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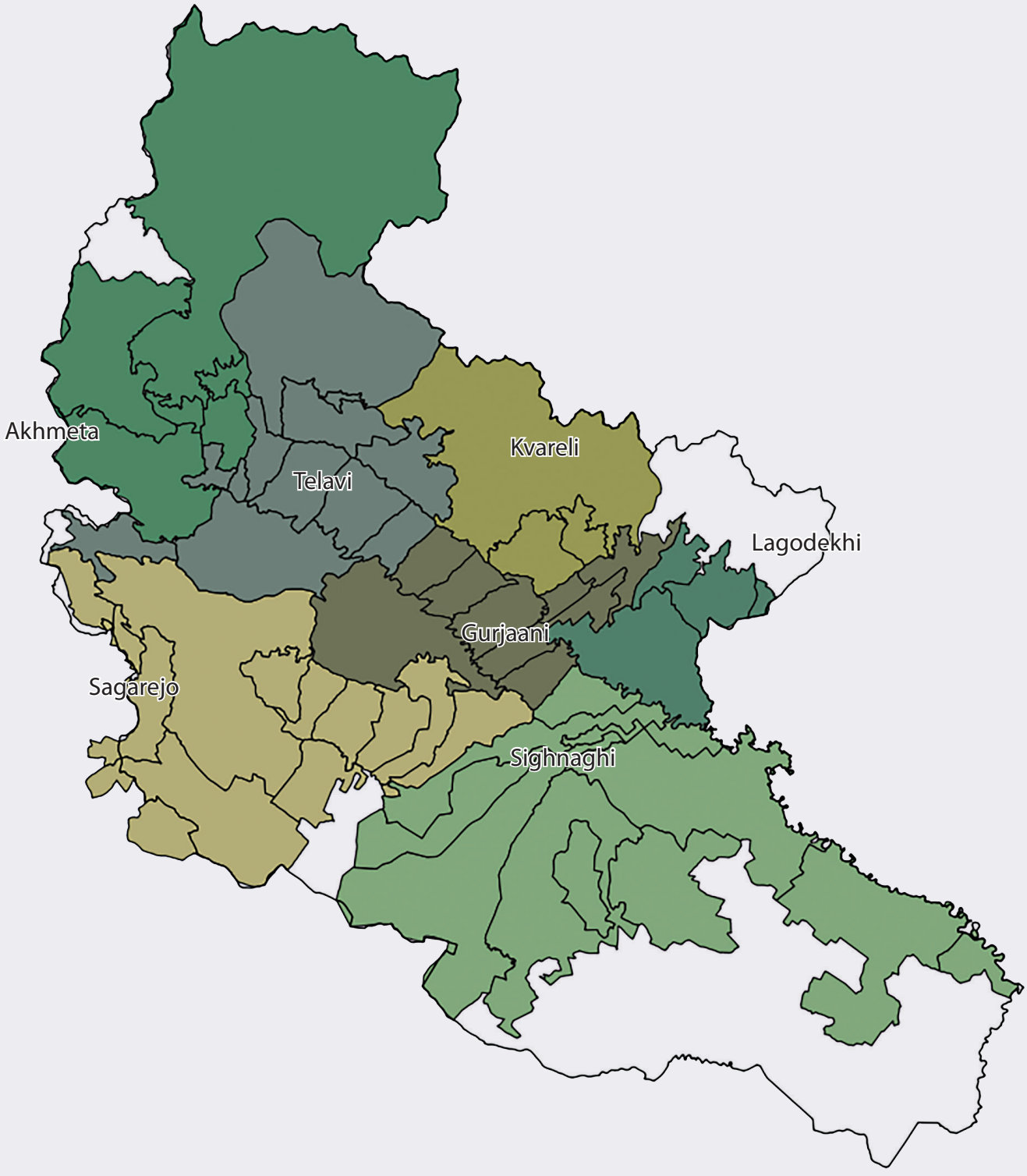
Research

IDENTIFICATION OF FUNCTIONAL REGIONS AND THEIR COMPETITIVE ADVANTAGES IN KAKHETI, GEORGIA



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IDENTIFICATION OF FUNCTIONAL REGIONS AND THEIR COMPETITIVE ADVANTAGES IN KAKHETI
GEORGIA

