

Possibilities of implementing crowdsourcing initiatives in rural development programmes in Poland

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Key words: crowdsourcing, rural development in Poland, public participation

SUMMARY

Rural areas in Poland are inhabited by 39.8% of the country's population (GUS, 2018a). They face various challenges in the scope of development of efficient and competitive agriculture and forest economy, strengthening of area structures as an independent living and economic space, and preservation of cultural landscape and natural environment.

Measures aimed at the improvement of rural development instruments have been undertaken in Poland for many years. The Rural Development Programme for the years 2014-2020, specifying the framework of development of rural areas in Poland, draws attention to the need of activation of residents of rural areas, and use of endogenic potentials for the purposes of local development. The entire process of spatial planning in rural areas in Poland requires undertaking measures promoting creative attitudes among residents of rural areas and enabling their involvement in joint undertakings.

One of the tasks of ongoing rural development projects is to take social conditions into consideration. The research seeks potential activities to be undertaken by local self-governments interested in the development of local identity and sense of belonging.

The development and common use of the Internet and new digital tools come with a wide range of new possibilities, challenges, and perspectives in the scope of rural development. One of such tools is crowdsourcing. The survey applies this relatively new approach to knowledge acquisition, information diffusion, and exchange of thoughts and views among authorities, experts, and the crowd. It entails a combination of top-down, traditional, hierarchical process, and a bottom-up, open process engaging an online community. The analysis of trends observed in European policies reveals that the application of the idea of crowdsourcing for strengthening social participation is a very desirable and important issue.

The article presents the possibilities of implementation of the idea of crowdsourcing in rural development programmes in Poland, particularly in planning works related to the implementation of land consolidation. A dedicated application was created in the GIS environment especially for this purpose.

Possibilities of implementing crowdsourcing initiatives in rural development programmes in Poland

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1. INTRODUCTION

Rural areas in Poland face many challenges in the scope of efficient and competitive agriculture and forest economy, strengthening area structures as an independent living and economic space, and preservation of the values of the cultural landscape and natural environment. Poland stands out in Europe in terms of its environmental and landscape diversity. This results from the natural conditions (diverse land relief and variability of soil and climate conditions), uneven industrialisation and urbanisation of the country, high contribution of permanent grasslands, and preservation of extensive agriculture over a considerable area, particularly in regions with mosaic spatial structure (in the eastern and south-eastern part of the country) (Kaługa 2009). Arable land constitutes 60.2% of the territory of the country (GUS, 2018b). Half of it constitutes unique habitats disappearing in the European landscape, with havens of rare and endangered species of flora and fauna (Machnik and Kurczewski, 2014). High environmental and landscape values of agricultural areas are confirmed by covering their considerable part by the Natura 2000 network (Gwiazdowicz, 2010). Reconciling the economic development of rural areas with environmental and landscape protection is a difficult task. Activities with this goal in mind have been undertaken in Poland for many years in the framework of the Common Agricultural Policy of the European Union.

Rural development in Poland is currently stimulated by the Rural Development Programme for the years 2014-2020. It draws attention to the need of activation of residents of rural areas, and use of endogenic potentials for the purposes of local development. The entire process of spatial planning in rural areas in Poland requires activities promoting creative attitudes among residents of rural areas, and enabling their involvement in joint undertakings.

One of measures related to the transformation of the spatial structure of rural areas in Poland, implemented in the scope of the programme, is land consolidation. Consolidation works performed so far did not make the most of the knowledge resources of the local community regarding their area of residence (in the scope of resources of local material and intangible cultural heritage, local environmental conditions affecting agriculture, functionality and quality of access roads to arable and forest land, problem areas, etc.). This translated into: a unilateral character of the solutions of the consolidation plan, and the exclusive consideration of the improvement of the area structure of agricultural farms and transportation system, lack of implementation of the currently promoted idea of sustainable development of areas, non-optimal use of funds for the purposes, and a small number of implemented consolidation procedures.

