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IMPORTANCE OF INTELLECTUAL CAPITAL RESOURCES IN RURAL DEVELOPMENT USING THE fsQCA METHOD AS AN EXAMPLE

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Abstract

The aim of this paper is to present the context of intellectual capital in rural area development using the example of fuzzy qualitative comparative analysis (fsQCA), which is one of the few methodological innovations of recent decades and which bridges the gap between quantitative and qualitative research. Based on surveys and interviews with local organizations, the study examined the relationships between the results of work and the composition of variables that constitute intellectual capital components. The results, related to intellectual capital, were divided into three variables representing human capital (education, experience-years of work, language skills), structural capital (presence of IT system in an organization, the number of procedures and processes) and relational capital (the number of cooperating organizations, the number of NGOs in the community, the level of trust in the manager).

The research outcomes showed that different combinations of intellectual capital components led in practice to the same result; nevertheless, human capital was an indispensable element of the combination.

Keywords: intellectual capital, rural area development, fuzzy-set Quality Comparative Analysis (fsQCA)

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INTRODUCTION

In knowledge-based economy, intellectual capital is recognized as a source of growth, innovation and competitive advantage (Edvinsson, Malone 1997; 2001, Lev 2004, Mikuła 2012, Paliszkiewicz 2007, Pietruszka-Ortyl 2016, Sokołowska 2005, Ziemiańczyk 2011; 2012). The European Union documents also confirm that innovation and the human factor are seen as key drivers of growth, both in terms of a country, a region or a unit (OECD 2013). Therefore, in the EU documents, smart development or the development of a knowledge – and innovation-based economy is one of the main priorities in the Europe 2020 strategy (Veugelers *et al*. 2015).

Intellectual capital is a key asset to the value creation process in every organization and is a source of lasting competitive advantage (Holland 2006, OECD 2013). Investments in intellectual capital are long-term activities with a delayed return; these are investments in intangible assets that do not have a physical or financial form (Lev, 2004) but are definitely contributing to the organization's value creation through employee knowledge, organizational processes as well as innovations and relationships (Serenko and Bontis 2004, Zieliński 2008).

In this spirit, following the current trends, the study focuses on the key element of changes that is intellectual capital with its integral components such as human capital, organizational and relational capital in the context of rural area development.

INTELLECTUAL CAPITAL

There is no universally accepted definition of intellectual capital in literature. Intellectual capital can be defined as the sum of intangible assets (knowledge, information, intellectual property and experience) formalized, acquired and exploited in order to create higher value assets (Bratnicki 2008, Davenport and Prusak 1998, Kannan and Aulbur 2004, Mikuła 2016a).

In literature, three main components of intellectual capital are distinguished (Fig.1):

- Human capital which has the largest share in intellectual capital and includes, inter alia, education, competencies, attitudes, skills and experience of employees.
- Structural capital (organisational capital) – processes, IT systems, infrastructure, strategies and organizational culture.
- Relational capital – these are primarily social skills that allow for cooperation with others. The ability to cooperate or trust others becomes one of the most important characteristics of development in a situation when the development results from teamwork rather than from the effort of

individuals. At the human level, relational capital largely depends on their social skills that is on establishing and maintaining contacts, as well as functioning in more or less formal relationships (networks).

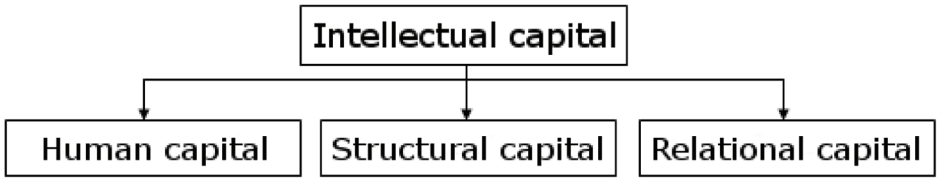

Figure 1. Elements of intellectual capital

ELEMENTS OF INTELLECTUAL CAPITAL IN THE CONTEXT OF POLISH VILLAGES

Examined by various centres (Centre for Public Opinion Research, CSO, Social Diagnosis), the level of human and relational capital, as well as the economic condition of Polish villages and farmers, gave grounds to put forward a thesis that the distance between the urban and rural world in terms of education, the use of modern technologies as well as in the area of social activity significantly diminished (Fedyszak-Radziejowska 2016). It is worthwhile to analyse the different elements of intellectual capital.

