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# Model of electronic public health management on the example of the territorial community of Vinnytsia region

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## ABSTRACT

Influence of respondents' state of health among the employed population was revealed, in particular, depending on the status of the settlement. It is found out that the preservation, strengthening and accumulation of human capital for the health of citizens depends, in particular, on the effectiveness of the combination of decentralization reform and medicine. The model of electronic management of public health (on the example of the territorial community of Vinnitsa region) is offered. It is reasonable that an important element of the above model at the initial stage of implementation is to obtain synergies from the introduction of electronic document flow, which allows motivating members of territorial communities to self-preserve human health capital.

**Keywords:** digital economy, digital medicine, decentralization, territorial communities, self-preservations of health.

## 1. INTRODUCTION

Presently after the level of human development, in particular on such criteria as a health level, mean time of life, relation of citizens to his self-preservation Ukraine falls behind from the developed countries of the world, in particular to the USA, Japan, EU. High level of morbidity and, as a result, high level of premature death rate, especially economically conduces active Ukrainians to the socio-economic losses for an economy. Yes, from data <sup>1</sup>, through the premature death rate of population annually the about 4 million years of potential life are lost in Ukraine, and volume of national product, that not the mine-out folds about 90 milliards of hryvnias. annually. In addition, economic losses are as a result of premature death rate in age – 64 presented 72,3 milliards of hryvnias. If to compare the got amount of losses from GDP of Ukraine for corresponding period, then they presented 13,28% from GDP. In 2013 there were the conducted calculations of the received less size of GDP due to premature death in Ukraine, that presented 12 milliards of dollars of the USA <sup>2</sup>. Thus, there is a necessity for the search of effective events in relation to the improvement of health of labour resources of country and motivation of him level to self-preservation. One of effective, to our opinion, a construction of informative society is, development of digital economy and system electronic a management a public health.

Many foreign scientists occupied research of questions of development of informative society, in particular D. Bell, E. Giddens, P. Druker, M. Castells <sup>3</sup>, J. Masuda, M. Poster, E. Toffler <sup>4</sup>, A. Tyren, and many other, that all-round investigated conception of construction of informative society with the elements of forming of digital economy. In Ukraine by the interdisciplinary stumper of human development, in particular his co-operating with functioning of informative society, digital economy and necessity of reformation of the home system of health protection the devoted labours of O. Amoshi, S. Bandura, O. Batalova, E. Bondarenka, O. Berdanovoi, I. Valyushka, V. Varnavskogo, V. Vakulyenko, M. Voynarenka, O. Grishnovoi, G. Dmitrenka, A. Kolota, E. Libanovoi <sup>6</sup>, L. Lisogor, V. Novikova, O. Novikovoi, V. Onikienka, S. Pirogov, N. Ringach <sup>2</sup> and many others.

The aim of the article is a construction of electronic case a public health frame in Ukraine (on the example of territorial society of the Vinnitsa district of the Vinnitsa area) within the limits of development of reformation of medicine and

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decentralization. The scientific novelty of the article, unlike the existent system by a management a public health, consists in realization of conceptual principles of forming of frame electronic case a public health on the base of territorial society of the Vinnitsa district on principles of cooperation of the system of electronic management of health of «eHealth», functioning of digital economy and medicine. By the innovative constituent of the marked model territorial society that together with efforts of the state must explain his cock to maintenance and strengthening of property asset of health is incorporated. It can be attained due to effective cooperation of all elements driven to the model. On the first her implementation phase her staple is an input of the electronic system of circulation of documents, that consists of such important under factors, as: electronic medical card, electronic recipe, electronic setting, electronic sheet of no operability, informative system of patient. Cooperation of all elements of an offer model will allow to get the effect of synergy, that shows up in the implicit increase of level of human development, quality of life, human capital of health, socio-economic prosperity of not only the separately taken incorporated territorial society but also Ukraine on the whole<sup>10,11</sup>.

## 2. METHOD

Reformation of different spheres of vital functions of Ukrainian society must be sent to the increase of quality of human life. The basic criterion of that is healthy and protracted life. Unfortunately, Ukrainians presently limit in access to highly skilled quality Medicare, in fact on different estimations every second citizen of country is poor. A problem increases existent disproportions of development of regional centers and his districts, unequal access to medicine, and, accordingly, and by the low level of health. By proof of it the sociological questioning is conducted from application of questionnaire among the concerned citizens (in future respondents) of the Vinnitsa area in 2014. During sociological researches 537 persons participated in a questionnaire, including from them 77% – persons that live in municipal locality; 58% – women. The expected coefficient of variation testifies that totality is homogeneous, and middle typical. Therefore, will analyses influence of the state of health of respondents among the concerned population of the Vinnitsa area depending on status of settlement. Results will erect in a table 1.

