibition in Dubai, Iraqi Ministry of Health's delegation met more than 100 companies' representatives from the United States, the United Kingdom, Germany, China and India, who showed their interest in doing business with Iraq. According to the Minister of Health's representative, the last war increasingly destroyed everything, so it is necessary to revive the country from the ground up. Therefore, Iraq can be considered a very good market for everything. Some large construction projects will affect Al Bayaa Teaching Hospital in Baghdad (USD 210 million), Fallujah Maternity and Children's Hospital is a part of the plan of construction of 11 hospitals. The German company "Medical Services" and Turkish Universal Hospitals Group signed the contracts with the Iraqi Ministry of Health for the construction of six hospitals with 100 hospital accommodationans and 2 hospital clinics. The Germans are working on two hospitals with 500 hospital beds: Al Najaf Hospital, Cancer Therapy Center, Al Ninevah Teaching Hospital in Mosul. The US Agency for International Development is building 360 original health centers in 18 provinces under the $ 74 project. Japanese $828 million grant is used for medical programs. The Iraqi Ministry of Health also plans to build a pediatric hospital with 300 hospital beds in Karbala and three teaching hospitals with 400 hospital beds each. To the 4th exhibition Iraqi Ministry sent a team of 22 consultants who needed to find companies willing to invest in the Iraqi medicine.

Representatve (descriptive) model for the essence of innovation activity in the medical field. The result of using the representatve (descriptive) model for the scope of innovation activity in the medical field is to get the excess list of indicators that describe innovation in the field of medicine. Such complete list may be obtained, if systems of indicators, known today, are observed as co-interacting in the scope of one system. This makes it possible not only to operate within the parameters of individual elements, but also to identify the parameters that characterize the relationships between them and the resulting system indicators. It is the most important for the field of medicine as a whole, if to view it holistically, rather than to consider it as a sum (or a set) of medical institutions and their innovation performance. At the same time, an excessive number of indicators should be reduced to a more rational, amenable for efficient quality measurement, analysis and interpretation.

Based on these provisions, the representative (descriptive) system model of innovation activity in the medical field was proposed (fig. 2). It integrates such elements as indicators of innovation activity as a whole; performance of research and development; global indicators (patents, etc.); biotechnology indicators.

Environment is presented by the features of Iraq as a country in which innovation activity is surveyed in the field of medicine.

Today, the most "weak point" in the model is indicators that characterize the relationships between the elements, as well as the scoring system performance.

Excessive list of indicators can be formed by adapting existing models of periodic surveys of innovation activity in different countries (eg, Russia [37]).

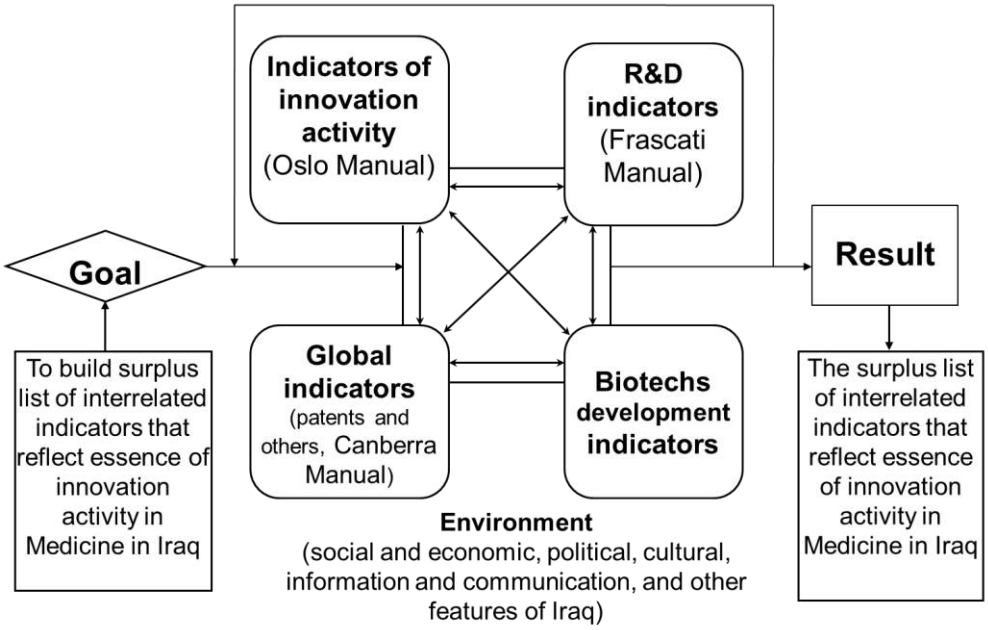

Fig. 2. The representative (descriptive) system model of innovation activity in the medical field

The model of innovation activity environment's representation in the medical field. As environment of activity, we mean a set of systems and factors that directly or indirectly affect the acting subject, and / or are affected by it.