The development and common use of the Internet and new digital tools comes with a broad range of new possibilities, challenges, and perspectives in the scope of development of rural areas. One of such tools is crowdsourcing – a tool allowing for effectively reaching the

interested social groups, use of their knowledge on the area, acquiring their opinions and ideas, and then their involvement in the implementation of the planning works. It permits the inclusion of the community in the decision-making process regarding the type of aspects of space that should be considered in the implementation of works related to the transformation of the space of rural areas, as well as acquiring detailed information on the study area, not available in the existing spatial data bases. It may also result in the development of innovative solutions by reducing the cost and time usually required in the traditional problem-solving process (Brabham, 2008).

Public participation is a key priority in public planning and crowdsourcing. It is regarded a good way to engage citizens and facilitate an open dialogue between them and planners (Bugs et al., 2010). The analysis of trends observed in the European policy (projects CAPS – Collective Awareness Platforms for Sustainability and Social Innovation) shows that the application of the idea of crowdsourcing for the purpose of strengthening of social participation is a very desirable and important issue. Numerous examples also include among others crowdsourcing platforms engaging residents in common search for solutions to local problems, as well as in transforming, improving, and governing the city, e.g. WeDundee.com in Scotland, FixMyStreet.com in Great Britain, or OtwartaWarszawa.pl in Poland. Holland also has considerable experience in the scope (among others Bol et al., 2016; Grus and Sjoukema, 2017). It has been applying the tool in works related to updating topographic maps with the support of elementary school pupils for several years. OpenStreetMap (OSM) is the most famous example of crowdsourcing available today (Haklay and Weber, 2008).

Land consolidation is one of the processes shaping the spatial structure of rural areas. Therefore, the implementation of consolidations (but also preparation of strategic documents for local development affecting the functional-spatial structure of rural areas) requires undertaking measures promoting creative attitudes among residents of rural areas, and enabling their involvement in joint undertakings. The article presents the concept of implementation of the idea of crowdsourcing in processes transforming the spatial structure of rural areas based on a dedicated application.

2. CHARACTERISTICS OF THE LAND CONSOLIDATION PROCESS IN POLAND

One of the basic measures contributing to the development of agriculture and rural areas in Poland, as well as in the countries of the European Union (Vitikainen, 2004), is the land consolidation process. Consolidation works in Poland currently gradually cease to be treated as measures limited only to new planning of boundaries of registered plots optimal only from the point of view of owners of agricultural farms. From the moment of Poland's accession to the European Union (in 2004), land consolidation increasingly frequently constitutes an element of a group of measures aimed at complex development of an area subject to consolidation, with consideration of complex renewal of villages, improvement of the transport system, protection of the natural environment, protection of landscape values and cultural heritage, and improvement of water relations (Bielska and Leń (eds.), 2015; Krupowicz et al., 2017; Kupidura et al., 2014; Sobolewska-Mikulska (ed.), 2015; Sobolewska-Mikulska and Wójcik, 2018; Stańczuk-Gałwiazek et al., 2018; Wilkowski and Pułeczka, 2002).

Poland is one of the largest beneficiaries of EU projects oriented at rural development, where the land consolidation process is of particular importance (Janus and Markuszewska, 2017). Poland currently experiences high demand for implementation of such works. The needs in the scope cover more than 7 million ha, constituting approximately 69% of the area of arable land of family farms in the country (Jędrejek et al., 2014). Depending on the region, they are respectively larger or smaller. The greatest needs concern the southern, south-eastern, and central part of the country, due to a small surface area of plots and their high dispersal (Jadczyzyn and Woch, 2017). In the programming-financial perspective 2014-2020, approximately 285 million EUR is allocated for the implementation of land consolidation procedures. This will permit the consolidation of land with a total surface area of approximately 106 thousand ha (Programme, 2018).