Table 1. Influence of the state of health of respondents is among the concerned population depending on status of settlement

A settlement	Terms and quantitative estimation of the state of health <sup>1</sup>				
	VB	B	S	W	E
Municipal locality	0,0097	0,0754	0,5133	0,3868	0,0145
Rural locality	0,0079	0,1269	0,4761	0,3650	0,0238

<sup>1</sup>results are driven to the table 1 settled accounts as specific gravity the amounts of respondents, that estimated the state of health corresponding terms («Very bad» (VB), «Bad» (B), «Satisfactory» (S), «Well» (W), «Excellent» (E)) to the general amount of respondents that gave to the answer for the put questions. At the evaluation of corresponding influence there was the used method of subjective estimation of health of respondents after a self-appraisal. (Source: it is made on results the sociological questioning<sup>7,12</sup>).

Thus, the best health level for to the terms «well», the habitants of municipal locality (0,4013), than habitants of rural locality, have «excellent», and, accordingly, the habitants of rural locality worse estimate the state of health - almost twice comparatively with the habitants of municipal locality. It is explained by that city-dwellers have a greater access to quality Medicare and more expert in questions self-preservations of health, that needs to be provided to the citizens at rural locality. Exactly with the aim of removal of corresponding misbalanced reform of decentralization and medical reform are intensively conducted in Ukraine, that inter se is constrained and envisages a transmission to the organs of local self-government from executive of greater part of plenary powers, resources and responsibility bodies. For basis of realization of reform of decentralization, the taken principles of EU Charter of local self-government (in 1985). The consequence of decentralization is creation of the incorporated territorial communities in Ukraine, that in accordance with a century 4 the above-mentioned Charter «Authority of local self-government» have a complete right freely to decide any question that does not conflict with Constitution of Ukraine and her Laws, but at their decision it costs to take into account the requirements of achievement of efficiency and economy<sup>13,14</sup>.

For example, by the state on 01.09.2018 11215 territorial communities were counted in Ukraine, from them an amount of the incorporated territorial communities is 828 units. 490 territorial communities operate in the Vinnitsa area, in

particular 38 incorporated communities<sup>8</sup>, and their area presents 4324,3 km<sup>2</sup>. Reform of decentralization is sent to the increase of volumes of financial resources in the incorporated territorial communities. The marked resources can be used on the increase of standard of life of citizens. For example, it is envisaged to send financial resources not to maintenance of hospitals and places of beds, but to finance directly charges on treatment of patient. Id est here conception works «money follow by a patient».

Pre-condition of the effective functioning of territorial communities in Ukraine is investing of money in a human capital, in particular in the capital of health of every member of local community. Exactly on communities the presently fixed duty of strengthening (prophylaxis) of health. Therefore, there is a necessity of construction of effective and effective electronic case of persons that live in clearly certain territorial society a public health frame. Actuality of construction of the marked model increases aspiration of Ukraine to be integrated to «family of EU», id est – to become the full-fledged member of EU, and it envisages the change of model of functioning of economy. Yes, in the center of all economic processes in a country it must be not financial capital, but human, especially capital of health.

It costs to notice, that an important task before territorial communities is motivation of every her member to self-preservation of health. In fact, it is known that from medicine tenth part of health of man depends only, and more than half – from her way of life. For this reason, taking into account a critical health of Ukrainians level, territorial communities must search the optimal models of his maintenance, strengthening and development. Here it costs to remember electronic case the state frames, that allow to promote efficiency of all spheres of vital functions.

Presently a digital economy, under that in a classic kind understand activity in that the fixed assets of production are digital (electronic, virtual) data, develops in the developed countries; as artificial intelligence (development of robots, cashes); by fourth industrial revolution («Industry 4.0»); by an economy on call («on - demand economy»). The basic spheres of digital economy is government control, informative infrastructure, research-and-development, shots and education, informative safety, state administration, clever city, digital medicine and others like that.