In available sources, innovative enterprises producing products are the most frequently described. The following provisions reflect this vision.

Innovative environment has traditionally been viewed as a certainly established socio and economic, organizational and legal, political environment that provides or retards the development of innovation activity. According to this approach, all the environmental factors can be grouped into two categories. Factors from the first group directly affect enterprise functioning (suppliers, customers, competitors and various intermediaries). Factors from the second group indirectly affect enterprise functioning (the state of the economy, scientific and technological progress, political, demographic, environmental and others).

It is believed that in the process of managing an enterprise's environment the following major problems arise:

-a large number of factors that a company is obliged to react to in order to survive, and the level of variation of each factor;

-rapidly changing environment;

-high uncertainty of external factors, which depends on the number and capacity of the available information;

-interconnectivity, integrity and indivisibility of factors.

Among the internal factors of innovative activity of an enterprise are usually considered the following:

1) knowledge-based production, the presence of developmental research units and experimental productions;
2) the degree and the depth of raw materials processing;
3) the level of added value obtained;
4) production cicle duration;
5) the duration of circulation;
6) continuous productions;
7) type of production in a particular enterprise (mass, long-run, large-scale etc.);
8) the impact of seasonal factors on manufacturing activity;
9) production power-intensity;
10) capital-output ratio;
11) the technical level of production;
12) level of performance;
13) ecologically - harmful productions;
14) depreciation of equipment and fixed assets;
15) the level of diversification of production in the industry;
16) qualification level of employees;
17) the proximity to the consumer market.

The external environment is seen as a combination of two relatively independent subsystems: the macro-environment and the immediate environment.

Macro environment creates the general environmental conditions for company functioning. In most cases, macro environment is not specific in relation to a paticular company. However, the extent of its influence on companies' innovation activity varies. This is due to differences in their areas of activity and in inner potentialities.

The analysis of environmental economic components allows us to understand how innovative resources are generated and distributed, what is the value of gross domestic product, inflation rate, unemployment rate, deduction rules and how they affect innovation.

Legal regulation analysis involves law studies and gives companies an ability to determine the boundaries of actions in interrelations with other subjects, as well as methods used to defend their own interests.

Political analysis is carried out in order to clearly present the intentions of public authorities in the field of innovation activity. During analysis it can be found out what innovative programs are being tried to enforce various social structures, which lobbying groups exist in government bodies, what is the government's attitude to various regional economy sectors, and what legislative changes are possible.

Social analysis is aimed at identifying the impact of people attitude for innovation activity, work and life quality, existing social custom values, demographic structure of society, population growth, level of education, people's willingness to change residence (place of living).

Technological analysis of the environment allows to see opportunities that science and technology development opens up for the production of new products, the provision of services and improvement of products.

Analyzing these environmental components, there are two things to be kept in mind. Firstly, there is a strong interaction of all components, so the analysis should be done systematically tracking the impact of changes to each other. Secondary, it is about the degree of impact of certain components on various companies, since the degree of impact can be demonstrated in different ways, depending on company size, its branch belonging and geographic location.

Consumer analysis allows to better understand what kind of products is in demand, what sales volume a company can expect for, what to produce in the future, for what range of potential buyers to expect. Supplier analysis aims to identify different aspects of provisioners' (company stakeholders supplying different raw materials, energy, information, etc.) activity.

However, in this paper we propose to observe the environment of innovation activity in the medical field at a higher level of generality. From these positions, innovation activity in the medical field is formed due to the peculiarities of medicine. Medicine is viewed as a specific field of activity, as well as a field of rendering of services (that, however, are difficult to clearly separate from the related products, equipment, technologies, etc.), as a national economy subject (industry level) and as a subject of innovation economy (fig. 3). Such approach is interesting because it allows creating constraints for the formation of rational indicators for innovation activity's survey in Iraq.

Medicine as a specific sector of activity has its features that define restrictions for selecting proper "medical" indicators. Medicine as a specific service sector has its features too and they set restrictions for the selection of indicators of medical services, their efficiency.