2.1 Legal regulations and technical procedures

As directly stipulated by the *Act of 26 March 1982 on land consolidation and exchange (Journal of Laws of 2018, item 908)* regulating the land consolidation procedure in Poland, the objective of this type of measures is the provision of more favourable management conditions in agriculture and forestry through the improvement of the area structure of agricultural farms, forests, and forest land, rational management of the plot layout, adjustment of real estate boundaries to the system of melioration facilities, roads, and land relief. The scope of the measure covers a number of surveying, legal, and administrative activities necessary for initiating the consolidation procedure, conducting administrative proceedings, and disclosure of the decision on the approval of the consolidation plan in the land and buildings register and in land and mortgage registers. It particularly covers the preparation of the consolidation plan (surveying-legal documentation), as well as implementation of post-consolidation management – particularly considering the construction and adjustment of agricultural transport roads, correction of the course and improvement of technical parameters of melioration ditches, land reclamation, and implementation of other measures resulting from the consolidation plan, permitting taking possession of newly designated plots and land management in a given area. Consolidation proceedings are performed by the starost as a task in the scope of governmental administration from the resources of the State Budget, with a prevalent contribution of financing from the resources of the European Agricultural Fund for Rural Development. The highest authority in the scope is the voivode. Consolidation works are coordinated and performed by the voivodeship self-government with the support of voivodeship offices of surveying and arable land.

Two types of consolidation are designated: initiated on request and *ex officio*. Pursuant to the act on land consolidation, initiation of the consolidation procedure can occur on request of the majority (more than 50%) of owners of agricultural farms (with an area of more than 1 ha) located in the designated consolidation area, or on request of owners of land with a total area exceeding half the surface area of the designated consolidation area (irrespective of the total area of land in possession). In order to apply for financing of consolidation works, the starost applies for financial resources in a competition announced by a respective department of the Marshal Office. The criteria of admission of applications are specified in the Regulation of the Minister of Agriculture and Rural Development of 10 December 2015 on detailed conditions and course of granting and provision of financial support for land consolidation procedures, in

the scope of submeasure “Support for investments related to development, modernisation, and adjustment of agriculture and forestry” covered by the Rural Development Programme for the years 2014-2020 (item 2180). Preference is given to undertakings that have a positive effect on the landscape and environment, and implement allocation of land for public purposes and for tasks increasing retention.

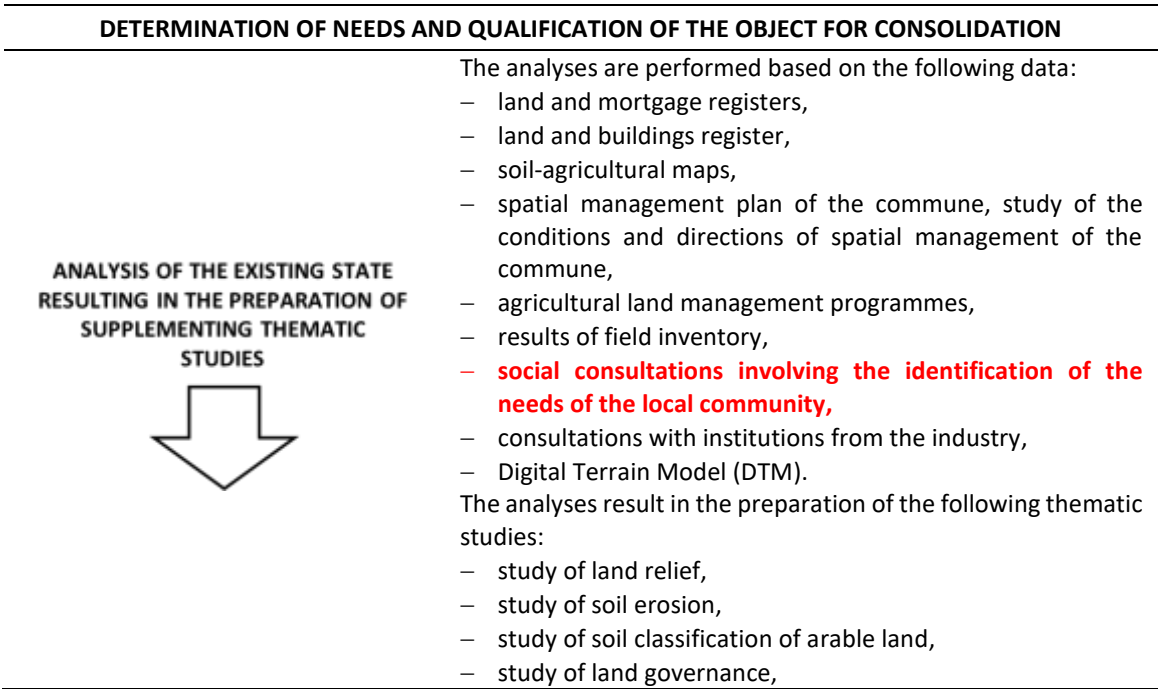
Consolidations initiated ex officio, particularly (after obtaining the opinion of the village administration and social-vocational farmer organisations operating in a given village) so-called infrastructural consolidations, are implemented in an area where the plot layout was or will be considerably worsened as a result of the course of the existing or constructed public roads (particularly motorways), railways, on-ground pipelines, and water reservoirs or melioration facilities. The objective of such consolidation is to eliminate or minimise the unfavourable effect of investments on rural space. The costs of consolidation works and post-consolidation management are covered by the investor, if they apply for the consolidation.

