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MODEL OF INFORMATION SYSTEM FOR SMART VILLAGE

Abstract: In this paper is proposed concept of an information model for development of smart villages in the Republic of Croatia in Slavonia region. An insight into the existing supply of structured knowledge and broadcasting of important information in areas relevant to 'smart villages' shows that there are hundreds of information emitters that provide information for use in development of local 'smart village' projects. Therefore, this project proposes: (a) introduction of a specific institution (mini consortium of several villages) *implementation unit*, which will identify information needs for the thematic group of belonging villages, and accordingly (b) construction of an appropriate information system. Based on the results of these analyses, the concept of the "Alberta Information System for the Development of Smart Villages", for Osijek Baranja County is proposed.

Keywords: implementation unit, rural services, rural-urban linkages, smart communities in rural areas

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Introduction

In our papers (Ivanović, 2005, 2005a, 2007, 2007a, 2008, 2018, 2021) we pointed out:

- (a) The basic elements of the socialist transition in the field of agriculture and the elements in force; constitutional agrarian economy of the EU;
- (b) The EU model of rural development as a new transition opportunity for the Slavonia region that must not be missed;
- (c) The importance of organic agriculture for the development of Slavonian villages;
- (d) A new model of looking at the overall development of local areas by balancing local human resources and traditions – which has not been the case so far;
- (e) Transition processes regarding rural development and the need for broad education of Slavonian farmers to stop being subcontractors of large socialist combines but to become farmers – commodity producers of their products for the market;
- (f) The social problems of introducing broadband access to rural areas and the economic interests of large telecommunications companies that do not take into account the needs of rural areas;
- (g) Set up elements of the Alberta Smart Rural Information System – based on a broadband approach and thematic pre-selection of the information needed to develop specific rural areas.

In our papers (Ivanović et al., 2013; Ivanović et al., 2014; Ivanović & Ambroš, 2016; Job & Grgić, 2021; Lacković & Ivanović, 2020; Matić et al., 2016) we pointed out reasons why special information model for smart villages is needed and proposed implementation units (several villages that connect the same topics regarding agro production).

In this paper, we made an analysis of local Web portals in Slavonia, Baranja, regarding sharing of information and knowledge about agricultural production and smart village development. The aim of our research is to create regional model of knowledge and information dissemination for villages.

The Slavonia region

Basic data on the Slavonia region in the Republic of Croatia (Fig. 1) are shown in Table 1. It should be emphasized that Slavonia lost 86,000 inhabitants in period between the two censuses 1991-2001 due to destruction of the war, and next 85,000 in the next ten years (2001–2011) due to economic reasons – emigration to other regions and other countries (Ivanović, 2010) Estimates say that in the period 2011–2021 population also reduced due to emigration by about 70,000.

Slavonia region has tradition and excellent conditions for agricultural production, but due to poor policy towards the village and agriculture in the last 30 years villages are losing population and number of family farms is decreasing (Table 1 and 2).



Fig. 1. Five counties in the Slavonia Baranja region in the Republic of Croatia
Source: Ivanović, 2018

Table 1. Residents and settlements in the five counties of Slavonia region (2011 census)

County	Area km ²	Population	Number of cities	Number municipalities	Number settlements
Brod-Posavina	2,030	158,575	2	26	185
Osijek-Baranja	4,155	305,032	7	35	263
Požega-Slavonia	1,823	78,034	5	5	277
Virovitica-Podravina	2,024	84,836	3	13	188
Vukovar-Srijem	2,454	179,521	5	26	85
Region Slavonia	12,486	805,998	22	105	998
Republic of Croatia	56,594	4.284,889	127	429	6,756
% Slavonia in RC	22.1	18.8	17.3	24.5	14.8

Source: Statistical Yearbook of the Republic of Croatia 2018

Table 2. Number of settlements and family farms in the five counties of Slavonia region

County	Number of Agro households (2003)	Number family farms (2013)	Number family farms (2016)
Brod-Posavina	20,704	7,137	6,085
Osijek-Baranja	41,103	12,078	9,282
Požega-Slavonia	13,521	5,139	4,383
Virovitica-Podravina	19,062	7,080	5,718
Vukovar-Srijem	26,316	7,122	6,087
Region Slavonia	120,706	38,556	31,555
Republic of Croatia	448,532	154,400	130,264
% Slavonia in RC	26,9	25.0	24.2

Source: Croatian bureau of statistics. Agriculture – review by counties, 2017

As can be seen from Fig. 1, the area of Slavonia occupies 22.1% of the territory of the Republic of Croatia, and Table 1 shows the number of settlements and inhabitants according to the 2011 census. The region, therefore, has 805,998 inhabitants, 22 cities, 105 municipalities and 998 settlements. Table 2 shows that the number of agricultural households and agro-farms decreased from 38,556 in 2013 to 31,555 in 2016 and this decline continues (according to local media reports, because there are no statistical surveys).