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CONTENTS

ABBREVIATIONS

BSU – Basic Spatial Unit

FR – Functional Region

FST – Fuzzy Set Theory

GeoStat – National Statistics Office of Georgia

1. ABSTRACT

The present research report aims to identify functional regions in Kakheti, Georgia and analyze the most competitive subsectors in each of the regions. As such, the report is composed of two main components: identification of functional regions and identification and analysis of competitive subsectors. The study of functional regions relies on the data obtained from a mobile company to analyze interactions between Basic Spatial Units of Kakheti. Three methods are used for the delineation of FRs – Chains, CURDS and Intramax methods. The results of three approaches are evaluated using Fuzzy Set Theory approach and validated in a workshop with field experts. Based on FST evaluation and validation workshop outcomes, results of the CURDS method - 7 functional regions are chosen as the final product of the research project. In the identification of competitive sectors and subsectors, the research relies on Location Quotient and Shift Share methodologies. The most competitive subsectors identified within each of the functional regions are analyzed through in-depth interviews with companies, experts in the field and a government official. In six of the functional regions of Kakheti, wine production surfaced as the most competitive subsector while in the seventh functional region the most competitive economic activity was egg production. Based on the analysis of interviews, the research report discusses the main challenges and opportunities present in these subsectors and offers relevant recommendations to policymakers.

2. INTRODUCTION

The concept of a region has traditionally been one of the cornerstones in the disciplines connected to space. A region is a delimitated spatial system and an expression of organisational unity that differentiates it from another region (Abler et al., 1972; Gregory et al., 2009; Klapka et al., 2013; Philbrick, 1957).

A functional region (FR) is a region organized by horizontal relations in a space in the form of spatial flows or interactions between parts of the region (Ullman, 1980), also called basic spatial units (BSUs). FR can be understood as a generalized pattern of spatial interactions. It can be defined by many different spatial interactions, including population flows (commuting to school or work, migration, shopping or recreation), traffic and goods flows (traffic and passenger flows by land/sea/air), commodity and financial flows, information flows (communications and newspaper circulation), gas/water/electricity flows (service connections), and so forth (Vanhove and Klaassen, 1987). In most of the literature, however, FRs are defined by economic interactions. For example, Farmer and Fotheringham (2011) and Van der Laan and Schalke (2001) define a FR as a spatially contiguous region in which aggregate supply and demand meet, and Karlsson and Olsson (2006) define a FR as a territorial area characterised by a high frequency of intra-regional economic interactions (such as intra-regional trade in goods and services, labour commuting, and household shopping). Among different economic interactions, the daily interactions in the labour market are considered a good relative measure for the cohesion of a functional region (Ball, 1980; Cörvers et al., 2009; OECD, 2002). In this context, the basic characteristic of a FR is the integrated labour market, in which intra-regional labour commuting, intra-regional job search, and search for labour demand are much more intensive than among the inter-regional counterparts (Karlsson and Olsson, 2006; Van der Laan and Schalke, 2001). Consequently, self-containment is the crucial characteristic of a functional region (Smart, 1974; Halás et al., 2015).

Several procedures for the delimitation of FRs have been suggested (e.g. Coombes et al., 1986; Farmer and Fotheringham, 2011; Kim et al., 2015; Masser and Brown; 1975; Slater, 1981, etc.). Farmer and Fotheringham (2011) identified three general classes of functional regionalisation procedures: hierarchical aggregation, multistage aggregation, and central place aggregation. Regardless of the approach, the aim of regionalisation procedures is to define as many functional regions as possible, subject to certain statistical constraints that ensure that the regions remain statistically and operationally valid (Casado-Diaz and Coombes, 2011).

Following the example of many European countries, the importance of functional regions in the planning and implementation of socioeconomic policies is starting to be recognised in Georgia as well. This research report is the result of this growing recognition of and attention towards the topic of functional regions.

The research project described in this report is composed of two main parts – (1) identification of functional regions in Kakheti and (2) analysis of leading economic sectors and subsectors within the identified FRs. In the first section, the research aims to identify functional regions in Kakheti. The second component of the research is focused on the economic analysis of subsectors that are shown to be the most competitive within each functional region. The research aims to study competitive advantages and the most pressing challenges of each subsector in the functional regions in order to develop relevant recommendations and enable further growth of the subsector in the functional region. Recommendations will be developed targeting the local as well as central government in order to develop needed support mechanisms and stimuli to bolster the expansion of the subsector under question.