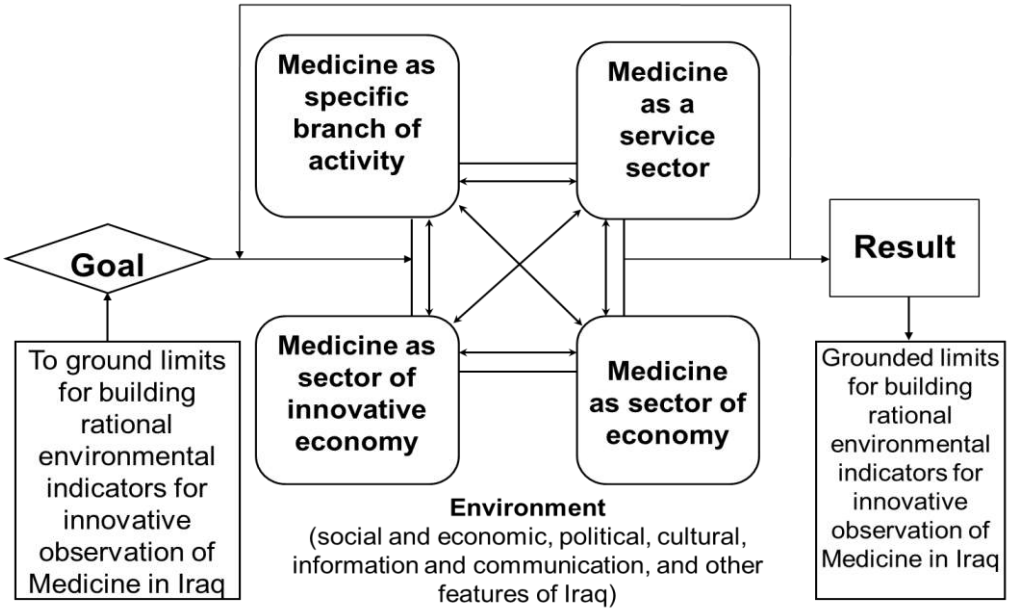

Fig. 3. The system model of innovation activity's environment in the medical sector of Iraq

Medicine as a specific sector of national economy (industry level) has its features that give economic indicators for particular subjects and industries in general. Medicine as a specific sector of innovative economy has its features that give economic indicators of innovation activity for certain active subjects and industries in general.

An example of cost efficiency of innovation activity given below (based on the source [38]) is typical.

1. Integral Effect. It represents the quantity of the difference between innovation results and costs for settlement period, usually the initial year, that is discounting

results and costs are taken into account. Integral effect is also known as net present value (NPV), net present effect.

2. Profitability index is the ratio between net present value and innovation discounted cost (that was discounted for the same date). It is also known as profitability index. It is closely related with the integral effect. If the integral effect is positive, the profitability index>1, and vice versa. If profitability index>1, then an innovative project is considered economically efficient. Otherwise (profitability index<1) a project is ineffective. In terms of severe shortfall innovative solutions with highest index of profitability should be preffered.

3. Operating ratio. It is equal rate of discounting when discounted income for a number of years becomes equal innovation investments. In this case, innovation project's revenues and expenses are determined by reduction for the design moment of time It is also known as internal rate of return, investment return rate.

4. Pay-off period. Unlike the indicator which is used in practice "payback period of capital investments", it is not based on profit but on cash flow with reduction of innovation investement funds and amount of cash flow to the present value.

However, the indicators characterizing relationships between the elements of innovation activity's environment are more interesting than the indicators of certain elements of innovation activity's environment (Fig. 3).

Environmental factors of Iraq will also play an important role. For example, decades of armed conflict, political and social instability have contributed to the appearance and development of a relatively new kind of mental medicine in Iraq. It focuses on non-pharmaceutical approaches to reduce anxiety and depression of people, caused by violence and uncertainty.

The model representing innovation activity's area (space) in the medical field. At the level of everyday understanding, space (area) is intuitively understood as a stage of activity. From a quantitative point of view, space is associated with the length, shape, configuration or size of physical bodies, as well as the distance between the bodies. In our World, it is sufficient to use three independent coordinates to describe all these categories. The most common representation of space is associated with sequence of arrangement (reciprocal arrangement) of simultaneously co-existing objects.

