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RURALITY INDEX: A STATE-OF-THE-ART NETWORK VIEW

Gustavo B. Braga
Universidade Federal de Viçosa / Universidade do Minho
gustavobraga17@gmail.com

Paula C. Remoaldo
Universidade do Minho
cris.remoaldo@gmail.com

Ana Louise C. Fiúza
Universidade Federal de Viçosa
louisefiuza@gmail.com

Abstract

The United Nations (2009) declared that the year of 2007 was the first time in human history when the majority of the world's human population was not living in rural areas. That being said, there is currently no official definition of the term "rural". Consequently, the discourses in academics and politics about this theme are controversial.

Some approaches have sought to define "rural" in either descriptive or socio-cultural terms, while others believe there are no differences between rural and urban. In spite of this, there are authors trying to create a rurality index, which contributes to delineate "rural" in the literature. Several authors have taken part in this approach, generating a web of studies in which they applied rurality indexes to different objectives, such as aiding public policies.

With the objective of better understanding the peculiarities and interactions among these authors and indices, this chapter seeks to build a network concerned with this line of research. In these studies, the primary tendency was the definition of "rural" as a lifestyle.

In this investigation, we created a network by using the social network methodology. The results demonstrated the centrality around Cloke (1986; 1977) and his seminal role. The outcomes also showed low modularity and density in the network, which suggests that the discussion is still at an elementary level and that there is no wide exchange of ideas between authors concerned with rurality indexes.

Keywords: Rural Definition; Rurality Index; Network.

Resumo

As Nações Unidas (2009) declararam que o ano de 2007 foi, pela primeira vez na história da humanidade, o ano em que a maioria dos habitantes à escala mundial passou a viver em espaços urbanos. Não existe nem na literatura nem por parte de agências oficiais uma clara definição sobre o que é o "espaço rural". Paralelamente, os discursos académicos e políticos sobre esse tema são controversos.

Alguns autores têm procurado definir o "espaço rural" em termos descritivos ou socioculturais, destrinçando-se do "espaço urbano". Há autores que procuram criar índices de ruralidade, gerando um

conjunto de estudos que aplicam os índices de ruralidade tendo por base vários objetivos, como por exemplo, auxiliar as políticas públicas.

Com o objetivo de compreender as particularidades e interações entre esses autores e índices criados, este capítulo procura construir uma rede. Nos estudos analisados, a principal tendência foi a definição de rural como um estilo de vida. Foi criada uma rede utilizando a metodologia de redes sociais. Os resultados demostraram uma centralidade em torno de Cloke (1986; 1977) e do seu estudo seminal. As saídas também mostraram uma baixa modularidade e densidade na rede, o que sugere que a discussão ainda está a ser realizada a um nível elementar e que não há uma ampla troca de ideias entre os autores que pesquisam os índices de ruralidade.

Palavras-chave: Definição do rural; Índice de ruralidade; Redes.

1. Introduction

The definition of "rural" does not currently have a consensus at the international level. In the literature, and within international organizations, there have been inaccuracies in the rural definition. Coca et al. (2012) illustrated the difficultly in offering a trouble-free meaning to the word "rural". They demonstrated that there is complexity and fuzziness in the geographic-sociologic definition. This scenario has led to issues, like the super-estimation of the urban population.

The United Nations (2009) affirmed that, in 2007, the urban population was already the majority of the population of the world. Indeed, by the year of 2007, it was the first time in human history when the majority of the human population was not living, officially, in rural areas. Some authors, such as Wimberley, Morris, & Fulkerson (2007) from North Carolina State University and the University of Georgia, celebrated May 23, 2007 as the day when most of the world's population came to live in urban areas. In fact, the estimations forecast an increase in the urban population which, in 2050, will represent two-thirds of the world's human inhabitants (UNDATA, 2013).

However, this data is based on the official definitions of each country, individually, where there is an extensive amount of variety in the definition of rural. In Chile, for example, rural is a place with less than 1,000 inhabitants or between 1,001 and 2,000 inhabitants and more than half of the active population working in the agricultural sector. In Brazil, rural is defined by the municipal public administration. While in its neighbourhood, Peru, urban areas are settled centres with 100 or more dwellings grouped contiguously and are administrative centres of districts (Minnesota Population Center, 2013).