Model of dissemination of knowledge and information for smart villages

State of dissemination of knowledge and information for smart villages

We have pointed out the insufficiently efficient agricultural policy in Croatia in our previous works (Ivanović, 2005, 2005a, 2007, 2007a, 2008) as well as the depopulation process (Ivanović, 2010). At a time of rapid doubling of scientific knowledge and technologies (Ivanović, 2009) – in Croatia, there are insufficient efforts to share new knowledge in agriculture and agricultural policy. True, there are public advisory services for farmers in Croatia, there are public calls for funding new productions and cooperation of agricultural faculties and institutes with the village, there are magazines and radio and TV shows for farmers – but it's not all connected in public space.

Thus, over the years – considering the issue of dissemination of new knowledge in the agricultural sector for farmers – there were contributions (elements) that are now integrated into the model "Alberta" information system.

Our analysis of local Web portals (municipalities and local action groups – LAG) regarding the sharing of new knowledge in agriculture and agrarian policy for smart villages – on a sample of 30 portals showed that – more or less all publish almost the same content – calls to farmers to co-finance the implementation of individual measures from the implementation of EU rural development projects or the proclamation of warnings for certain diseases (plants and livestock) or short-term weather conditions regarding crop production. to dozens of domestic Web portals. Given that the number of farmers who know foreign languages is negligible – the use of foreign Web portals e.i. (Smart Villages, 2019, 2019a) is also negligible (Ivanović et al., 2014; Ivanović & Ambroš, 2016; Ivanović, 2018; Job & Grgić, 2021; Lacković & Ivanović, 2020; Matić et al., 2016).

A model of knowledge and information dissemination for smart villages

Unlike thematically defined Web portals that offer a wide range of information about everything in the area – "Alberta" model is designed as a specialized source of information based on pre-selection of information needed to develop specific rural areas for certain regions (e.g. field regions), vegetable production regions, fruit and grape production regions, coastal regions, mountain regions and livestock, etc.

A model of collecting and disseminating knowledge needed for smart villages' development is presented in Fig. 1 and Fig. 2.

In order to effectively monitor the daily broadcasting of new organizational, economic, environmental, IT and agro-technological new knowledge and financial

information, it is proposed to establish expert groups on agro-production at the regional level (in Croatia – several counties); eg for the area of the Slavonia region (given the tradition and natural conditions) these are thematic groups:

- 1) Farming.
- 2) Livestock.
- 3) Vegetable growing.
- 4) Poultry.

In addition to agro-experts for related productions (agronomists etc.), the expert group also includes computer scientists, economists, lawyers, foreign translators, technologists and designers) and daily prepares texts with photos and diagrams that they publish on the appropriate Web portal (Fig. 2). Since villages and municipalities do not have enough experts for all the required areas – the expert team is filled by the necessary experts from neighboring cities. Of course – other regions (where traditions and natural conditions are different – e.g. regions with viticulture, fruit growing or Mediterranean regions) will have different structured thematic groups. In that way, centers would be created for collecting and disseminating the latest knowledge and information for development of smart villages. In the second stage of the development of information system for smart villages – according to the agreed rural development policy – all local media (newspapers, Web portals and radio and TV of municipalities, cities and LAGs) make available (access) to their readers. Thus, in our example (Slavonia), family farms and farmers will be able to consult and consume on a daily basis the latest knowledge and information needed for activities in the development of smart villages, i.e. agro-production that they are engaged in or interested for it (Fig. 3).