Based on this common understanding of space, it is reasonable to associate the space of innovation activity with actually existing elements of the innovation system, which are characterized by certain mutual arrangement from geometric point of view. In the medical sector, it is better to observe from the geographical point of view national-wide.

This understanding of innovation activity's space in the medical field allows us to find the most rational reference values for the interpretation of survey results.

Applying the principle of concentric model of project environment to the field of medicine requires changing some model elements. The result of this change is shown on fig. 4.

In this model, the "core" is medicine as a specific sector of economy. Moreover, it covers both the public and private sectors. The following levels of review are presented within the space of country region, country, the world and civilization. This application of the model enables us to simultaneously interpret the results of the survey in relation to the reference values of the spaces of different scales. This gives us an opportunity to see the benefits and to identify problems, set strategic directions, goals and desired results of further innovative development of medicine.

Country region's space is composed of subjects of innovation activity operating in provinces. The reference values are determined by the best performance of their activities.

Country's space is composed of subjects of innovation activity operating within 18 provinces.

From a geographical point of view, Iraqi world region's space is traditionally presented as the Middle East region. This corresponds with the WHO classification. However, it is also possible to see the region from the perspective of the World Bank classification, which considers Iraq belonging to a special group of oil-producing countries. Then this geographical area will determine the borders of the world region.

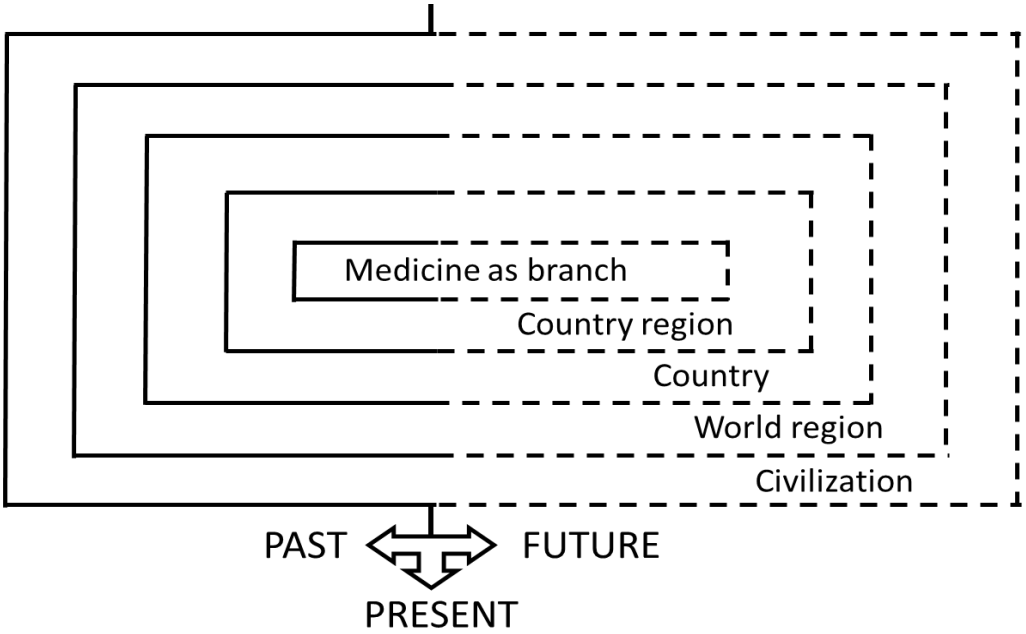

Fig. 4. The model of concentric environment of medical sector as a field of activity

The civilization space is geographically represented by all the countries of the modern world. However, the level of civilization development is set by epicentres that are the most developed countries.

Model of innovation activity's subjects (entities) in the field of medicine. According to the Oslo Manual [2], innovation activity's entities are viewed as statistical units of surveys. A statistical unit may be an observation unit that has its statistical data collected and sorted, or it may be an analytical unit that arises during the statistical analysis as a result of rearrangement of observation units based on their characteristic values for more detailed and / or homogeneous data.

In most cases, the most appropriate primary statistical unit for innovation survey is a single enterprise. However, it is not correct to mix up a single enterprise and a "legal entity". While legal entities (units) are independent in legal terms, they are not necessarily independent economic entities with autonomy in decision-making as for their activities. This fact is especially important in the formation of samples of innovation activity's subjects in the field of medicine.