From data of company «Enterprise Strategy Group»<sup>9</sup>, 96% companies, where digital transformation passed grew volumes sale twice and anymore. Therefore, with the aim of construction of economy, that will be based on artificial intelligence, Government of Ukraine in 2018 worked out a document «Conception of development of digital economy and society on 2018–2020», where a ponderable role is spared a health protection. The important element of digital economy is the system «E-government» («e-Government»). Part of her presently within the limits of realization of reform of decentralization and medicine will be realized in electronic control system by a health («e-Health»).

Electronic control system by a health («e-Health») is a mechanism of electronic government, in particular by the system of health protection. Her primary purpose is a reliable, rapid, comfortable accumulation of medical information, her exchange between a doctor and patient. The central element of model («e-Health») is a transition from the system «treatment of illnesses de-facto» to the prophylactic system of health protection, that would warn, in time discovered and treated these illnesses. She is examined separate specialists as foundation of increase of human capital of health. «e-Health» began to operate in Ukraine from 01.01.2018 and envisages the conclusion of declarations with a select doctor (domestic, by an internist and other); extract of medical sheets of no operability; indemnification of money on delivery of medications to the sick citizens on favorable basis. From 01.01.2019 this model will give possibility to get ambulatory or stationary services, reports from the inspection of patients and others like that. A model («e-Health») within the framework of reform of decentralization and development of the incorporated territorial communities the effect of synergy allows to get from co-operating with the modern systems («e-Government») and on the whole from development («Industry 4.0»).

As an example of practical realization of electronic case a public health frame it is possible to point the model of Polianskoi incorporated territorial society «System of territorial management of territorial society» a public health<sup>17</sup> (STMTS) that unites for itself 7,5 thousand habitants in the 9-ти villages of Zakarpattia. The marked model is sent to deepening of improvement («e-Health») and increase of her efficiency, motivation of every member of society on forming of culture of self-preservation of health. Thus, within the limits of functioning of STMTS the article of her activity is forming of responsibility for a public health, and treatment of illnesses in stationary and specialized establishments is provided by the state<sup>15,16</sup>.

In the article will analyses master data about the association of territorial communities of the Vinnitsa district (Vinnitsa area) with the aim of strengthening of actuality of necessity of strengthening of human capital of health of every member of the incorporated territorial society and construction instead of old model of the system of health protection

«Semashko» new taking into account radical changes at her reformation on the modern stage of socio-economic development of Ukraine (table 2).

Table 2. An analysis of data is in relation to the association of territorial communities of the Vinnitsa district

Name of society	Amount of advices that united, units	Area of the incorporated communities, km <sup>2</sup>	Amount of population, persons
Of Voronoveska a settlement is incorporated territorial society	2	82,8	7881
of Sokirineska the rural is incorporated territorial society	2	48,9	3628
of Lyuka-Meleshkivska the rural is incorporated territorial society	3	92,81	7031
of Jakyushinetska the rural is incorporated territorial society	3	97,71	9470
Together	10	322,22	28010

Data source <sup>8</sup>.

Thus, the amount of the incorporated communities of the Vinnitsa district (ICVD) presents 10 units, in that lives 28,01 thousand persons, that on the quantity of habitants almost in four times anymore, for example, then at STMTS. Therefore, with the aim of strengthening of human capital of health of ICVD it is necessary to take experience of construction of STMTS and on this basis to build an effective model electronic a management a public health (MEMPH). In her basis next basic principles must be fixed:

- it is providing of every member ICVD accessible, quality Medicare directly in a residence;
- are accordance's to the criteria of contemporaneity, personalization, to prevention, manufacturability and safety;
- it is an increase of the productivity and efficiency of the use of material, human, informative and other types of resources at the grant of medical services at absolute material well-being of quality medical services and their availability.

The brought principles over must be taken into account at the construction of MEMPH (fig. 1).

From MEMPH (rice. 1) evidently, that her by staples, that will allow to realize conception of forming, maintenance and strengthening of human capital of health of member of the incorporated territorial society of the Vinnitsa area is: «system of electronic circulation» of documents, «system of the controlled from distance education», «system of television medicine» and «medical informative system». The main conceptual constituent of MEMPH (see rice. 1) consists in distribution of functions between the state, territorial society and every his cock. Yes, at the level of the state, providing of quality and timely treatment of illnesses is envisaged in stationary and specialized establishments; at the level of territorial society the input of mechanism of the health center system and realization of the proper ambulatory treatment is envisaged maximally close to the residence of members of ITS; at the level of member of territorial society it is envisaged to work out the effective mechanism of self-preservation of health that must include an important constituent – forming of healthy way of life.