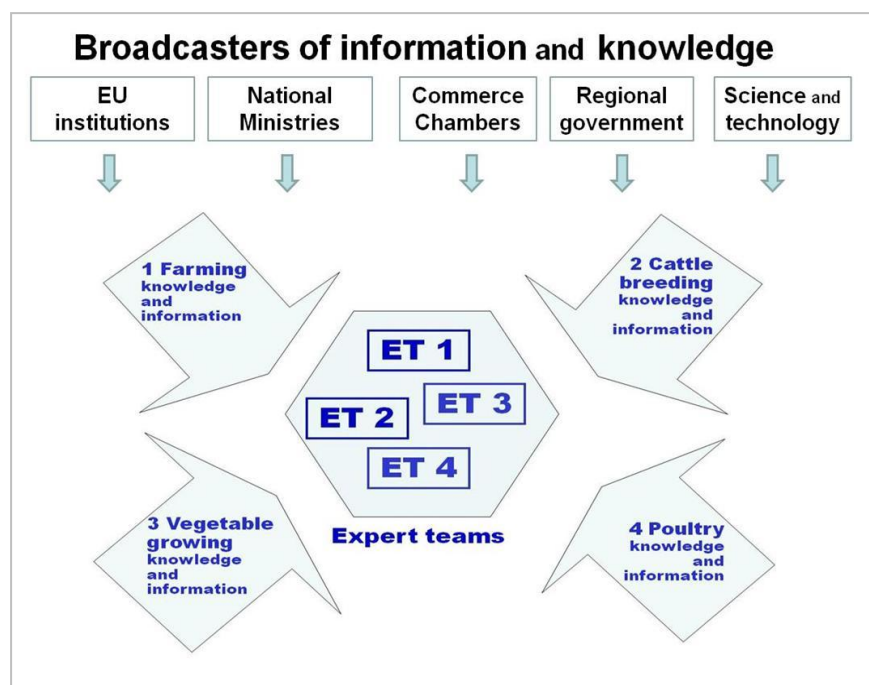


Fig. 2. Knowledge and information collection model for smart villages
Source: Author's work

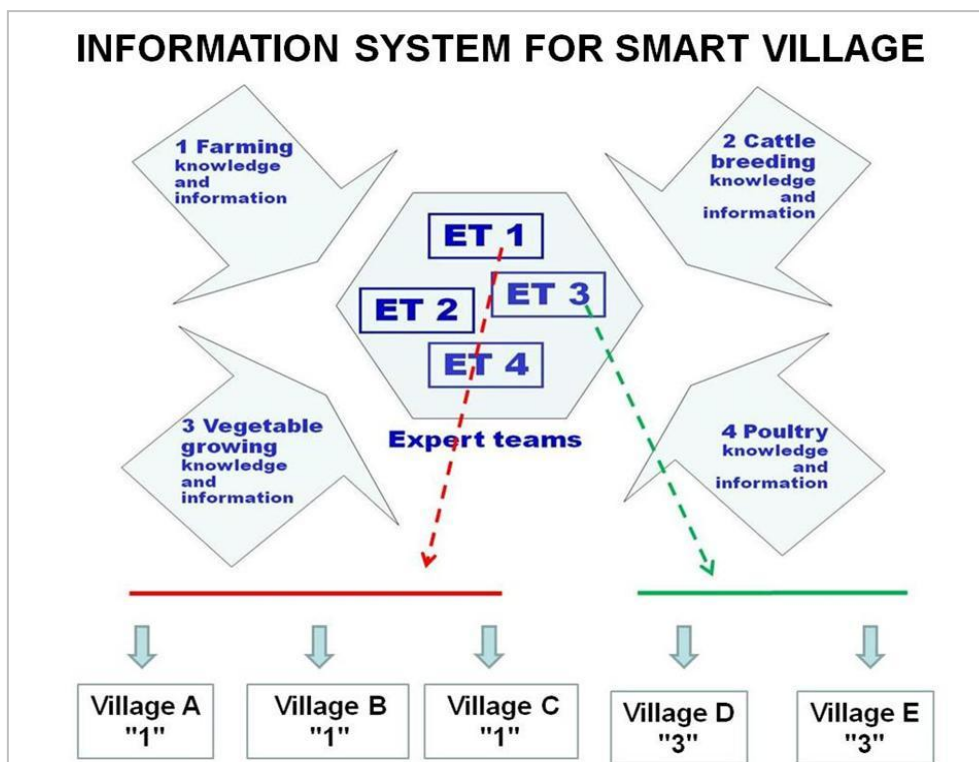


Fig. 3. Model of dissemination of knowledge and information for smart villages

Source: Author's work

Conclusion

Leaving the socialist planning model of agriculture in the Republic of Croatia during the post-socialist transition process, the need to educate agricultural producers to turn from subcontractors of socialist combines into farmers, i.e. producers of goods for the market, was not taken into account. This is especially important for the Slavonia region; so many years have been lost, villages are losing population and the number of agricultural households and agro-producers is declining.

In the current environment of rapid knowledge growth and information growth, the "Alberta" model of disseminating knowledge and information for rural development and smart villages has been proposed.

"Alberta" model is designed as a specialized source of information based on pre-selection of information needed to develop specific rural areas for certain regions; vegetable production regions, fruit and grape production regions, coastal regions, mountain regions and livestock, etc.

The villages do not have the necessary professional staff, so it is necessary to supplement the expert teams with experts from neighboring cities.

As social cohesion in Croatia (and Slavonia) is underdeveloped – the implementation of the "Alberta" model will require the coordination of county authorities – as we proposed in the project "Alberta Information System for Smart Village Development", a project for Osijek-Baranja County.

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