In academic discussions, the definition of rural has several approaches. Although authors like Lefebvre (2003) advocate for a non-quantitative definition of rural, authors such as Cloke (1977, 1992), created rurality indexes for measuring the rural percentage. This research line has followers that are

predominantly located in Europe; however, rurality indexes exist in America (Waldorf & County, 2007), Asia (Long, Zou, & Liu, 2009), Africa (Schlesinger, 2013) and Oceania (Humphreys, 1998).

The rurality indexes approach has contributed to policies focused on people living in rural areas. They enable an empirical delimitation for rural that simplifies the rural-policies enforcement. For example, Kralj (2000) produced a rurality index which was applied in Ontario, Canada, for rural healthcare planning (Ministry of Health and Long-Term Care, 2008). Despite this, Mills (1988) said that the attempt to define rurality is a "fool's errand" and an unnecessary burden. But Mills himself also indicates that it is necessary to identify "shades of urban" in the countryside.

Due the importance of this theme, we strive to answer the following question: What is the level of discussion in the international literature about rurality indexes? This discussion about rural definitions might improve the rural policies and the academic discussions.

The present chapter uses a qualitative technique in nature as the network analysis. This methodology was created in the 1930s by anthropologists (Mizruchi, 2006). This methodological tool is also consolidated in other areas, such as the economy.

The present chapter is structured into four sections. In the first section, the theoretical standpoints of several rurality indexes founded in indexed journals are presented. In the second section, the social network methodology is discussed to allow for the recognition of the dialogue among authors of this approach. In the third section, the results of the investigation are analysed and developed. In the last section, the concluding remarks are presented.

2. Rurality indexes and its approach

The most commonly cited paper in the area of the rurality indexes context is Cloke (1977). The Cloke (1977) paper represents the first attempt at creating a rurality index; Cloke developed the index for England and Wales in the United Kingdom (Cloke, 1977).

In Portugal, many attempts to measure the rural concept began after 1980 (Diniz, 1996; Remoaldo, 2002; Pereira, Pereirinha, & Passos, 2009; Silva, 1985). In Spain, work in this area began in the 2000s (Gómez, Rodicio, & Prado, 2004; Prieto-Lara & Ocaña-Riola, 2009). These studies became common in Europe in the 2000s (Romagnoli, 2002; Teljeur & Kelly, 2008; Öğdül, 2010; Verbeek, Pisman, & Allaert, 2012).

Publications dealing with this concept also took place in North America (Edmonson & Fontanez, 1995; Weinert & Boik, 1995; Leduc, 1997; Olatunde, Leduc, & Berkowitz, 2007; Waldorf, 2007; Sánchez, Ambriz, & Becerril, 2008). There were also a few isolated papers in Oceania (Humphreys, 1998), Africa (Schlesinger, 2013) and Asia (Long et al., 2009) (Table 1).