Next to the aforementioned types of land consolidations, the following are also implemented in Poland (Sobolewska-Mikulska (ed.), 2015):

- Land consolidations related to the implementation of anti-flood investments, aimed at obtaining real estate for the purposes of construction of anti-flood structures,
- “secondary” land consolidations resulting from secondary fragmentation of the area structure of agricultural farms in already previously consolidated areas, or liquidation of common land, consolidation of forests and forest land, alteration and modernisation of agricultural transport roads, counteracting erosion.

The course of the land consolidation process in Poland is presented in Figure 1.

Figure 1. Land consolidation procedure in Poland (red colour designates elements of the procedure involving active participation of the local community)



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- study of plot surface area,
 - study of spatial distribution of plots of a group of farms with the greatest surface area,
 - study of spatial distribution of plots of a group of farms with the highest number of plots,
 - study of forest and tree stand cover with proposed agricultural-forest boundary,
 - study of existing and planned roads,
 - study of plots with no access road,
 - study of water relations,
 - study of land use by field inventory,
 - inventory and photographic documentation.
-

The graphic part of the concept presents:

- boundaries of the consolidation area,
 - proposals concerning changes in the boundaries of communes or villages,
 - land excluded from consolidation,
 - proposals of changes in the arable land structure, and of designation of land allocated for forestation, development of wind protection belts, anti-erosion measures, etc.,
 - requirements in the scope of maintenance and protection of field tree stands, tree stands and bushes constituting biological enclosure of water streams, gullies, ravines, high balks – counteracting erosion phenomena,
 - correction of the course of the existing melioration canals and ditches requiring renovation, and planning of melioration ditches in areas requiring meliorations,
 - proposals for the range of reclamation,
 - needs in the scope of changes in the transportation system with consideration of footpaths and road crossings,
 - proposals for the location of land of large-area farms, commune property, common land, etc.,
 - proposals for road management,
 - improvement of water conditions and water management,
 - direction of planning plots,
 - changes in the land use structure,
 - designed agricultural-forest boundary,
 - tree stands and bushes,
 - protected areas,
 - location of land for public purpose investments.
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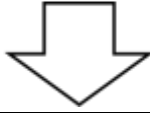




**PREPARATION OF THE
ASSUMPTIONS FOR THE LAND
CONSOLIDATION PLAN**



**ENVIRONMENTAL IMPACT
ASSESSMENT**



- Preparation of the environmental study for land consolidations with an area of arable land exceeding 10 ha in areas covered by forms of environmental protection and 100 ha for the remaining areas.
 - Decision (issued by the starost) on the obligation of preparation of the EIA report or revoking the obligation.
 - Issuing the decision on environmental conditions (issuing authority – starost).
-