Human capital, and thus the level of education, skills and experience, is one of the most important indicators of the changes that have taken place in recent years in the Polish village. The diminished educational distance between rural and urban areas, which existed for decades, was the result of changes (Fedyszak-Radziejowska 2016). For the first time in the years 2012-2013, the percentage of rural residents with at least secondary education (38%) was higher than those who completed only primary school (28-31%). Although people with higher education are more often (26%) found in Polish cities than in rural areas (11%), in 2015 the percentage of rural residents benefiting from educational services was similar (22,6%) to the one in the largest cities (22,7%).

The development of information technology, the possibility to travel around the world and the Internet access have expanded the number of indicators that enrich the human capital of a given community. In 2015, 64.8% of people over the age of 16 used the Internet; in the largest cities the percentage amounted to 81,7%. The village systematically has been shortening the distance separating it from the city; two years before the Internet had been used by half of the village residents (50,9%) whereas in 2015 the number rose to 55,6% (Fedyszak-Radziejowska 2016).

However, the Internet is today only one of the technologies that shape the level of human capital in particular environments and social groups (Tab. 1).

Table 1. Use of technology and the media in 2015 (%)

Users:	Computer	Mobile	Smartphone	Mobile Internet
Poles in total	66,0	90,4	44,7	17,5
Cities>500 thousand	82,1	96,2	61,9	33,7
Village	57,3	85,7	36,1	11,6
The youth 16-24	97,2	99,1	79,4	41,2

Source: Social Diagnosis 2015, p.356 (in polish) http://pts.stat.gov.pl/

Modern technologies are used in Poland mainly by young people and the population of the largest cities. Among rural residents and farmers, the percentage of users of these technologies is noticeably lower than in cities. However, the distance between the level of human capital in urban and rural areas measured by the use of modern social communication technologies is not as significant as some might imagine or as some stereotypes suggest. The ability to drive a car, thus having a driving license, and knowledge of foreign languages are also parts of human capital. In the light of the Diagnosis 2015, the number of driving license holders in the village is exactly the same as in Poland in total (62%), whereas the driving ability among farmers is more common (75%) than in the whole country. Also, the knowledge of foreign languages does not differentiate the inhabitants of villages and cities as clearly as before. In 2015, 19.9% of Poles in total and 14.1% of rural residents declared communicative level of English (Fedyszak-Radziejowska 2016).

Relational capital in the Polish village is also widely described in literature (Fedyszak-Radziejowska 2016, Herbst 2008). It is worth noting that the understanding of the relational capital of the village requires a departure from the schema, standard approach or public statistics. For example, in 2008 there were actually only 13 thousand registered organizations, 8 thousand associations linked to the Church and 15 thousand active, traditional volunteer fire departments in the villages. There were 800 orchestras, 300 art groups, 600 sports teams, and about 1,000 traditional chambers of traditions functioning in volunteer fire departments. Herbst (2008) noted that even though fewer people were involved in formal organizations in the Polish community than in the city, they were more active and did voluntary work. The organizations were usually poorer, focused on local issues and linked to local government (Fedyszak-Radziejowska, 2016).

An important supplement to the knowledge of relational capital are the latest Centre for Public Opinion Research (CBOS) announcements (2016). In

their light, village residents were willing to engage and self-organize. Activity in at least one organization was declared by 37% of Poles, 38% of farmers and 35% of village residents. Despite many doubts and critical remarks on relational capital in the village, the research results proved that there were no significant differences in social activity in the city-village division.