Table 1 – Rurality Index Studies

Author (year)	***Country***	***Principal Indicators***
MELO, C.; PARRÉ, J. (2007)	Brazil (Paraná)	Population density; Proportion of official rural population; Migration; Household amenities; Performance of agriculture
KAGEYAMA, A. (2004)	Brazil (São Paulo)	Population density; Proportion of official rural population; Migration; Household amenities; Performance of agriculture; Environmental conservation; Scholarity
JONARD, F.; LAMBOTTE, M.; RAMOS, F. (2009)	European Union (All Countries)	Population density; Land cover; Peripherally
LIBRECHT ET AL (2004)	European Union (Some Regions)	Population density; Land cover
VERBEEK, T.; PISMAN, A.; ALLAERT, G. (2013)	Netherlands (Flanders Region)	Open space; Local infrastructure; Accessibility guarantee; Local economy; Local heritage; Public services
PRIETO-LARA, E.; OCAÑA-RIOLA, R. (2009)	Spain	Population density; Senior citizen index; Young children index; Economic dependency index; Retirement index; Farming, livestock or fishing-related occupation; Housing habitability index; Percentage of immigrants; Percentage of self-employment; Second dwelling ratio; External noise; Pollution
CLOKE, P. J. (1977)	United Kingdom	Population density; Occupancy rate; Mobility; Distance to nearest centre
LONG, H.; ZOU, J.; LIU, Y. (2009)	China (Eastern coast)	Cultivated land; Rate of rural population; Employed population in primary industry; Employed population in primary industry; Productivity of rural labour
CLOKE, P.; EDWARDS, G.(1986)	United Kingdom	Population density; Occupancy rate; Mobility; Distance to centre
PUIA, O. (2011)	Romania (Sălaj East of Jibou)	Agriculture index; Work force of the employees in the agriculture and industry index; Population index
HARRINGTON,V.; O'DONOGHUE,D.(1998)	United Kingdom	Population density; Occupancy rate; Distance to centre; Population females; Household amenities; Population over 65; Occupational structure
WEINERT, C.; BOIK, R. (1995)	USA (Montana)	Distance to emergency care; Population density
PEREIRA, E.; PEREIRINHA, J.; PASSOS, J. (2009)	Portugal	Population level; Population density; Population homogeneity
DINIZ, F. (1996)	Portugal	Demographic; Employment; Economy; Entrepreneurship; Quality of life; Accessibility
OLATUNDE, S.; LEDUC, E.; BERKOWITZ, J. (2007)	Canada	Access to healthcare services; Professionals and structure of healthcare services
LEDUC, E.(1997)	Canada	Population to doctor ratio; Population density; Population demographics; Telecommunications
ÖĞDÜL, H. (2010)	Turkey	Agricultural production; Non-agricultural production; Employment structure; Demography; Educational level; Flows
CLOKE, P.; LITTLE, J. (1993)	United Kingdom	Population density; Occupancy rate; Mobility; Distance to nearest centre
CLOKE, P.; MILBOURNE, P. (1992)	United Kingdom	Population density; Occupancy rate; Mobility; Distance to nearest centre
EDMONSON, B.; FONTANEZ, W. (1995)	USA (48 States)	Access to traditional economic opportunity sources or power
ROMAGNOLI, A. (2002)	Italy	Social and economic dimensions; Land use

To be continued.

Table 1 – Rurality Index Studies (Conclusion)

Author (year)	***Country***	***Principal Indicators***
GLOVER, J.; TENNANT, S. (2003)	Australia	Accessibility
GÓMEZ, B.; GÓMEZ, P.; RODICIO, A. ; PRADO, B. (2004)	Spain (Comunidad Autonoma de Castilla y León)	Population size; Population composition; Work situation; Public and private services; Tourism; Students; Localization
REMOALDO, P. (2002)	Portugal	Population size; Population density
SÁNCHEZ, F.; AMBRIZ, A.; BECERRIL, I. (2008)	Mexico	Work; Performance; Localization; Dwelling
TELJEUR, C.; KELLY, A. (2008)	Ireland	Population in settlement; Land use
WALDORF, B. (2007)	USA (Indiana)	Population size; Population density
WALDORF, B.; COUNTY, M. (2007)	USA (Continental only)	Population size; Population density
BIBBY, P.;SHEPHERD, J. (2004)	England	Population size; Population statements
KRALJ, B. (2000)	Canada (Ontario)	Population density; Travel time to nearest referral centre
PASSADOR, C.; LOPES, J. (2014).	Brazil (São Paulo)	Number of students from officially rural areas
PERRETTI, B. (2002)	Italy (Provincia di Potenza)	Demographic variables; Type of economic activity
RATÓN, M.; PÉREZ, M. (2005)	Spain (Comunidad Autonoma de Galiza)	Population size; Population density; Population structure; Type of economic activity
SCHLESINGER, J. (2013)	Africa (Moshi, Tanzania and Bamenda, Cameroon)	Building density; Dislocation time
SILVA, R. (1985)	Portugal (Aldeia da Varzea)	Population size; Agricultural population
HUMPHREYS, J. (1998)	Australia	Healthcare services; Size of the community; Remoteness; Indigenous population; Environmental considerations

Source: Author's own elaboration.