An element of MEMPH is «System of electronic circulation» of (X) documents. It one of major elements of model. He must consist of under elements (factors) : management of medical organization (account of capital assets, facilities, presence of medical preparations, their expense and others like that) resources – (x<sub>1</sub>); system of economic and statistical account (amount of appeals, amount and quality of the rendered medical services, cost of treatment and others like that) – (x<sub>2</sub>); electronic medical card (EMC) – (x<sub>3</sub>); electronic recipe – (x<sub>4</sub>); electronic setting – (x<sub>5</sub>); electronic sheet of no operability – (x<sub>6</sub>); informative system of patient – (x<sub>7</sub>).

On the first stage of reformation of medical industry the system of electronic circulation of documents, that consists of under factors, acquires in the system of electronic management of important value a public health – (x<sub>1</sub>–x<sub>7</sub>). In future during reformation of industry introduction of other elements of the system – controlled from distance medical

education, system of television medicine and on the whole complex integration of the medical informative system is envisaged in digital medicine and economy.

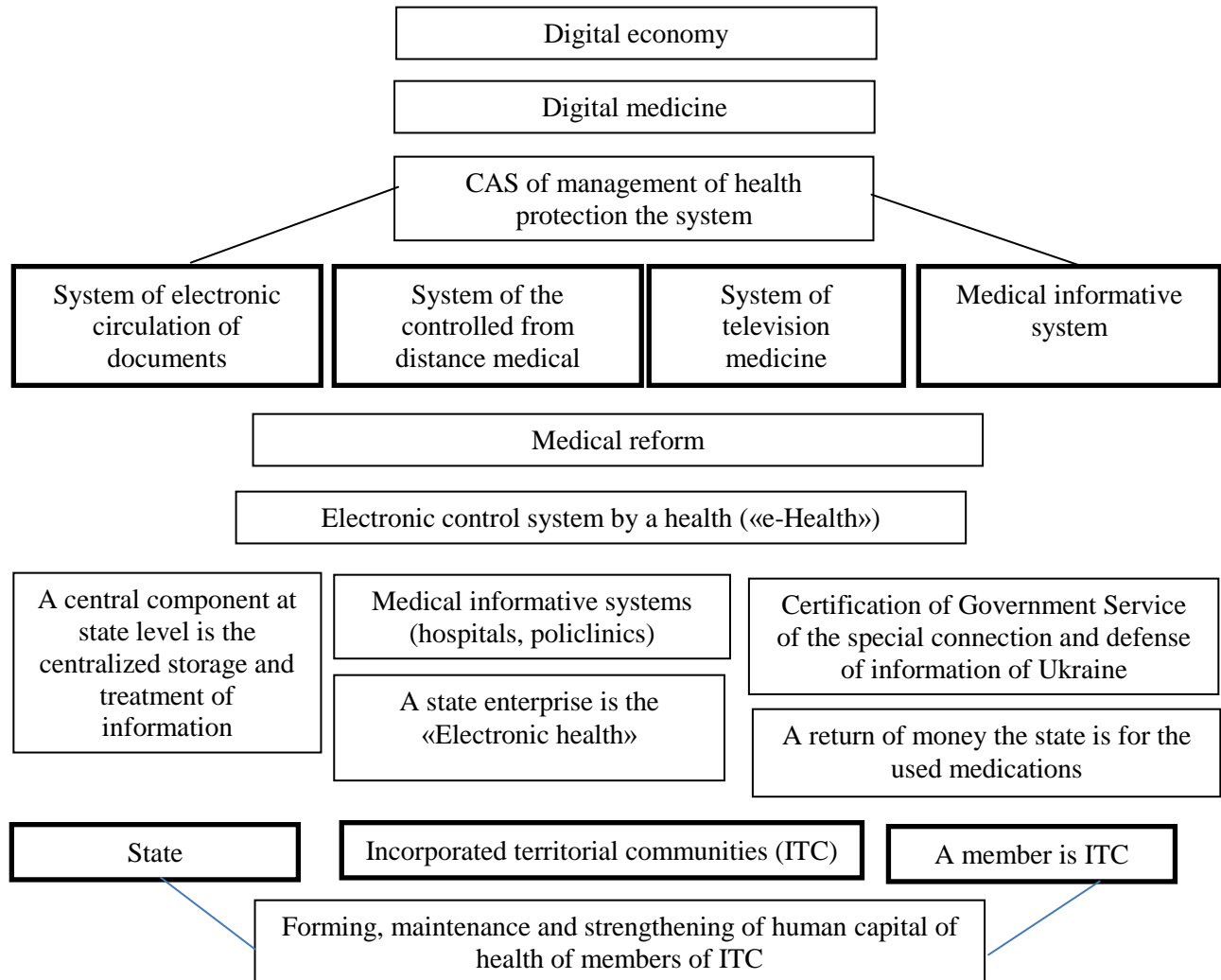


Figure. 1. Electronic case a public health (on the example of territorial society of the Vinnitsa district) frame