SCOPE AND METHOD OF RESEARCH

Qualitative Comparative Analysis (QCA) is an approach based on Boolean algebra which is an algorithm used to formally test the accuracy of the assumed theorems and the conditional relations between outcomes and output variables (Woodside 2010). QCA is an interesting technique for analysis in management, especially when the samples are medium or small. This type of technique allows for a detailed analysis of the impact of variables contributing to a particular outcome, and is based on understanding of configuration of how the combination of causes leads to the same series of results. More importantly, the QCA is suitable for analysing a high degree of complexity of variables.

The conventional QCA (crisp OCA) method was developed by Ragin (1987) and was later expanded into a fuzzy qualitative comparative analysis (fuzzy set-fsQCA) (Ragin 2008). FsQCA is developing in management sciences mainly due to rigorous tools related to complexity theory (Woodside 2014). Calibration in this approach involves assigning variable values from 0.0 to 1.0 depending on their degree of membership (Woodside and Zhang, 2012).

The fsQCA method focuses on conditions (combination of variables) that lead to a given result. The main advantages of fsQCA in comparison to the traditional correlation analysis (e.g. regression) are as follows (Ragin 2008):

- asymmetric relations (inter alia interrelations of dependent and independent variables),
- equifinality (a principle that says that the same results may be reached no matter what sources or paths are used),
- complexity of causes (combinations of causes and determinants leading to the outcome).

This type of technique was ideal for the study for two reasons. The first one is that it allowed for examining which of the components of intellectual capital was important in creating values in the organization (in this case, the projects prepared). The other aspect referred to the size of the sample. The advantage of this method was that it enabled researchers to work with medium to small samples (Ragin *et al*.,2003, Ragin and Rihoux 2004). This study used the statistical package of fsQCA 2.5 for analysis (Ragin and Davey 2014).

Sample and data calibration

Not only does fsQCA analyse the isolated effect of two or more variables on the final result, but also it examines all possible (intensifying or moderating) interactions between these variables.

The research was conducted among organizations participating in the rural area development process at the local level in the Małopolskie Voivodship. The questionnaire was addressed to managers and leaders of 250 organizations involved in rural area development. The questionnaire was disseminated using CAWI (computer assisted web interview) technique.

The next step was to select the organizations with reference to the assumed aim that is the level of knowledge utilization in organizations (considered as the number of projects prepared) and the size of the organization. In the selected 9 organizations, interviews were conducted with people at the managerial level. The results, related to intellectual capital, were divided into three variables representing human capital (*human*: education, experience-years of work, language skills), structural capital (*organisat*: presence of IT system in an organization, the number of procedures and processes) and relational capital (*relational*: the number of cooperating organizations, the number of NGOs in the community, the level of trust in the manager of the unit – the Likert scale).

The subsequent step involved calibration using the *direct method* proposed by Ragin (2008). To calibrate the results of the study, they were transformed into two different measures, which values ranged from 0 to 1. These values did not represent the probabilities but the degree of membership to the category (Ragin 2000, Schneider *et al*. 2010). The fsQCA analysis generated three possible solutions: complex, minimal (economical) and intermediate (the latter is presented in this publication).

RESULTS

This section checks whether any causal conditions can be considered as an indispensable element (condition, component) of the result. The condition is necessary when the outcome is a subset of the specified causal conditions (causa conditio) (Ragin 2006, Schneider *et al*. 2010). The fsQCA uses a consistency measure to assess the extent to which observations meet strict rules. The obtained consistency score "1" indicates that the combination of causal conditions is consistent with the rule in all cases. The condition or combination of the conditions is necessary or nearly necessary when consistency outcomes exceed threshold 0,9.

Table 2. Analysis of the necessary conditions

Test conditions *	Consistency	Covering
human	0,833	0,918
~ human	0,611	0,805
organisat	0,704	0,864
~ organisat	0,722	0,848
relational	0,648	0,946
~ relational	0,815	0,830

* According to the nomenclature, the symbol (~) denotes the negation of the feature.