The earliest study in Table 1 is Cloke (1977). Cloke (1977) classified the territory of England and Wales into four groups: extreme rural, intermediate rural, intermediate non-rural and extreme non-rural. Cloke's index quantified rural from 0 to 1, considering the demographic variables for measuring the index. The groups were created to facilitate the interpretation of the results. It should be highlighted that Cloke was the pioneer of the approaches that seek to establish ways of measuring rurality statistically (Halfacree, 1993).

Although his ranking was simple, Cloke also published other studies (1986; 1993), where geo-economic factors were considered to compute the rural concept. For example, in one of his publications (Cloke & Milbourne, 1992), rurality was faced as a social construct. "In this way 'rurality' becomes a social

construct and 'rural' becomes a world of social, moral and cultural values in which rural dwellers participate" (Cloke & Milbourne, 1992, p. 360).

In 1986 and 1992, Cloke wrote about rural lifestyle changes (Cloke & Edwards, 1986; Cloke & Milbourne, 1992). This analysis emphasized the attractive effect of the rural ideal. The people who live in the "new" rural spaces view the rural spaces as a natural countryside environment, where they can be happy, healthy and problem-free (Cloke & Milbourne, 1992, p. 370).

The top trends in the changes in the rural definition can be synthesized in the following Cloke quote.

> (i) the increased mobility of people, goods and messages have eroded the autonomy of local communities; (ii) the 'delocalization' of economic activity makes it impossible to define homogeneous economic regions; (iii) new, specialized, uses of rural spaces (as tourist sites, parks, development zones, etc.) have created new specialized networks of relationships in the areas concerned, many of which are no longer localized; (iv) the people who 'inhabit' a given rural area will include a diversity of temporary visitors as well as residents; (v) rural spaces now refer to functions 'performed by the countryside for non-rural users and characterized by the fact that they exist independently of the action of rural populations' (Cloke & Milbourne, 1992, p. 360).

These new features are not new. Rambaud (1969) noted these characteristics in the inhabitants of the French countryside. For Rambaud (1969), the vector for these changes is the increase in the number of rural hotels and the amount of rural tourism. The pluriativity induces new techniques for rural economies, like we saw in Cloke & Milbourne (1992), and leaves it to the intensification of urban-rural lifestyle exchanges.

However, the lifestyle changes are not incorporated in all British rurality indexes. Table 1 shows the variables used in Cloke's rurality index. We can see that, despite the lifestyle proxies, like household amenities, the major variables attempt to measure the demographic features. That can be understood as a limited vision about the rural space.

Following Cloke's idea, Bibby & Shepherd (2004) produced a rurality index for the United Kingdom to meet the needs of public policies. Contrary to Cloke, the authors did not rank rural areas by variables concerning lifestyle. Bibby & Shepherd had a pragmatic view about the rural space, as they measured rural using only demographic variables. They defended the term "rural" as feeding on the discussions at the cultural, sociologic and economic levels. Nevertheless, they developed an index that was only focused on the demographic density and healthcare access; making it a very restricted definition.

Weinert & Boik (1995), Leduc (1997, 2007), Humphreys (1998) and Teljeur & Kelly (2008) generated rurality indexes for the aim of healthcare public policies in the United States, Canada, Australia and Ireland, respectively. These authors had a similar view to Bibby & Shepherd (2004), as they used demographic density variables. However, these authors also included healthcare services variables, aggregating the lifestyle perspective by means of public services.

In Italy, Romagnoli (2002) defined a rurality index which considered institutional, social and economic dimensions; however, Romagnoli highlighted land use. That index opposed rurality to urbanity. Romagnoli (2002) also considered urbanization as an irreversible phenomenon. Perretti (2002) created the urbanization of society index (*indice di urbanità sociale*), which uses demographic and other economic activity variables. That index views industry activities as a proxy of urbanization.

Different to the indexes previously presented, Glover & Tennant (2003) developed an accessibility index for Australia called the Accessibility/Remoteness Index for Australia (ARIA). The ARIA doesn't aim to define rurality, but it can be used as a measure of one rural dimension.

Jonard et al. (2009) proposed an index for Europe, classifying the rural space into four categories: rural peripheral, rural accessible, urban with open space and urban with closed space. Despite the index having no commitment to the rural lifestyle, one might associate the rural peripheral (less accessibility) with the traditional lifestyle and rural accessibility with a more urban lifestyle.