In general, an enterprise exactly is the most appropriate statistical unit. Enterprises may be:

- enterprises, consisting of a single legal unit dealing predominantly with one kind of economic activity;

- enterprises that are a group of legal units,which cannot be considered as independent economic entities, including
- legal units, vertically or horizontally integrated in an enterprise;
- certain legal units with support functions, including research and development.

When it concerns the subjects of innovation activity in the field of medicine, it is interesting to consider them at a lower organizational level than on the level of an enterprise. An example is collection of regional statistics or using two-level approach for data collection. In such cases, an appropriate secondary statistical unit is an economic unit that can be defined as "an enterprise or a special purpose entity (business branch) with a fixed location. It deals with only one particular (but not supportive) production activity or which generates the largest share of added value cost whithin the scope of the main kind of production activity". The concept of secondary statistical unit may be useful for the survey of relatively large companies, operating in more than one region. The subjects of innovation activity make us interested from the perspective of their innovation activity.

We assume that all acting subjects in the field of medicine can be considered subjects of innovation activity. Then, the elements of the model (fig. 5) may directly be the medical institutions that provide medical services; institutions (companies, organizations, firms) that produce (supply) pharmaceutical products, equipment, etc .; educational institutions (medical universities and colleges); scientific and research institutions.

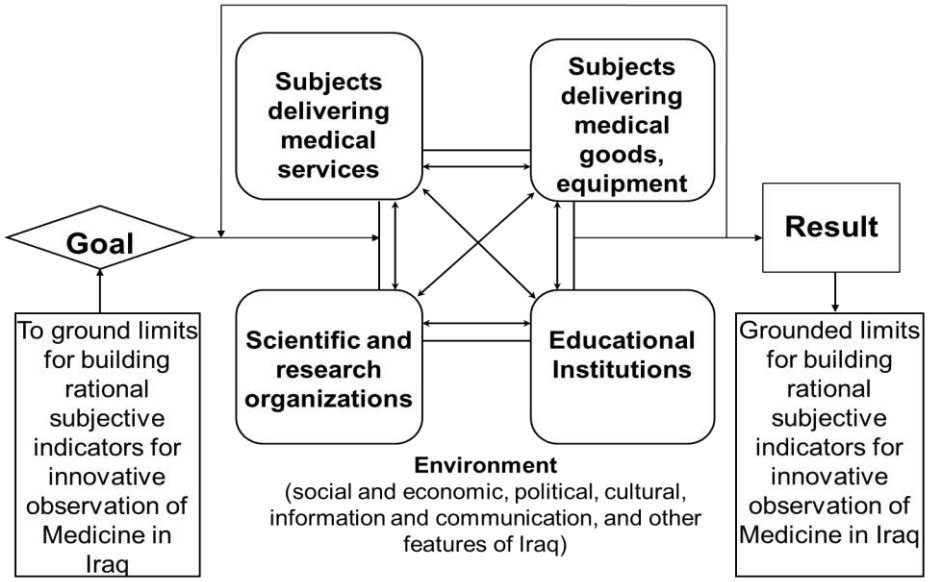

Fig. 5. System model of innovation activity's subjects in the medical field in Iraq

Medical institutions in Iraq are public and private hospitals (clinics, centers, specialized centers), as well as educational institutions' basic clinics (both public and private), as well as military hospitals. Their regional allocation is shown in tabl. 3. It can be seen that state medical institutions predominate. A special group consists of so-called medical training institutions that are educational institutions' basic clinics, both public and private. This enables to mention a significant predominance of the public sector over the private medical sevtor in Iraq.

We would like to mention the following edicational institutions [39]: Medical Faculty of the University of Baghdad, Hewler Medical University, University of Human

Development, two dental colleges and pharmaceutical college of University of Baghdad, etc. Research institutions afre managed by the Ministry of Higher Education and Scientific Research. Major research institutions are the Atomic Energy Commission, the Organisation for Scientific Research, the Iraqi Academy of Sciences, Academy of Sciences of Kurdistan, the Middle East Research Institute of Kurdistan. The organization of scientific researches has 6 research centers. The Iraqi Academy of Sciences (founded in 1947) brings together scientists engaged in the humanities and history of medicine. Academy of Sciences of Kurdistan develops the problem of Kurdish Studies.

