Building a Knowledge-Model about Land Restitution Policy in Colombian-case Applying a Systemic Ontological Methodology

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Abstract. This work aims at proposing a knowledge-model based in the application of a systemic methodology for ontology building about the official recognition for the victims of forced displacement in the Colombian case. In this human and social science circumstance, the official policy of restitution is the way as the Estate is re-establishing the victims' rights, particularly for land restitution problematic. We expose the relevance of a qualitative analysis based on netnography as another and useful knowledge source together with the application of a methodology for ontology construction (SMOL). In addition to the tool used for ontology building and enrichment, we have applied some common tools (NVIVO & GEPHI) for qualitative analysis incrementally during this knowledge-discovering process. Consequently, the land restitution domain representation has been reached from different knowledge sources, such as journals reviews, other previous domain-ontologies (SIDEON), some interviews for affected by displacements and the derived knowledge available on social networks (Twitter posts).

Keywords. Knowledge Modelling; Ontologies; Ontology-Learning Methodology; Social Networks; Land Restitution; Public Policies

1. Introduction

This work presents a semantic conceptualization based on ontologies about land restitution, forced displacement, and public policies which have been applied to restore the rights of the victims and the effective enjoyment of their rights in the Colombian case. Regarding to the applied methodology for the ontology building, we highlight the relevance of a qualitative analysis based on netnography. In this way, we explore the potential and trends of digital social networks (twitter posts) as an active political-e communication tool and useful source to enrich semantic conceptualizations around any similar or complex knowledge domain.

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The role of digital social networks as conditioning factors for governments and public institutions to be more transparent and to provide access to the information held by them is analysed. In the recent literature [1], this social media application is called the "Web 2.0 technology" adoption. Likewise, we build the semantic model based on ontologies from a methodological point of view in three steps or STAGES in an incremental way, based on SMOL [2]. So, from the analysis of documentary sources (STAGE 1), from the results gathered by the computing data and information analysis such as NVIVO (STAGE 2) and the network graphic analysis with GEPHI (STAGE 3), we can obtain the semantic representation of the ontology components identified in an ontology using PROTÉGÉ. Therefore, the main contributions of this work focus on threefold: 1) a deeper semantic conceptualization and greater comprehension of forced displacement, land restitution and public policies in Colombia; 2) the combination of qualitative research with knowledge management (KM) through different computing resources; and 3) the addition of diverse sources for ontology modelling for public policy on land restitution. This paper is structured as follows: in Section 2, we present the theoretical and analytical framework where technologies can help public policies about land restitution and force displacement. The methodological framework where the three stages are explained can be found in Section 3, and the resulting semantic model is presented in Section 4. Finally, conclusions are included in Section 5.

2. Theoretical and Analytical Framework

The use of digital formats can entail large implications and consequences for research, as it opens new perspectives to knowledge in different disciplines; these formats allow the development of new tools to take advantage of the resources used in the research. In this study, we used qualitative analysis, from the humanities and social sciences field, as a proper methodology to tackle the issue on forced displacement and land restitution. For this purpose, we use documentary references ethnographic exploration, as non-structured interviews, and other more netnographic resources, as current digital social networks. These resources help us to find out about the perception of individuals on this topic, highlighting some references on recent citizen participation through these channels regarding political proposals. Finally, on the intended semantics of the studied domain, we represent the ontology from models and methodologies, based on different knowledge sources, concluding with a semantic model construction.

2.1. Digital Social Networks to Dynamize the Public Policies

The addition of digital social networks in the public sector is associated to the increasing use of different tools of the 2.0 web, which sustain them, as: Facebook, Twitter, YouTube, blogs, etc., increasingly being adopted by the different governments and public administrations [3]. These channels partly break the lethargy and lack of interest of the people towards politics, as they use them daily as a neutral participation space. These elements allow democracy to settle, conceiving the citizen not just as a mere observer, but as another actor of the political game, and seeing the public administration as an open entity, being the new technologies useful for social transformation [4]. Regarding knowledge sources, the digital social networks are considered as the new socialization tool thanks to the interaction allowed using the web 2.0. From them, it is possible to obtain additional information and knowledge sources of individuals. In fact,

the interaction of messages among individuals and Institutes allows the contextualization of social phenomena among those studied subjects and the possible inherent relationships which may have arisen. The analysis of these post can be used to interpret the social behaviour of the involved parties [5]. In fact, in recent years, the Internet has become a very important tool for researcher from the Humanities and Social Science field [6].

2.2. Land Restitution and Applied Public Policies: the Case Study

The public policy for the victims of the armed conflict in Colombia is then aimed at restoring the rights of the affected individuals and communities, as related to the effective enjoyment of their rights from a comprehensive sustainability perspective not only limited to the restitution of their lands. This includes their right to return or the relocation of a displaced person due to the internal armed conflict (FARC guerrilla group) given by the possibility of returning to their usual residence areas or to relocate in a new area, under conditions of free decision, security and dignity.