The remainder of this report is structured as follows: the following chapter discusses the methodological framework used in both components of the research: identification of functional regions and the analysis of economic subsectors, as well as the data collection process and key characteristics of research respondents. The fourth chapter presents the results of the research in both components. Within the first component, the study of functional regions within Kakheti is presented in the following order: identification of functional regions using three methods, evaluation of the results of each method using Fuzzy Set Theory approach, discussion of results, and the outcomes of the validation workshop. Following this, the second component of the research is presented: identification of competitive sectors and subsectors in the FRs of Kakheti, situational analysis of identified subsectors, and the analysis of the competitive advantages of each subsector based on interviews with companies and field experts. This is followed by a chapter discussing recommendations developed on the basis of key conclusions of sectoral analysis.

3. METHODOLOGY

Given the multidimensionality of the research project, an interdisciplinary methodological framework was constructed, drawing from the approaches of spatial analysis and economic research. In the paragraphs below, the methodological aspects of these two components of the research are explained separately.

3.1 METHODS USED FOR THE DELINEATION OF FUNCTIONAL REGIONS

To ensure the robustness of the research findings, the study design included a combination of three methods for the identification of functional regions. FRs in Kakheti were modelled using the following three methods: (a) Chains method, (b) CURDS method and (c) Intramax method. In the subchapters below, each of the abovementioned methods is explained in greater detail using mathematical notations.

3.1.1 Chains Method

As the first method of delineation of FRs, the research team used Chains approach, which relies on drawing FR borders around predefined urban centres. The approach was introduced and applied by Karlsson and Olsson (2006) and later improved by Konjar et al. (2010) and Drobne et al. (2010). The first step in this approach is the identification of centres of prospective FRs. Normally, the centres are defined as the most important employment centres in the analysed territory that are strongly self-sufficient. A municipality is strongly self-sufficient if most of its active population also work in that same municipality; usually, this percentage is set at 66.67% or more (Karlsson and Olsson, 2006; Drobne et al., 2010; Konjar et al., 2010). In the second step, chains of nodes are created, adding on municipalities to self-sufficient municipalities, i.e. predefined centres of FRs, until the condition defined in Equation (1) is satisfied. This condition defines the border of FR_i, which is the break line, where the attraction is equal to both of the closest self-sufficient municipalities:

$$FR_i = \{x : w_i(x) \geq w_j(x)\}, \qquad (1)$$

where i and j denote two FRs' centres that are connected by a line, and stands for an intermediate point between the endpoints i and j. At a location x, the commuting frequency to the centre i is $w_i(x)$. The chains are formed for three types of municipalities (nodes): (a) the municipalities that are directly connected with their maximum flow to the centre are automatically placed to that centre; (b) municipalities that are not directly connected with their maximum flow to the centre but are connected with their maximum flow to a non-self-sufficient municipality, which is then connected to a predefined centre (chains are determined iteratively); and (c) the pairs of municipalities, which present to each other the destination of their maximum flows, are connected to the region in which the direction of the second maximum flow is oriented. As suggested by Karlsson and Olsson (2006), the chain was allowed to have three links. If more links existed, the link was broken at the weakest point. Moreover, we tested the approach by allowing two, three, four and five links, but there were no significant differences in the results.

Chains method was used in several studies; e.g. Karlsson and Olsson (2006) applied the method for Sweden, and Konjar et al. (2010), Drobne et al. (2010), Drobne (2019) for Slovenia.

The chains were calculated automatically, using software based on Java platform (Konjar et al., 2010). Chains method was the only method that allowed the modelling of FRs around predefined centres.

3.1.2 CURDS Method

The next approach used to delimitate functional regions in the Kakheti region was the so-called CURDS method, which was developed at the Centre for Urban and Regional Development Studies, University of Newcastle by Coombes et al. (1986). Over the years the method has been updated several times. In the study performed, the third version of the updated methodology was tested, described in Coombes and Bond (2008). The method, which was developed primarily to model local labour markets, is included and programmed in the R LabourMarketAreas package. The version 3.0 of the package was used (LMA, 2017) in R software (R Core Team, 2016).

In the CURDS method, the leading principle is to maximize the internal mobility of commuters in each area (intra-FR flows) and minimize flows of commuters crossing area borders (flows across FR borders). These two principles are used to determine the self-containment level of the delimitated FR. Self- containment is observed based on two criteria: (a) as containment in supply (supply-side self-containment value - SSSC) and (b) as containment in demand (demand-side self-containment value - DSSC).