Table 3

Medical institutions' distribution between the public and non-governmental sectors in Iraq

№	Country regions	Medical institutions			
		Public	Private	Training (public and private)	Military
1	Baghdad	28	46	10	4
2	Ninawa	11	4	3	1
3	Basra	8	4	4	1
4	Sulaymaniyah	13	11	1	-
5	Erbil	18	2	-	-
6	Dahuk	7	4	2	-
7	Kirkuk	7	2	-	1
8	Diyala	8	2	-	-
9	Al Anbar	11	1	1	-
10	Babil	8	3	2	-
11	Kerbala	2	-	3	-
12	Maysan	7	1	-	-
13	Al Muthanna	4	-	-	-
14	Najaf	7	-	2	-
15	Dhi Qar	7	2	1	-
16	Salah ad Din	8	-	1	-
17	Wasit	6	-	-	1
18	Al-Qādisiyyah	12	-	-	-

The Iraqi Ministry of Health may be considered a special cluster of subjects of innovation activity in the medical field [40]. Its mission is to ensure the health and medical care to each Iraqi citizen both in standard and emergency situations in the country. The Ministry also manages medical personnel. It is responsible for ensuring quality healthcare for all society members. The main managerial task of the Ministry is to do strategic planning of the medical industry and healthcare development, to assist in organizing the activities of all branches and of all institutions, to inspect for quality assurance.

The two-level conceptual system model of innovation activity's survey in the medical field of Iraq (fig. 6) have been developed to consider it holistically. In general, the use of the proposed model forms the basis for further modeling of the system of indicators, data collection methods, data and information processing for the survey and statistical population, presentation of results. This also takes into account peculiarities of Iraq as an environment of survey implementation.

Summary and perspectives for further researches in this direction. The proposed conceptual models are universal, as opposed to the existing ones. In the absence of clearly defined basic principles and terminology of innovation activity in the field of medicine, they allow generating system-holistic view of the medical sphere as an object of innovation survey.