2.3. Semantics and Ontologies on Forced Displacement

Semantics studies the meaning of the words within a conceptual concept or specific domain (topic). In specialized knowledge areas, some structures to help model such knowledge become essential. Among them, we have tools such as thesauruses, taxonomies, and ontologies [7]. Thesauruses and ontologies create a series of semantic relationships among the theories and the concepts, allowing a formal representation and connexions among them, enabling the consensus thoughtful the knowledge domain [8].

As regards this semantic modelling work, we use the model *Ontology Learning Knowledge Support System (OLeKSS)* as a reference for building the domain ontology since it allows the use of different knowledge sources to build the ontology [9]. Particularly, the KSS-communication model´s component has been tested with this case.

Due to the relevance of the displacement and restitution issue in social, political, economic, and humanitarian terms, several organizations and institutions, have developed a series of researches on *forced displacement* in Colombia. As an alternative to this problem of scattered information and to the conceptual and terminological polysemy, some researchers have developed an information system named SISDEON to build an Ontology about forced displacement in Colombia [10]. From this study and using other complementary sources, the researchers of this work have also implemented a quantitative analysis of the forced displacement problem but aiming at assessing the public policies efficiency applied to land restitution to remediate the victims' rights [11].

3. Methodological Framework

The semantic development process (3 stages) requires a systemic methodological approach supported by some important ICT software tools integrated in the SMOL methodology [2], useful to organize knowledge to obtain our IEER-Ontology.

*STAGE 1: First Version of the Semantic Analysis***.** We have obtained a first basic model of the ontology (land restitution policies) from textual sources and the reference model on forced displacement suggested in SIDEON [10]. In fact, the first semantic version

was conceived from the policies taken by the Colombian government regarding the problem of forced displacement to contribute to a better understanding of the issue, to thoroughly analyse the governmental and state response and finally, to validate the victims' perception about benefices of the land restitution process due to violence [11].

STAGE 2: Application of the Qualitative Approach to this Case. The ethno- and netnographic information (survey, twitter, and websites) is processed by means of NVIVO tool. Among the diverse sources, the following have been used: a) up to 94 documents from academic sources; b) 28 non-structured interviews to displaced victims; c) 2.524 Twitter references on land restitution policies; and d) 40 social media elements on information related to the studied topic, found online from news, blogs, and YouTube videos. Regarding to non-structured interviews, the perceptions of the victims on the reasons and consequences of forced displacement from their own perspective are taken. Concerning the social media, it allows to build a NVIVO conceptualization in Figure 1.

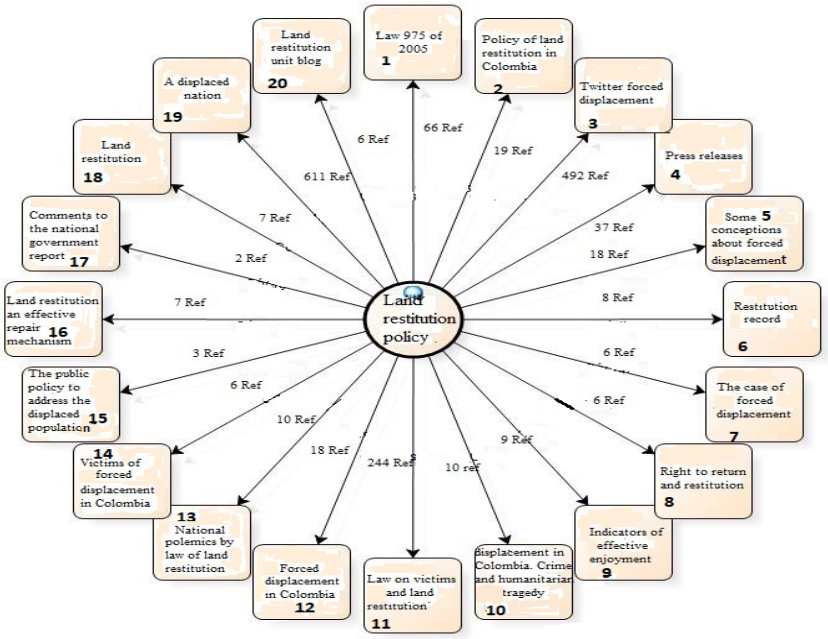

Figure 1. NVIVO main resources

From the 20 identified nodes in Figure 1, are conceptual elements that belong to main classes in our final IEER-ontology (1, 2, 6, 8, 9, 11, 13, 15, and 16); due to they are related to the Land restitution policy. The other ones are most related to the cited SIDEON ontology [10]. The conceptualisation of the main terms from the NVIVO resource can been summarized as follows: a) Forced displacement (fitting on SIDEON) from 4,835 references; b) Land restitution from 99,009 references; c) Public policies for land restitution: from 140,717 references; and d) Indicators of Effective Enjoyment of Rights (IEER) from 109,817 references.