Both SSSC and DSSC can be calculated based on data about the size of the population under consideration living and working in different basic spatial units (BSUs). f_{hk} represent the flow of commuters from (group) BSU h to (group) BSU k.

$SSSC = \frac{RW_i}{R_i}$ self- containment on the supply side, (2)

$DSSC = \frac{RW_i}{W_i}$ self- containment on the demand side, (3)

where

$R_i = \sum_k f_{ik}$ is the number of workers living in / number of the working population in, (4)

$W_i = \sum_h f_{hi}$ is the number of workers working in / the number of working places in, (5)

$RW_i = f_{ii}$ number of workers living and working in. (6)

The supply-side self-containment value (SSSC) can be used to measure the range of employment opportunities for the local active population. A high SSSC rate indicates a relatively closed FR (a large proportion of workers who live in the FR find employment in the same FR). Conversely, a low SSSC rate indicates a relatively open FR (a large proportion of locals work in other FRs). On the other side the demand-side self-containment value (DSSC) can be used to measure the range of possibilities for FR employees to find suitable living options in the FR. A high DSSC rate indicates that a large proportion of workers employed in the FR also found housing and live in the same FR. But at the same time a high DSSC rate can also be an indicator of jobs shortage in the FR (Drobne, 2016).

In addition to the two self-sufficiency criteria, an important criterion to be considered for the evaluation and delimitation of FR is also the number of active, employed persons, i.e. the population under consideration in the FR.

Before performing the iterative procedure of the CURDS method, the four parameters by which the FRs are modelled need to be defined based on the criteria previously described. These are: the minimum number of working population in FR *(minWP)*, target number of working population in FR *(tarWP)*, minimum self-containment value in FR *(minSC)* and target self- containment value in FR *(tarSC)*. For the last two parameters, the smaller of the two considered self-containment values (SSSC and DSSC) is used:

$SC = min(SSSC, DSSC)$ (7)

The user of the CURDS method has to define cut-off levels for each parameter. In this way a unique validity rule or condition is set for the area analysed.

The process starts by considering each BSU as a potential FR that is checked against the four previously defined parameters *(minWP, tarWP, minSC and tarSC)* which define the criterion function f_V.

$$f_V(WP,SC)=\left(1-\left(1-\frac{minSC}{tarSC}\right)max\left(\frac{tarWP-WP}{tarWP-minWP},0\right)\right)\frac{min(SC,tarSC)}{tarSC} \quad (8)$$

where WP is the number of working population in FR.

The group of aggregated BSUs forms a FR when the validity condition for the FR is met:

$$f_v(WP,SC) \geq \frac{minSC}{tarSC} \quad (9)$$

The CURDS algorithm integrates BSUs into FRs step by step. BSUs are grouped according to the strongest link , defined by the flows (number) of commuters between them. After each aggregation, the validity condition for the FR is checked.

$$L_{hk}=\frac{f^2_{hk}}{R_hW_k}+\frac{f^2_{kh}}{R_kW_h} \quad (10)$$

where f_{hk} is the size of the working population living in the (group) BSU h and working in the (group) BSU k and f_{kh} is the size of the working population living in the (group) BSU k and working in the (group) BSU h. R_h is the size of the working population in the (group) BSU h and W_k is the number of workplaces in the (group) BSU k.

The third version of the CURDS method and the aggregation algorithm implemented using R software in the LabourMarketAreas 3.0 package are described in detail by Franconi et al. (2016a, 2016b). One of the advantages of the CURDS method is that it allows the division of newly formed groups of BSUs if the group does not meet the requirement for FR validity anymore. As such, BSUs that are split off from an analysed group of BSUs form a group of unallocated BSUs, which can later re-enter the delimitation procedure and form a FR with another group of BSUs.

The final delimitation of the FR using the CURDS method is therefore contingent on the four parameters *(minWP, tarWP, minSC and tarSC)*, which depend primarily on the size of the area analysed and the size of the labour market. The recommended cut-off levels of the four parameters in the literature (Coombes and Bond, 2008; Franconi et al. 2016a, 2016b) are: the target value of the self- containment parameter should be between 0.75 and 0.80 ($0,75 \leq tarSC \leq 0,80$), the minimum value of the self- containment parameter should be between 0.60 and 0.70 ($0,60 \leq minSC \leq 0,70$), while the target ($tarWP$) and minimum size of the of working population ($minWP$) in the FR depend on the characteristics of the BSUs (e.g. population density), on the existing labour mobility, flows of commuters and other characteristics of the territory or country that we divide into FR. Defining the appropriate cut-off value for the last two parameters has significant impact on the number and size of the delaminated FR. Franconi et al. (2016a) recommend that the target size of the working population in FR ($tarWP$) should be greater or at least 10,000.