The outcomes of the consistency test and the coverage test, which reveal the relationships between the variables, are shown in Table 2. It reveals that the consistency and valid are sufficient.

Table 3. Analysis of subsets for the assumed outcome

Condition	**Consistency**	**Covering**	**In total**
human*organisat*relational	0,963	0,481	0,690
organisat* relational	0,969	0,574	0,754
human* relational	0,968	0,556	0,742
human* organisat	0,943	0,611	0,774
relational	0,946	0,648	0,797
organisat	0,864	0,704	0,805
human	0,918	0,833	0,899

The subsequent step was to check the sufficient conditions after having established the necessary conditions. It was necessary to create the most appropriate types by converting the set of values with reference to the causal conditions in the *fuzzy set value*. Causal condition may be considered sufficient in achieving the outcome if, in any case, the *X* value of the fuzzy causal condition does not exceed the fuzzy value of the *Y* result (Ragin 2000, Schneider *et al*. 2010).

Three solutions such as complex, economical and intermediate (the latter is presented in this paper) were generated in the fsQCA analysis.

Intermediate solution (Table 4) indicates two combinations of causal conditions.

Table 4. fsQCA analysis – intermediate result of a sufficient condition for obtaining (and not obtaining) the outcome in the form of projects in local organizations

	raw coverage	unique coverage	consistency
Model: nproject=f(human, organisat, relational)			
~relatonal*human	0,759	0,315	0,932
relational*organisat*~human	0,537	0,093	0,967
solution coverage:	0,852		
solution consistency:	0,939		

According to Woodside and Zhang (2012), the fsQCA model is informative when the consistency is above 0,74. Coverage (0,851852) and consistency (0,938776) from two conditions appeared to be sufficient. Sufficient conditions explain 85% of empirical evidence (Woodside, 2014).

Empirical meaning is associated with the degree to which the causal condition or combination of causal conditions explains the result. It is worth noting that the empirical meaning was evaluated in two points – the so-called raw coverage and unique coverage as suggested by Ragin (2006). When a unique coverage is different from 0, it means that there is more than one path. In the case of the study, the results indicated that the causal pathways encompassed the majority of the results (outcomes).

Here are the two combinations of sufficient conditions:

1. ~relatonal*human (raw coverage: 0,759259; consistency: 0,931818) and
2. relational*organisat*~human (raw coverage: 0,537037; consistency: 0,966667).

The raw coverage for single causal pathways ranged from 0,537037 to 0,759259. The condition is suitable when the raw coverage falls into the range of 0,25 and 0,65 (Woodside and Zhang, 2012).

Analysing the results, it can be noted that the combination of the three identified variables led to successful results. In other words, in terms of sufficient conditions, all variables were important in forming intellectual capital in local organizations contributing to rural area development.

DISCUSSION

Intellectual capital is a key asset to the value creation process in every organization and is a source of lasting competitive advantage (Holland 2006, OECD 2013). Investments in intellectual capital are long-term activities with a delayed return. These are investments in intangible assets that do not have

a physical or financial form but which contribute significantly to the organization's value creation through employee knowledge, organizational processes, and innovations and relationships (Mikuła 2016b, Serenko and Bontis 2004, Zieliński 2008, Ziemiańczyk *et al*. 2013, 2014, 2017).

With the use of the fsQCA method, the impact of intellectual capital on the effects of work in local organizations in the form of projects was verified. The results showed that the different combinations of intellectual capital components determined the outcome – the level of efficiency in local organizations. In other words, different combinations of intellectual capital components led to the same result in practice; however, the essential element of the combination was human capital.

The presented research has several limitations that may inspire future studies. Firstly, the results are based on a sample of local organizations and consequently the outcomes may be group specific. It is, therefore, worthwhile to carry out research in other groups/samples/companies/at different levels of the organization. Secondly, although this study used literature guidelines, other factors, such as the level of specific skills, processes or collaboration, may need to be considered in the future. Thirdly, comparisons between regions/countries could provide an interesting opportunity to compare research results.

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