STAGE 3: Application of the Social Network Approach. We have modelled graphically the relationships among the different concepts (Twitter sources) using relationship

graphs offered by the GEPHI tool. Essentially, it makes use of social networks and allows us to find the coherence and correspondence among participant groups in the networks as clusters or nodes with a high clustering or isolation index. The elements identified in the (7) nodes from the different sources lead to a better conceptualization of public policies for land restitution. The Figure 2 shows the message exchange results where the most relevant nodes belongs to the associated official and/or public institutions.

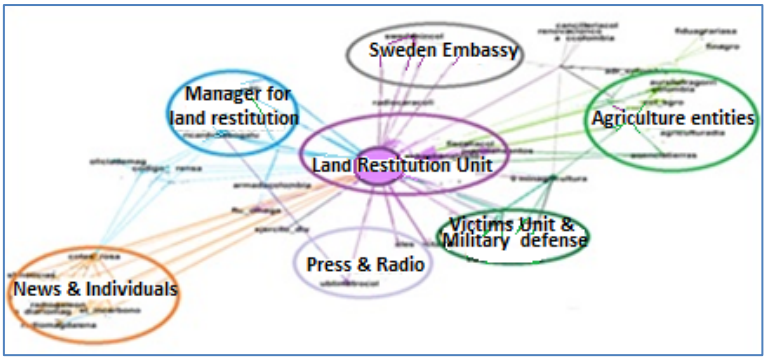

Figure 2. Graph analysis with GEPHI of specific Community Social Network

4. Results: an Integrated Semantic Model

Finally, Figure 3 shows a semantic picture of the developed IEER-Ontology. The area surrounded in green highlights Forced displacements (in SIDEON) and the red one highlights the Social networks results. The group of concepts involved in each stage of the SMOL application in this study are: STAGE 1: Forced displacement from articles and SIDEON ontology (Classes: 12 & relations: 15). STAGE 2: Land restitution policies from articles, twitter, and surveys (Classes: 19, relationships: 22, & instances: 12). STAGE 3: Social networks from twitter (Classes: 25, relationships: 27, & instances: 5).

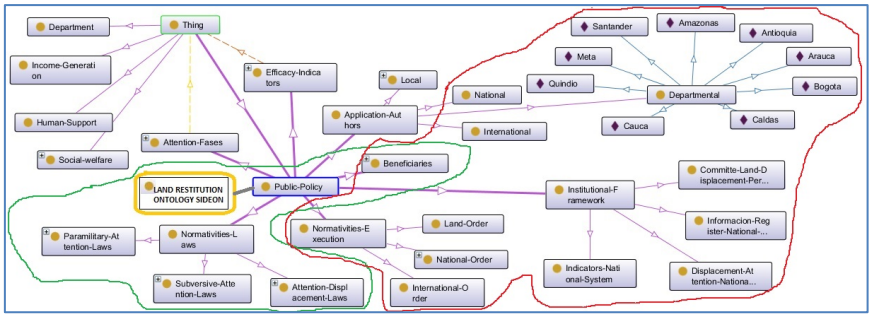

Figure 3. The IEER-ontology restitution domain representation in Protégé

5. Conclusions

By means of the use of several resources and/or data sources for the development of this exploratory research, we have proved the relevance of triangulations for formal sources (scientific & official documents), interviews, web pages and social network information for the holistic conceptualization of the studied topic through an ontological approach. Under this methodological scheme (SMOL), it is proven that social networks via micro-blogging offer an immensely rich scenario, accurate and in real time on the perceptions of the participating individuals regarding land restitution public policies for the victims of forced displacement in Colombia. The use of these techniques allows us to graphically represent a community, a profile, a group, and their relationships, enabling the application of comparative and longitudinal analyses to check whether the change in the strategy is useful in the community of if they still relate to another one in the same way. The social network data were taken complementarily to verify the perception and agreement of the individuals commenting about restitution policies. Operationally, we have structured a domain ontology increasingly starting with the forced displacement review, next the whole restitution policy and later, through the Social network analysis.

Finally, it was thus proven that from the different resources used in the research, a base model (ontology) can be obtained for the development of a Knowledge Support System, which would represent the land restitution problem in Colombia; within an enriched comprehension of the topic that can helps the official policy application, including the eventual portability to other countries with similar migration or displacement difficulties.

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