In the United States, Waldorf & County (2007) offered an orthodox way to measure rural. They considered rurality as a space having a small sized population, low density and remoteness (difficulty of access to urban centres). These authors believed that rurality is a vague concept. Their study delimited the rural spaces for population dispersion. The Waldorf & County (2007) approach is considered limited by authors like Rybczynski (1996) and Abramovay (2000, 2006), as they advocate that the delimitation of rural doesn't consider the sociocultural frameworks that are essential to define rural spaces.

In Spain, Prieto-Lara & Ocaña-Riola (2009) measured rurality with a factorial analysis. They used variables related to the demographic characteristics (e.g. population density, senior citizen index, percentage of immigrants and young children index), economic characteristics (e.g. economic dependency index, retirement index and percentage of self-employment), primary activity characteristics (e.g. farming, livestock or fishing-related occupation), household condition characteristics (housing habitability index and second dwelling ratio) and tranquillity characteristics (e.g. external noise and pollution).

Gómez et al. (2004) also conducted a study relevant to Spain. They applied a rurality index in Comunidad Autônoma de Castilla y León, which considered 27 variables. These variables were clustered into groupings related to population size, the labour market, public and private institutions, distance to

metro areas and scholar access. Similarly, Gómez et al. (2004) and Prieto-Lara & Ocaña-Riola (2009) incorporated the idea of the rural lifestyle into their indexes.

Ratón & Pérez (2005) also focused on Spain, but investigated a different region to Gómez et al. (2004) and Prieto-Lara & Ocaña-Riola (2009). Ratón & Pérez (2005) focussed on the region of Galiza. They demonstrated a similarity in the countryside and city lifestyle. The paper goes further into the demographic variables utilization, as well as the management of the region. Ratón & Pérez use a factorial analysis for their methodology. They then create a rurality index composed of four factors: economic activities, population structure, cultural level and demographic factors. Ratón & Pérez (2005) combined their results to develop three rurality levels (urban, intermediary and rural), where only seven Galician municipalities were considered urban.

Puia (2011) operationalized a rurality index for Romania in the region of Sălaj. He used agricultural and demographics variables collected between the years of 1990 and 2008. Although he is a geographer, Puia (2011) took a sociologic approach to defining rural spaces. His view around rural was defined by Ianoş (2004), who defined rural as a lifestyle.

Sánchez et al. (2008) created a rurality index for Mexico, considering social and economics elements. In terms of the social factors, they used population volume, a proxy for isolation. Sánchez et al. (2008) also built a group of demographic variables in relation to living conditions and access to public services. The economic factors listed by Sánchez et al. (2008) included jobs and performance. This Mexican point of view illustrates that it is not necessary to fully understand the rural concept by only using a single theoretical approach.

The Portugal approach is considered the vanguard of rurality indexes. Silva (1985) created an index of rurality, that is founded on agronomics. Her rurality index is calculated by the ratio between agricultural population and total population, accepting rural as synonymous with agriculture.

Diniz (1996) attempted to measure rurality in the Portuguese regions of Trás-os-Montes and Douro. He selected variables like work force, per capita GDP (gross domestic product), entrepreneurship, accessibility, and quality of life. The dimension “quality of life” was composed by the number of hospital beds, number of doctors per thousand inhabitants and a purchasing power index. Sen (1999) considered these variables to be a limited vision of quality of life, because it ignores other dimensions necessary for a view of development, such as education.

In Portugal, Pereira et al. (2009) promoted an ambitious project to measure rurality. They took into account a rurality index and an accessibility-economics index. The Pereira et al. rurality index analysis considered three rural dimensions: population size, population density, and population homogeneity. These dimensions composed the magnitudes of the mode of life proposed by Wirth (1938).

Öğdül (2010) built a rurality index for Turkey. His index measured rurality through non-agricultural, money flow, property flow, production, employment, demography and education. Öğdül (2010) pointed out that the use of a multivariate analysis to define rural is a trend in the international literature, such as a view of rural as a mode of life.

In this sense, Verbeek et al. (2012) built a rurality index for Flanders in the Netherlands. This index considered several dimensions to define the rural space: open landscapes, local infrastructure, accessibility, local economic, local heritage and the provision of basic services. The authors developed a flexible definition of rural, considering the mode of life of the people.