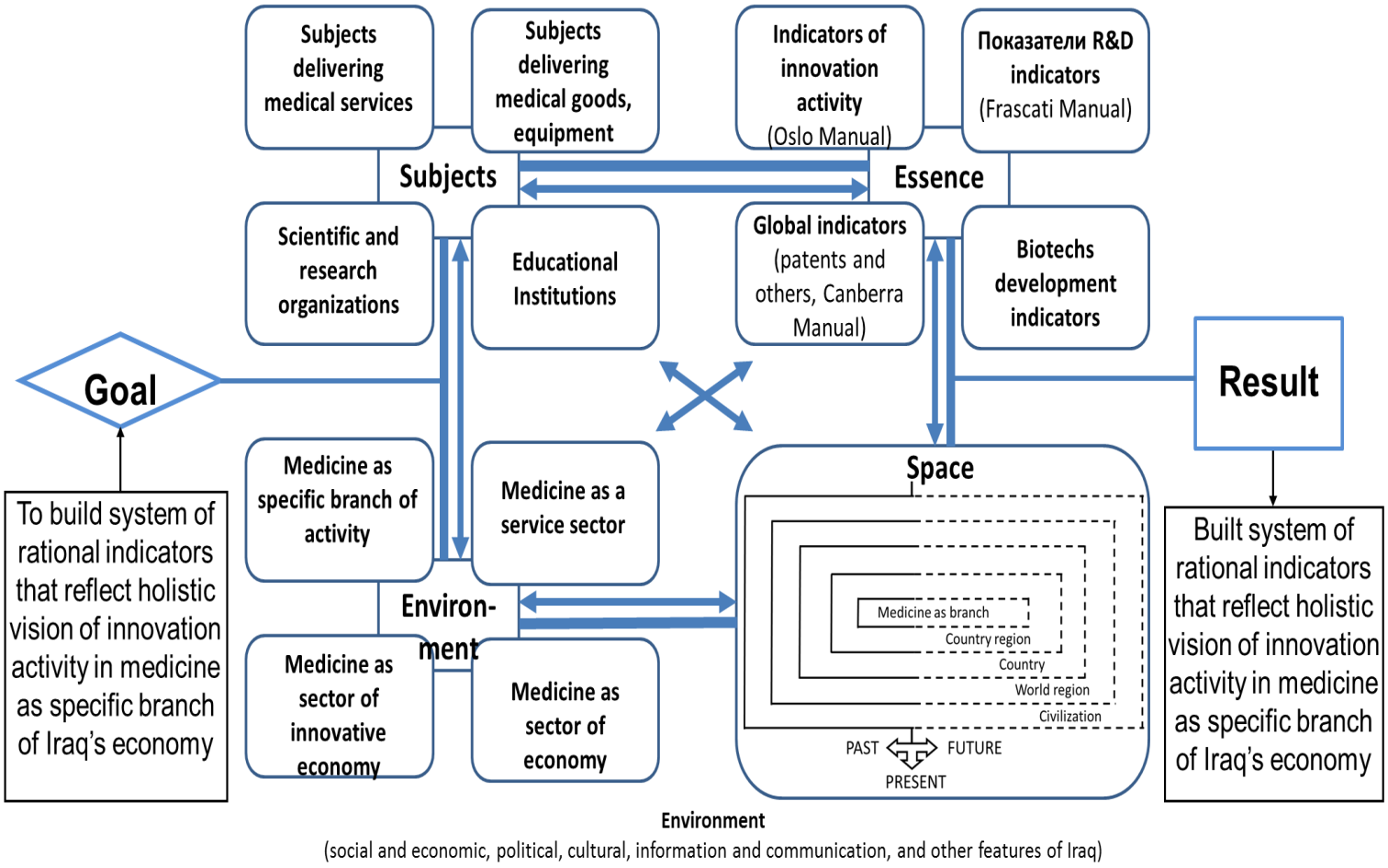

Fig. 6. Two-level conceptual system model of innovation activity's survey in the medical field in Iraq

The proposed model of systems forms the basis to limit the subject field of the innovation survey in the medical field, with all its specifics. It is also aimed to formation of a proper holistic system of indicators; selection of (or creation new ones) the most rational methods of data and information collection for the survey, as well as data and information processing; for justifing statistical populations' formation approaches; for offering the most effective methods of collection, processing and presentation of results. At the same time, the models take into account the peculiarities of Iraq as an environment of survey's implementation, as well as the need to compare the results with the results of similar studies in other countries.

REFERENCES

1. Hoque F. The 3 pillars of the innovation economy / Faisal Hoque. Retrieved from: http://www.fastcompany.com/3005977/3-pillars-innovation-economy.
2. Oslo Manual (2005). Guidelines for collecting and interpreting innovation data. Third edition. A joint publication of OECD and Eurostat. Retrieved from: http://www.docme.ru/doc/323948/oslo-manual--oecd-–-eurostat-2005.
3. Rach V., Medvedeva E., Rossoshanskaya O., Evdokimova A. (2011). Innovative development: model of triple spiral in the system-holistic vision context. Proc. of XVI Intern. scient.-pract. conference, Alushta, Simpheropol, 157-163.
4. Complete Collection of Project Management Statistics 2015. IT Project Management Challenges. Retrieved from: https://www.wrike.com/blog/complete-collection-project-management-statistics-2015/.
5. Rach V. (2002). Strategic potential of enterprise in conditions of knowledge economy. Project management and development of production, No.1, 4.
6. Rach V. (1997). Innovative activity: system aspects. Collection of East-Ukrainian state university, No.2, 120-127.
7. International forum of the healthcare industry. Retrieved from: www.lmt.kiev.ua.
8. Medical Exhibitions, Medical Shows, Medical Conferences. Retrieved from: http://www.exhibitioncentrehotels.com/industry/hospital-and-medical-industry.aspx
9. Frascati Manual - 2015 Edition. Guidelines for Collecting and Reporting Data on Research and Experimental Development. Available at: http://www.oecd.org/sti/inno/Frascati-Manual.htm.
10. Canberra Manual. The measurement of scientific and technological activities. Manual on the measurement of human resources devoted to S&T. Available at: http://ec.europa.eu/eurostat/ramon/statmanuals/files/Canberra_Manual_1992_EN.pdf
11. Baltz R.H., Davies J.E., Demain A.L. (Eds.) Manual of Industrial Microbiology and Biotechnology-- 3rd ed. 776 p.
12. Iraq's Ministry of Health: Annual report for 2012. Baghdad: Ministry of Health; 2013. Retrieved from: http://www.health.gov.sk.ca/health-annual-report-2012-13.
13. Iraq Pharmaceuticals and Healthcare Report Q4 2015. Retrieved from: http://www.researchandmarkets.com/reports/2891177/iraq-pharmaceuticals-and-healthcare-report-q3-2015.
14. Medicare Iraq Erbil 2015, the 6th International Exhibition for the Medical & Healthcare Industry. Retrieved from: http://www.iraqmedicare.com/Erbil/home.php.
15. Iraq Health Expo International. Retrieved from: http://tradeshow.tradekey.com/iraq-health-e88425.htm.
16. International index of innovations BCG. Retrieved from: https://ru.wikipedia.org/wiki.
17. TheGlobal Competitiveness Index. Retrieved from: http://gtmarket.ru/news/2012/09/05/4949.
18. National Innovation Capacity Index. Retrieved from: http://www.scienceportal.org.by/upload/15.11.2012_Radosevic.pdf.
19. The Global Innovation Index. Retrieved from: http://www.globalinnovationindex.org/content.aspx?page=data-analysis.
20. The Knowledge Economy Index by World Bank. Retrieved from: http://info.worldbank.org/etools/kam2/KAM_page5.asp.
21. Human Development Index**.** Retrieved from: http://gtmarket.ru/news/2014/07/24/6843.
22. Intelligence quotient and the Wealth of Nations. Retrieved from: https://ru.wikipedia.org/wiki/%CA%EE%FD%F4%F4%E8%F6%E8%E5%ED%F2_%E8%ED%F2%E5%EB%EB%E5%EA%F2%E0_%E8_%E1%EE%E3%E0%F2%F1%F2%E2%EE_%ED%E0%F0%EE%E4%EE%E2.