<p>LAUNCHING THE CONSOLIDATION PROCEDURE BASED ON THE DECISION OF THE STAROST</p> 	<ul style="list-style-type: none"> - Election of the Council of Consolidation Participants (up to 12 persons among the participants – as a consulting authority). - Appointment by the starost of the Commission fulfilling consulting functions in the preparation of the comparative land appraisal and issuing opinions on reservations to the consolidation plan.
<p>LAND APPRAISAL</p> 	<ul style="list-style-type: none"> - Passing the rules of land appraisal by consolidation participants. - Preparation of the map of land appraisal and register of comparative land appraisal before consolidation, and disclosing them to the public. - Detailed and thorough analysis of particular appraisal contours in the field.
<p>PREPARATION OF THE DETAILED PLAN AND REGISTER OF COMPARATIVE APPRAISAL OF LAND AFTER CONSOLIDATION</p> 	<ul style="list-style-type: none"> - Measurement of invariable elements of the plan – external boundary (protocol designation on land with plot owners), built-up plots (protocol designation on land with plot owners), roads (protocol designation on land with road administrator), waters (protocol designation on land with administrator), agricultural-forest boundary. - Collection of requests from consolidation participants in writing in terms determined in a notification letter. - Divisions of common land – in the case of requests for such works. - Planning plots of the new state based on collected requests and performed measurements of invariable elements. - Preparation of the register of comparative appraisal of land designated as a result of consolidation. - Preparation of the list of planned plots and cash equivalents.
<p>PRESENTATION OF THE PLAN</p> 	<ul style="list-style-type: none"> - Elevation, stabilisation, and presentation in the field of the planned new plots. - Presentation of the plan and collection of complaints regarding the plan. - Examination of the justification of the complaints by the starost (after prior issuing of an opinion by the Commission) and introduction of potential amendments to the plan.
<p>COMPLETION OF THE CONSOLIDATION PROCEDURE</p> 	<ul style="list-style-type: none"> - Decision approving the land consolidation plan together with the conditions of gaining possession of land designated as a result of the consolidation, and ways of settlements constituting an integral part of the decision (terms and rules of gaining possession of new plots, scope of reclamation works, list of new planned roads, and existing roads for modernisation, etc.). - Update of the land and buildings register and commencement of works related to post-consolidation management. - Disclosure of the new legal state in land and mortgage registers.

**POST-CONSOLIDATION
MANAGEMENT**



Post-consolidation management includes works involving:

- construction of adjustment of access roads to arable and forest land, and access roads to homesteads of particular consolidation participants,
 - correction of the course and improvement of the technical parameters of melioration facilities,
 - liquidation of redundant balks and roads, and performance of reclamation measures permitting mechanical cultivation of land (among others removal of bushes, planation of ditches, removal of balks, ploughing).
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Source: own elaboration based on: Act (1982), Decision (1983), Guidelines (2014).

2.2 Participation of the local community

The scope and character of participation of the local community in consolidation proceedings is stipulated in legal provisions (Act, 1982). The land consolidation process is implemented with the participation of the Council of Consolidation Participants consisting of 3-12 persons as a social consulting authority appointed by the consolidation participants. It fulfils consulting functions towards the surveyor, planner, and starost – it issues opinions on reservations to the plan, proposes the course of new roads. Consolidation participants have an important role of submitting individual requests concerning the location of their plots, and pass the rules of estimation providing the basis for the accurate determination of the value of land. Customarily in the Polish consolidation procedure, residents of the consolidation area do not actively participate in the planning works. It is a manifestation of social participation with informative and consultation character. Residents participate in the following stages of the process (see Figure 1):

- analysis of the existing state resulting in the preparation of a group of thematic studies,
- launching the consolidation procedure on request of the majority of owners of agricultural farms located in the area of the planned consolidation, or on request of owners of land with a total area exceeding half of the surface area of the planned consolidation area,
- land estimation,
- preparation of the detailed plan and register of comparative land estimation after consolidation,
- presentation of the plan and collection of complaints concerning the plan.

In such a situation, residents have no actual influence on the planned investment measures (directly or indirectly) concerning them. Only actual participation of the local community in the design works allows for minimising the number of socio-spatial conflicts, and for obtaining social acceptance in the scope of decisions taken in the scope of the land consolidation procedure (Hindsworth and Lang, 2009; Urbanik et al., 2010).

A measure that would enable active and actual participation of the local community in shaping their space of residence, as well as building the sense of local identity and belonging to the place of residence, is the concept of implementation of the idea of crowdsourcing at the stage of planning of consolidation works, recommended in this article. As a consequence, the community assumes shared responsibility for the undertaken measures and decisions, making the entire process more permanent and effective.