Long et al. (2009) developed a rurality index for China's eastern cost. This index looks at the rural social representations. For Long et al. (2009, p. 458), "The social representation approach can produce a more robust and flexible way of defining rurality, through accommodating the effects of social and economic change in rural environments". Long et al.'s index can be used for measuring social representation variables, such as the rate of cultivated land, the percentage of the employed population in the primary industry, the output value of cultivated land and the productivity of rural labour.

Schlesinger (2013) developed an Urban-Rural Index (URI) for the regions of Moshi, Tanzania, Bamenda and Cameroon in Africa. The peculiarity of this index is the use of Geographic Information Systems (GIS) to measure the rural spaces. The author took an approach that was similar to the continuum for rural-urban land in the United States (United States Department of Agriculture (USDA), 2013). Using satellite images, Schlesinger verified the buildings and the dislocation time. After this step was completed, the results were joined to obtain the rural-urban index (Fig. 1).

Librecht et al. (2004), like Schlesinger (2013) and the USDA (2013), used the GIS approach in elaborating a rurality index. They applied it in three European regions: Barcelona-Madrid in Spain, Montagis-Tours in France and Flanders in Belgium. The index formula was as follows:

Rural character Index = -std(log(population density)) - std(artificial area) + std(roughness) + std(distance to centre).

The authors calculated the index considering a low population density and less artificial area as more rural, while roughness regions and region distance to close centres were considered more urban.

In Brazil, Girardi (2008), in his doctoral thesis, exposed a typology for rural and urban spaces. Girardi (2008) applied the *Organisation de coopération et de développement économiques* (OCDE) rural definition. Nevertheless, he didn't follow the OCDE's formula, due to the limitations of the data. Consequently, this led to an overestimation of the Brazilian rural population. Kageyama (2004) and Melo

& Parré (2007) also created rural development indexes for Brazil. However, their indexes didn't try to measure the rural spaces; they only focussed on measuring the development concept.

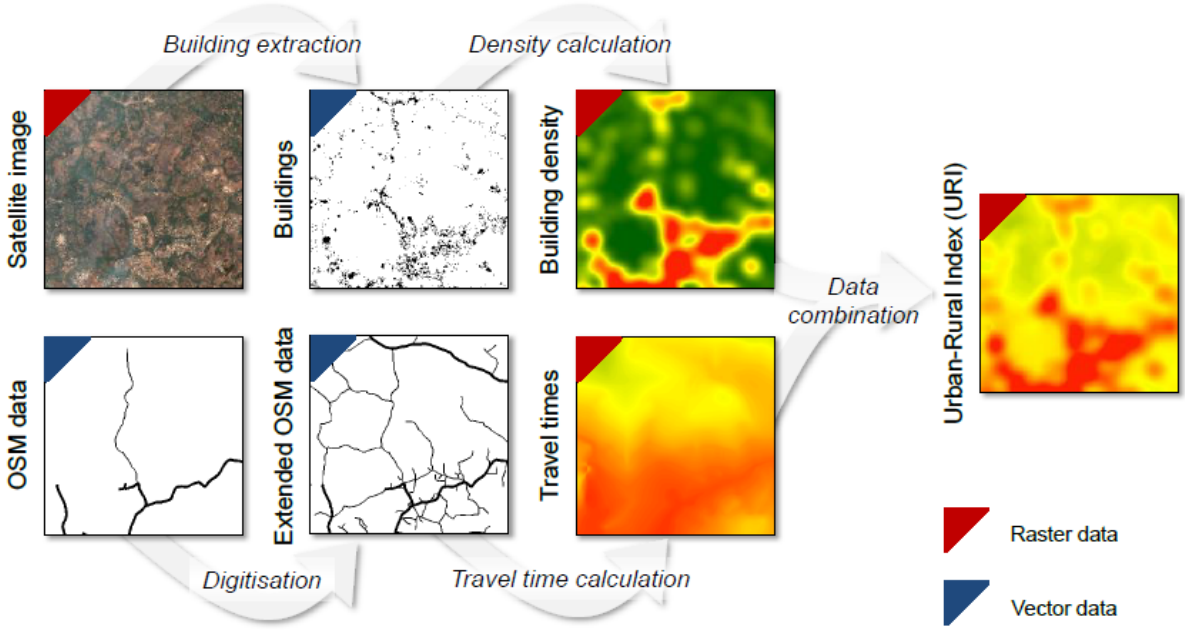

Fig. 1 – Urban-Rural Index of Schlesinger

Fonte: Schlesinger (2013, p. 69).