Under a factor the «Electronic medical card» (EMC) ( $x_3$ ) envisages a presence in the medical card of the personal data (clinical, biometrical, social, financial and economic, in particular to fear (obligatory or voluntarily medical insurance) of every member ITC. These data must consistently accumulate, to systematize and rationally take place with the aim of rapid grant of Medicare as within the limits of district, state, or abroad. Under the factor (of  $x_3$ ) is a that source, from that by means of the electronic key a patient can know about results undertaken medical studies, latest's and state of the health.

The next element of model (X) is under a factor ( $x_4$ ) – a «electronic recipe» that consists a domestic doctor (by an internist) is clamped by an electronic digital signature and loaded to them in a medical database, from where in a pharmacy he is rolled by druggists and written to the patient. Farther given about the purchase of preparations (medical facilities) again loaded in a database. Thus efficiency of control of doctor rises after turnover of preparations and their application by patients and influence of such dangerous factor that cheapens the human capital of health – self-treatment diminishes.

All information about the «Electronic setting» ( $x_5$ ) is fixed in EMC ( $x_3$ ), where fix all data about the state of patient, conducted analyses and laboratory researches, diagnostic and medical procedures, prescribed medicine and others like that.

The important element of model is the «Electronic sheet of no operability» ( $x_6$ ), that allows to form electronic hospital. Where the type of over illness, her weight (degree) and possibility of automatic calculation of losses, is brought clearly from no operability. In fact this sheet will be directed a hospital in Fund of social security to Ukraine and with corresponding accounts will come in the book-keeping of employer <sup>17</sup>.

At the construction of the «Informative system of patient» ( $x_7$ ) – the special shell that will allow to the patient to elect a doctor must be worked out; to get all complete information about hospitals that are situated in a district, areas and medical services, what of them give; written down to the doctors; to get information on the questions of medical insurance. Exactly for an account under to the factor ( $x_7$ ) a member ITC will be motivated to keep and strengthen the state of health. In fact, marked the electronic system must inform the man of necessity of the pre-arranged health center system and passing of prophylactic medical reviews, and in case of refuse of her to pass – to deprive a right on the receipt of amounts covered.

### 3. CONCLUSIONS

Modern state of health of members of ITC, in particular among the concerned population of the Vinnitsa area it is possible to estimate a term «satisfactorily», and his best level, in accordance with undertaken studies, is fixed exactly in municipal locality, and his worst level is felt in rural. Therefore, with the aim of removal of corresponding disbalance an electronic case a public health (on the example of territorial society of the Vinnitsa district) frame is offered in the article. The marked model is based on principles of development of digital medicine and economy, home experience of reformation of medicine and examples of realization of the marked models in the regions of country, for example, taken into account experience of Polianskoi ITC. The important elements of an offer model are combinations of levels: the «state – ITC – member of society». Exactly at the level of ITC at maximal participation of the state it is possible to provide motivation of members of society to keep, to strengthen and accumulate the human capital of health. On the first stage, functioning of the first level – input of the system of electronic circulation of documents is envisaged with her constituents: electronic medical card, electronic recipe, electronic setting, electronic sheet of no operability, informative system of patient. On next implementation of model constituents phases the receipt of effect of synergy is envisaged from the input of television medicine, system of the controlled from distance medical education, medical informative system. The innovative constituent of element of electronic circulation of documents is an achievement of motivation for the members of ITC to save the property asset of health due to organization of the health center system and timely prophylactic medical reviews and reduction of heavy forms to morbidity, disability and death rate among the citizens of ITC, especially capable of working and economically active.

Prospects of further secret services. During further realization of an offer model her constituents as television medicine, controlled from distance medical education integrated medical informative system must begin to work at the level of ITC. Combination of all constituents of an offer model, in particular is the important factor of stimulation of members of ITC to maintenance, strengthening and human stock of health accumulation and she is examined as a constituent of organizationally-economic mechanism of self-preservation of health of the concerned population.

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