The CURDS method has been used several times in different countries; e.g. Watts (2009, 2013) for Australia, Erlebach et al. (2016) and Halás et al. (2015, 2018) for Czech Republic, Franconi et al. (2016a) for Italy, Drobne (2019) for Slovenia, Casado-Diaz (2000) for Spain, Landré and Håkansson (2013) for Sweden, Coombes et al. (1986), Coombes and Bond (2008), Coombes ET AL. (2012) for United Kingdom, etc.

3.1.3 Intramax Method

The third method that was used in modelling FRs of Kakheti was the Intramax method (Masser and Brown, 1975; Masser and Scheurwater, 1978). It is a heuristic procedure and does not guarantee a global optimal solution to the partitioning problem where maximum interaction flows would stay in the regions and less would cross regions' borders (Masser and Scheurwater, 1980). However, the procedure seeks to maximise intra-group shares of total interactions, which take place within the aggregations of BSUs that form the diagonal elements of the matrix (Masser and Brown, 1975). The procedure monotonically raises the internal flows of the consolidated areas by aggregating small BSUs/FRs with relatively high interconnections first.

There has also been some criticism of the Intramax procedure as a pure statistical procedure that does not allow fine-tuning of regions (e.g. Coombes et al., 1986; Watts, 2013). However, Intramax's relative simplicity and its implementation in Flowmap software (de Jong and Van der Vaart, 2013) are the reasons that it has been used – even recently – for several different purposes (Drobne and Lakner, 2016): for labour market area delineation (e.g. Feldman et al., 2005; Koo, 2012; Watts, 2013; Landré and Håkansson, 2013), for housing market area delineation (Goetgeluk and de Jong, 2007; Brown and Hincks, 2008; Jaegal, 2013), for world trade block delineation (Poon, 1997; Kohl and Brouver, 2014), for functional economic region delineation (Mitchell et al., 2007, 2013; Mitchell and Stimson, 2010; Mitchell and Watts, 2010), to identify possible administrative or statistical regions (Nel et al., 2008; Drobne and Bogataj, 2012a,b) or transport regions (Krygsman et al., 2009), in allocation analysis of services (Drobne and Bogataj, 2014, 2015), and so forth.

The Intramax procedure is a stepwise analysis. In each step of the aggregation two BSUs/FRs, whose interaction gives the highest value of the objective function, are grouped together, and the interaction between them becomes the internal (or intrazonal) interaction for the resulting FR. This new region now takes the place of the two parent BSUs/FRs in the next step of the analysis. Thus, with N^N basic data units, all BSUs are grouped together into one FR after $N\text{-}1^{N\text{-}1}$ steps, and all interactions become intrazonal (Masser and Brown, 1975; Brown and Pitfield, 1990). The procedure, as well as the results of the hierarchical aggregation, can be presented in a tree structure of a dendrogram.

The original objective function in the Intramax procedure, as suggested by Masser and Brown (1975), improved by Hirst (1977) and Masser and Brown (1977), and simplified by Brown and Pitfield (1990), is:

$$\max_{i \neq j} \left(\frac{t_{ij}}{t^*_{ij}} + \frac{t_{ji}}{t^*_{ji}} \right) \qquad (11)$$

where t_{ij} t_{ij} is the observed value of the cell entry in the i^i th row and the j^j th column in interaction matrix $T=[t_{ij}]$, $T=[t_{ij}]$ and t^*_{ij} t^*_{ij} and t^*_{ij} t^*_{ij} are the expected values that are calculated as a product of sums of the i^i th row and the j^j th column:

$$t^*_{ij} = \left(\sum_j t_{ij} \right) \left(\sum_i t_{ij} \right) \qquad (12)$$

It should be noted that: (a) standardization of entries of the interaction matrix is not necessary, (b) the procedure maximizes the intra-regional (inner) share of total flows at each stage of the grouping process, and (c) the intra-regional (inner) flows, i.e. the values on the main sub-diagonal matrices of the partitioned matrix, should be taken into account in the row and column totals at each step of the aggregation procedure.