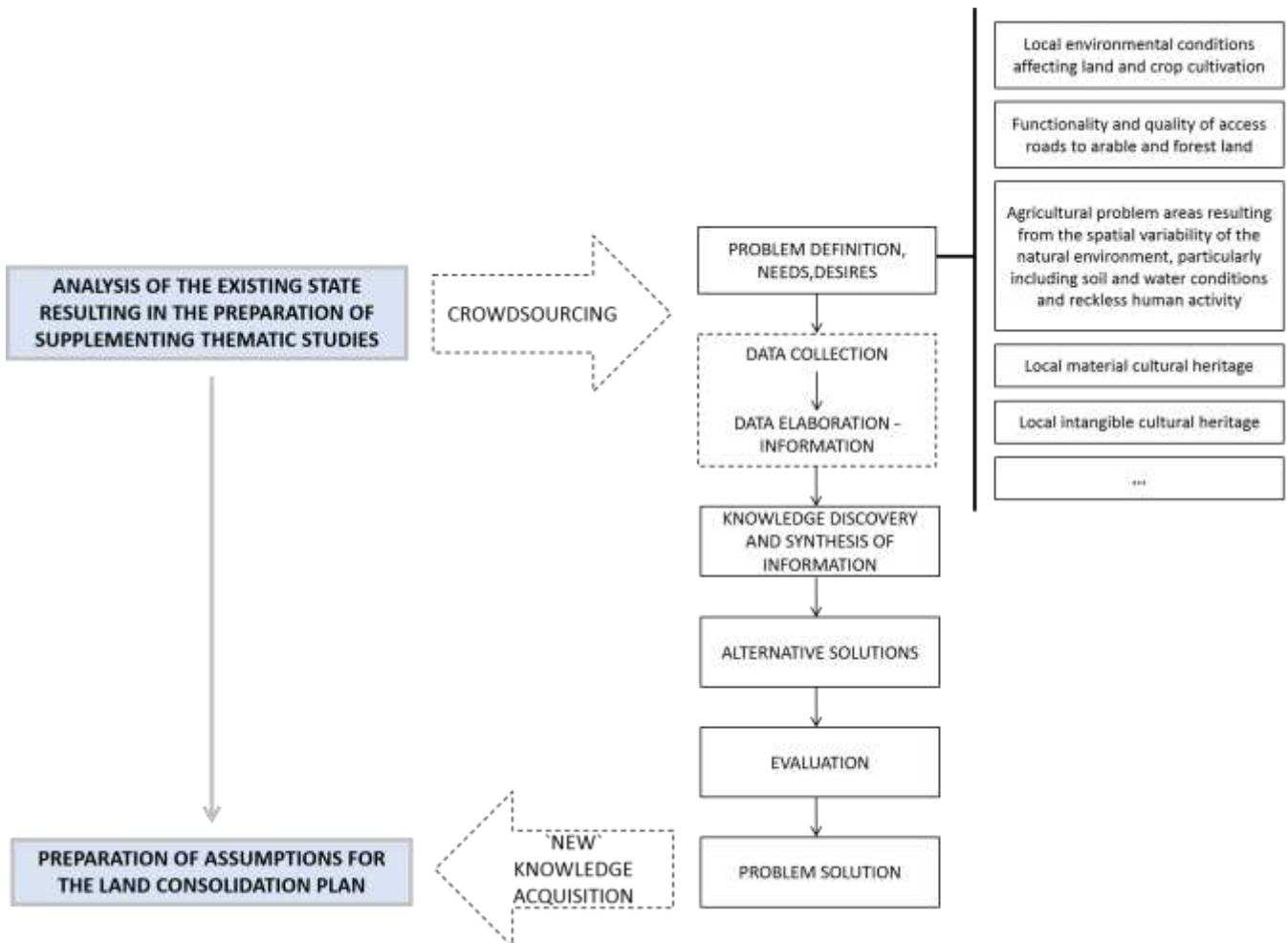
3. PROPOSAL OF APPLICATION OF THE IDEA OF CROWDSOURCING FOR THE PURPOSE OF IMPROVED USE OF THE POTENTIAL OF THE LOCAL COMMUNITY IN RURAL DEVELOPMENT PROJECTS

3.1 Study material and methods

In the approach proposed in this article, crowdsourcing for the purposes of implementation of land consolidation in Poland can be considered as a process evolving through the following steps (Figure 2):