3. Methodology

We reviewed indexed international journals in Scopus, Thomson Reuters Web of Science, Google Scholar and "*Periódicos Capes*", published between 1977 and 2013. In total, 36 papers and theses on five continents were considered relevant to the current study. Using a network analysis, a qualitative technique, as a methodological tool, a network for rurality index studies was developed using NodeXL version 1.0.1.245 software to calculate the network groups and the density.

The methodology in this study was originally created in the 1930s by Mizruchi, an anthropologist (Mizruchi, 2006). This methodological tool can also be consolidated to other areas, such as an economy. Mark Granovetter, who was awarded the Nobel Prize in 1973, used this methodology to demonstrate the

strong or weak interactions of the inter-actors. Furthermore, this analysis has been amply used in the social and behavioural science community (Granovetter, 1973; Wasserman, 1994).

The network analysis is grounded on the premise that significant relationships among the actors exist. The inter-actor links are considered ways to transfer material or immaterial resources. The results of the network models are a graphical structure showing the relationships between the inter-actors (Wasserman, 1994).

This paper considers the papers as actors and their relationships are the quotes in the inter-papers. Fig. 2 illustrates the network result.

4. Results

The network presented in Fig. 2 has a density of 0.019 and modularity metrics of 0.375. Hence, Fig. 2 demonstrates the weak dialog of the inter-authors of the state-of-the-art rurality index. Nineteen of the articles don't cite others studies about the rurality index. Despite this, five groups were identified in the network.

In Fig. 2, the main group, presented in dark blue, has a central element that includes Cloke (1977), the predominate papers from Europe, and one paper from the United States (Weinert & Boik, 1995). The main group considers several variables to measure rural spaces. The second group, in dark green, reinforces the centrality of Cloke (1977). This dark green group is composed of articles focussed on the countries of Portugal, Turkey and China that cite Cloke's paper. The third group, in light blue, is composed of research that understands rurality as a proxy of healthcare.

The last two groups don't have any gatekeepers or any connections to the main group. The first of the isolate groups, in light green, is a formula for studies funded by the European commission. The second of the isolate groups, in red, includes Brazilian studies, which try to measure rural development.

Summarizing the results makes it possible to corroborate the centrality for the Cloke point of view, the low density of the network and a weak inter-paper dialog. The low number of citations in papers concerned with the same country is also an important characteristic to take note of. In addition, it was found that the indexes applied in the United States, despite its congruence do not have any inter-paper links.