23. The Global Enabling Trade Index. Retrieved from: http://www3.weforum.org/docs/GETR/2014/GETR_Chapter1_2014.pdf.
24. Republic of Iraq. Ministry of Planning. National Development Plan 2010-2014. Baghdad, 2010. Retrieved from: http://planipolis.iiep.unesco.org/upload/Iraq/Iraq_National_Development_Plan_2010-2014.pdf.
25. Country cooperation strategy for WHO and Iraq 2012 - 2017 / World Health Organization. Regional Office for the Eastern Mediterranean. Retrieved from: http://applications.emro.who.int/docs/CCS_Iraq_2012_EN_14959.pdf.
26. Main messages from World health report 2013: Research for universal health coverage. Retrieved from: http://www.who.int/whr/2013/main_messages/en/.
27. The World Factbook. Retrieved from: https://www.cia.gov/library/publications/the-world-factbook/index.html.
28. Country cooperation strategy at a glance. WHO/CCU/14.03/Iraq. Retrieved from: http://www.who.int/countries/en/.
29. Mestre-Ferrandiz J. Defining Innovation: How to Transform Innovation into Value / Jorge Mestre-Ferrandiz. 26.06.2013. Retrieved from: http://www.slideshare.net/OHENews/defining-innovation-jm-f-june-2013.
30. Mestre-Ferrandiz J. The many faces of innovation. A report for the ABPI by the Office of Health Economics, March 2012 / Jorge Mestre-Ferrandiz, Arik Mordoh, Jon Sussex. Retrieved from: http://www.abpi.org.uk/our-work/library/industry/Documents/Many%20Faces%20of%20Innovation.pdf.
31. Raeport on Innovativeness of Health Sector in Poland in 2012. Retrieved from: http://issuu.com/inepan/docs/raport_medyczny_ang_netto_jpg.
32. Private Health Sector Assessment in Tanzania. Retrieved from: http://issuu.com/world.bank.publications/docs/9781464800405.
33. Biomedical research - a platform for increasing health and wealth in the UK. Retrieved from: http://issuu.com/acmedsci/docs/129620771468__1_.
34. Rossoshanskaya O. (2002). Features of planning projects basing on the system model. Project management and development of production, No. 1, 57-62.
35. Rach V., O. Rossoshanskaya, O. Medvedieva. (2010). Project management: practical aspects of implementing regional development strategies: textbook, Kyiv, 276.
36. Sananda Sahoo. Iraq Looks to Rebuild Health Care. Retrieved from: http://www.thenational.ae.
37. Indicators of innovative activities (2015): statistical collection, Moscow, 320. Retrieved from: http://www.studfiles.ru/preview/5814635/.
38. Lykholetov V., Pluzhnilkov V., Komarova E. (2005). Innovation management: textbook, Tchelyabinsk. Retrieved from: http://innovation-management.ru/otsenka.
39. List of universities in Iraq. Retrieved from: https://en.wikipedia.org/wiki/List_of_universities_in_Iraq.
40. Ministry of Health (Iraq). Retrieved from: http://www.moh.gov.iq/index.php/.

Рецензент статті
д.е.н., проф. Ахромкін Є.М.

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