1. online presentation of a problem,
2. obtaining opinions, needs, information from stakeholders (potential consolidation participants) regarding:
 - local environmental conditions affecting land and crop cultivation (for example scarps, balks, self-sown forest, shading by trees),
 - functionalities and quality of access roads to arable and forest land (for example roads with damaged surface, inaccessible during snowmelts and excessive precipitation, dirt roads, unadjusted to modern means of transport, machines, and agricultural tools, requiring paving, unused roads, informal roads – occasional crossings through neighbouring land (see Krupowicz et al., 2017)),
 - agricultural problem areas resulting from the spatial variability of the natural environment, particularly including soil and water conditions, and reckless human activity (for example mountain areas, land damaged by erosion, land threatened with steppisation, wetlands or stony land, wastelands, devastated and degraded land (see Sobolewska-Mikulska and Wójcik, 2018; Wójcik-Leń et al., 2018)),
 - resources of local material and intangible cultural heritage not constituting an element of the existing spatial data bases, such as: important places related to local traditions, customs (for example wetlands where flax was soaked, holly springs, magic places, places related to local legends or beliefs), places important for residents, memorial places (of burial, forgotten graves), locations of already non-existent buildings such as mills or windmills, etc. They are generally places which could be preserved and marked in the physical space of a village in the scope of the post-consolidation management (see Kupidura, 2013; Kupidura, 2017)),
 - others (it is an open group, depending on the local conditions and needs).
3. generation of alternative solutions by the stakeholders (potential consolidation participants),
4. evaluation of the solutions proposed by the stakeholders (potential consolidation participants) and surveyor-planner,
5. selection of the best solution provided by the surveyor-planner, and
6. introduction of the selected solution in the assumption of the land consolidation plan.

Figure 2. Concept of crowdsourcing for the land consolidation procedure in Poland



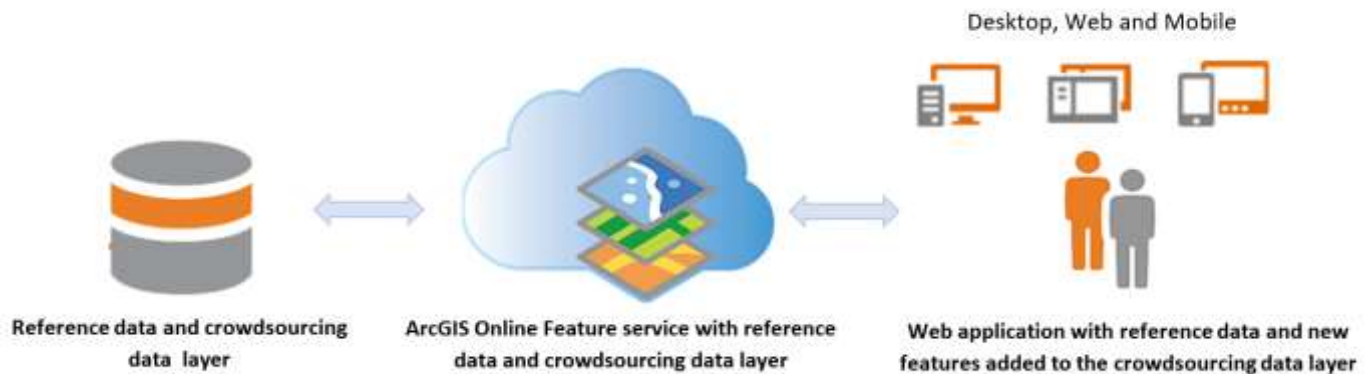
Source: own elaboration based on Papadopoulou and Giaoutzi (2014).