Masser and Brown (1975, 1977) applied the contiguity constraint, so only adjacent BSUs were considered for possible aggregation. In this study, we didn't apply the contiguity constraint.

3.1.4 Evaluation of functional regions by the fuzzy set theory approach

After FRs were identified using all three procedures, the quality of all regionalization procedures were compared applying Fuzzy Set Theory (FST), as suggested by Feng (2009) and Watts (2009, 2013). FST extends crisp set theory so that an element (BSU, in this study) can partially belong to a group (FR, in this study). Therefore, it can simultaneously belong to more than one group. By using the FST approach, we can identify potential misallocations of BSUs across FRs by the measurement of a membership function, so that each BSU can be partially assigned to a series of fuzzy FRs. A membership function for BSU i with respect to fuzzy residential FR m is defined as

$$M'_{im}=\sum_{j\in(g)m} w_{ji}/w_{\cdot i} \qquad (13)$$

where BSU i belongs to FR m on the basis of a regionalization method. On the other hand, the membership function with respect to fuzzy local employment FR m is defined as:

$$M''_{im}=\sum_{(j\in(g)m)} w_{ij}/w_{i} \qquad (14)$$

The membership function with respect to a fuzzy FR, m , M_{im}, was calculated as the average of M'_{im} and M''_{im}:

$$M_{im}=((M'_{im}+M''_{im}))/2 \qquad (15)$$

To compare the quality of each regionalization, we calculated average membership values for each FR, and for the whole system of FRs of the Kakheti region.

3.2 IDENTIFICATION AND ANALYSIS OF COMPETITIVE ECONOMIC SECTORS

To identify leading (concentrated and competitive) economic sectors and sub-sectors[1] in each identified functional region of Kakheti, the Smart Specialization[2] approach was applied. The approach was elaborated by the European Union and is widely used to analyze regional competitiveness. Identification of leading economic sectors and sub-sectors is based on three components:

- Economic potential
- Innovative potential
- Scientific potential

As data for innovative and scientific potential does not exist in Georgia, the analysis was done based on economic potential. This consists of:

- Specialization, growth dynamics and relative importance of industrial subsectors based on:
  - Employment
  - Value added/Turnover
  - Number of companies
- International competitiveness
  - Main product groups in exports
  - Revealed comparative advantage in export

[1] Sector-Section, Sub-sector – sub-class according to Nace rev 2,

[2] http://publications.jrc.ec.europa.eu/repository/bitstream/JRC111430/2018-04-24_western-balkans-report_online.pdf

As data of export by product groups and regions is not available in Georgia, the analysis was done based on the first component of economic potential: specialization.

The data about employment, value added, and number of enterprises were analyzed to identify the leading economic sectors in Kakheti. At the first stage, leading economic sectors for the Kakheti region were identified based on regional analysis methods and then, based on the number and size of companies operating in each of these selected sectors, leading economic sub-sectors were identified for each functional region of Kakheti.

3.2.1 Identification of leading economic sectors in Kakheti

To identify leading economic sectors (the concentrated and the competitive economic sectors)[3] for the Kakheti region, regional analysis methods, such as location quotient (LQ)[4] and shift-share analysis[5], were used (See Annex 1). LQ analysis reveals the basic economic sectors of the Kakheti region and indicates how concentrated an economic sector is in a region compared to the whole country. Shift-share analysis enables the identification of the competitive sectors for Kakheti region by identifying the factors affecting the changes in the number of people employed and value added by certain economic sectors.

After applying LQ and shift-share analysis and identifying competitive and concentrated sectors in Kakheti region leading economic sectors for Kakheti were chosen based on the following principle: the sector had to be both, concentrated and competitive, for Kakheti, so it had to be identified in both, LQ and Shift-share, analysis.

3.2.2 Identification of leading economic sub-sectors in the FRs of Kakheti

Having selected leading economic sectors for Kakheti, sub-sectors in each identified sector were analyzed and sub-sectors with the highest concentration rate in each FR were identified. For this, active enterprises in the chosen leading economic sectors in Kakheti were identified and data about the quantity and size[6] of active enterprises[7] in each sub-sector was mapped on the shapefile of FRs of Kakheti in GIS.