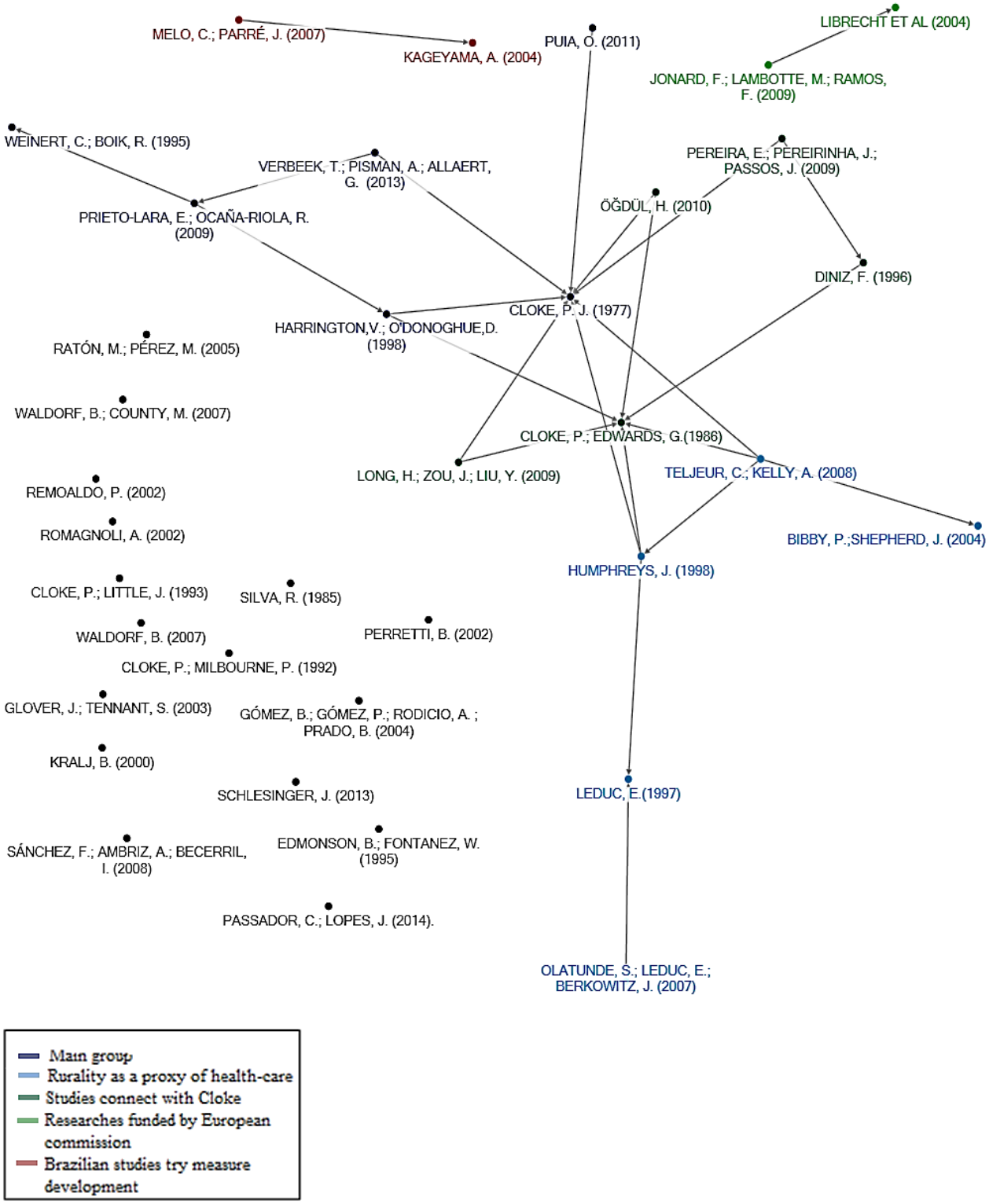

Fig. 2 – Network of rurality index papers. (Source: Author's own elaboration)

5. Conclusions notes

What is rural? To answer this question, rurality indexes show an approach with promising results. Since Cloke (1977), the literature has reflected the possibility of a multidimensional index that is not limited by an imaginary line to define the rural concept.

The studies that take on the dimension of a lifestyle appear to present more promising results. These studies consider public service access and are not limited to only considering population density. Thus, these studies have a view of rural that closely follows the trends in this line of research, as pointed out by Öğdül (2010).

However, we don't observe much dialog among the authors which have attempted to measure rurality. Contradicting the unforgettable English poet, John Donne (1839), who said "No man is an island entire of itself", a considerable number of scientists who have chosen a quantitative definition of rurality can be considered castaways using an isolated thought process.

Despite the low density of the studied network, it can be demonstrated that the centrality of the topic is in the seminal Cloke paper and has five theoretical streams, showed in network. All the streams have virtues and limitations, but a low density of dialog. These dialogs could promote the rurality index approach, making the line of research stronger. The necessity of promoting discussion reminds us of the continuity of John Donne's poem: "every man is a piece of the continent, a part of the main". However, it should be emphasized that the limits of this paper include the search for other forms of interactions in this network. In addition, the many languages and nomenclatures of the rurality indexes make it impractical to conduct a more thorough search.

We recommend that future research be conducted on assessing more related papers, such as including official agency definitions of rural. In addition, these research studies should seek out others ways of connecting the inter-papers. Thereby, these researchers will be presented with a network more closely representing the reality of state-of-the-art rurality indexes.

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