3.2 Application prototype

The objective of the application is on the one hand the disclosure of the existing reference data concerning the selected area, and on the other hand collecting data from the local community (crowdsourcing data layer). The tool for the provision and collecting data will be a web application available for stakeholders in the online environment. The web application will be developed by means of ArcGIS Online software by Esri. It will be composed of reference data, e.g. base map, descriptive layer concerning terrain attributes, and crowdsourcing data layer permitting adding point data (with a description and/or photograph) by the local community. The reference data and crowdsourcing data layers are disclosed as feature service in the ArcGIS Online cloud. The feature service is available for users through web applications, allowing for adding and supplementing new data on a current basis (see Figure 3). Depending on the needs, some data can be hidden or disclosed only to a specified group of people. The user will be able to gain access to the online application through a link or a generated QR code. The online application will be available for iOS, Android, and Windows, and displayed on mobile phones,

tablets, and desktops. Access with no necessity of prior logging in is assumed. The only condition of use of the online application is access to the Internet.

Figure 3. Web application architecture



Source: own elaboration.

The presentation and testing of the application in the field will involve three parts: introduction, practical test, and questionnaire. At the introduction stage, the promoter (surveyor-planner) will briefly explain the test’s objectives, the interface, and its functionalities, and encourage users to use the web application. In the second part, participants will implement a task. Users can interact for as long as they need. Participants will be encouraged to go outside using the web application. Last, they will answer a questionnaire with five direct questions and three open questions (Table 1). The direct questions will consider topics related to the ease-of-use, satisfaction and usefulness. The open questions will serve mainly to analyse the usefulness of its functionalities and tools for future improvements.

Table 1. Questionnaire

Do you agree with these statements? () yes () no

1. I found the web application easy to use and understand
2. I think that people in general would be able to use a web application like this easily
3. I found the information interesting and important
4. I think this web application can strengthen public participation in land consolidation process
5. I think all municipalities should have a web application like this available for the community in the case of implementation of documents affecting the functional-spatial structure of rural areas

Please answer:

6. What did you like most and what did you dislike?
 7. What do you think is missing?
 8. What do you think could be improved?
-

Source: own elaboration based on Bugs et al. (2010).

3.3 Discussion

The presented issues and data obtained from the local community will allow for a better and more detailed examination of the consolidation area by the surveyor-planner, and therefore more accurate consideration of the useful, spatial, environmental, and landscape values in the assumptions of the consolidation plan. We expect the proposed solution to permit effective reaching of the interested social groups, use of their knowledge on the area, acquiring their opinions and ideas, and then their involvement in the implementation of the planning works. The proposed solution offers a possibility of supplementing data used in consolidation works by the perceptive level, related to experience, preferences, associations, and memories of the local community concerning their living space. This particularly concerns data related to the cultural and landscape heritage of a given village (see Kupidura, 2013; Kupidura, 2017). The ideas and technical solution presented in the article are currently undergoing tests on selected consolidation objects in Poland.

4. CONCLUSIONS

Land consolidation is one of the processes shaping the spatial structure of rural areas. Therefore, the implementation of consolidations requires measures promoting creative attitudes among residents of rural areas, and enabling their engagement in common undertakings. It is possible through the application of the tool of crowdsourcing. A dedicated application was developed in the GIS environment especially for this purpose. The resulting obtained information on the area and the problems and needs of the local community will constitute input material for the surveyor-planner for the preparation of assumptions of the land consolidation plan. Then, they can be implemented in the land consolidation plan. The approach presented in the article can additionally contribute to:

- increase in the acceptance of the local community for the implementation of agricultural land management works and transformations of the functional-spatial structure of rural areas, unquestionably contributing to the improvement of land management conditions – completion of the consolidation procedure provides the basis for undertaking further common measures related to the commencement of the broadly defined transformation of the village, in the scope of possibilities of obtaining financial resources and finding solutions to economic-investment and environmental-landscape problems,
- increase in the interest of the local community in ways of building the sense of local identity and belonging to the place of residence,
- promotion of the quality of life in the village, or promotion of the village as a place of life and professional development with consideration of the economic, social, and environmental potential of a given area,
- improvement of the spatial, technical, and aesthetic conditions of building development in the village, and management of rural areas through among others the use and promotion of the cultural heritage of Polish rural areas,
- development of the digital society in rural areas through an increase in the level of knowledge in the scope.

The methodological and technical solutions proposed in the article will also be applicable in the preparation of other documents affecting the functional-spatial structure of rural areas in

Poland, such as: development strategy of the commune, study of conditions and directions of spatial management of rural communes, local spatial management plans.

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