In each functional region the minimum number of persons employed by each economic sub-sector was calculated by multiplying the number of small, medium and large enterprises by their corresponding lower limits of employed persons and then by summing up the results. The number of large enterprises in each sub-sector was multiplied by 100, medium-sized enterprises by 20, small enterprises by 1 and then the results were summed up. After finding the minimum number of persons employed in each sub-sector, the sub-sectors with the highest number of persons employed were defined as the most competitive for each functional region.

3.2.3 Analysis of leading economic sub-sectors in Kakheti

After identifying the leading sub-sectors for each functional region in Kakheti, in-depth interviews were conducted with representatives of private enterprises operating in the subsectors as well as experts and an official of a related government agency.

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3 Section- according to classification of economic activities NACE rev 1.1

4 Kirankabes, Cem; Arik, Murat. The Journal of Applied Business and Economics; Vol. 16, Iss. 3, (Jun 2014): 135-151.

5 Curtis, W. (1972). Shift-Share Analysis as a Technique in Rural Development Research. American Journal of Agricultural Economics, 54(2), 267-270. Retrieved from http://www.jstor.org/stable/1238712; Green, R., & Allaway, A. (1985). Identification of Export Opportunities: A Shift-Share Approach. Journal of Marketing,49 (1), 83-88. doi:10.2307/1251178.

6 Size determined based on the old methodology of the National Statistics Office of Georgia: a large enterprise has an average annual number of employees of more than 100, or an average annual turnover of GEL 1.5 million; a medium enterprise has an average annual number of employees of 20-100, and an average annual turnover of between GEL 0.5 million and GEL 1.5 million; a small enterprise has an average annual number of employees of no more than 20, and an average annual turnover of no more than GEL 0.5 million.

7 http://geostat.ge/index.php?action=page&p_id=2657&lang=eng

To conduct in-depth interviews for each chosen sub-sector, an interview guide was prepared. The guide included questions on production and delivery of services in identified sub-sectors, local and global markets, major export countries, pricing, future potential of the sub-sector, existing challenges and suggested solutions.

3.3 DATA COLLECTION

In line with the developed methodological framework, the research team collected data for analysis by relying on a combination of data gathering methods. At the first stage of the research, mobile data was collected for the identification of functional regions, while at the second stage key informant interviews were conducted with entrepreneurs as well as field experts and an official from a relevant government agency for in-depth analysis of leading subsectors within functional regions. The subchapters below discuss the data collection process at greater length.

3.3.1 Delineation of functional regions in Kakheti

At the launch of the research project, a survey and comparative analysis was conducted to assess the value, usability and availability of different sources of data (census, google traffic, public polls, mobile networks). Following the analysis and consultations with experts, it was determined that none of the publicly available data could justifiably be used for the analysis of interactions between the settlements of Kakheti. Consequently, mobile network data was identified as the most reliable and comprehensive source of information for delineation of functional regions in Kakheti. The decision to use mobile data was followed by negotiations with various mobile companies as well as legal experts on the issues of communication. Given the novelty of mobile data usage for the purposes of research in Georgia, the choice of a mobile company fit for the purpose was limited. Ultimately, agreement was reached with the company Beeline and according to the formed agreement, the company provided aggregated (anonymous) data on the location of Kakheti residents during daytime and night-time hours. Based on this data, movements of people were analysed to establish connections between the places where people live (spend nighttime hours) and work/study/obtain services (spend daytime hours). After a careful revision of data privacy standards, the research team came to an agreement with the company that satisfied the data requirements of the research project and was in full compliance with the company regulations and the laws of Georgia.

Beeline provided said data using information collected from telephone towers located in Kakheti. That is, linkages were formed between the coverage areas of different telephone towers. It is to be noted that due to Beeline's internal restrictions as well the regulations of the Georgian National Communications Commission, the research team was not allowed to obtain the exact coordinates or coverage maps of individual telephone towers located in Kakheti. To bypass this hurdle, the research team devised an alternative strategy of data collection which comprised the following steps:

- At the initial stage, the project team prepared a shapefile with the borders of 161 communities in Kakheti covering the whole region homogenously;
- The map was sent to Beeline and the company integrated the map of communities with the map of tower coverage areas. Two types of scenarios emerged in the integration process which demanded the modification of the initially prepared map of communities: (1) 2 or 3 communities were covered by a single telephone tower and (2) 2 towers were located in a single community. In the first case, respective communities were merged to form a single BSU while in the second case, data obtained from the two towers were merged into one in order to obtain information on the community in question. Eventually, at the end of the integration process, 57 BSUs were formed that served as the basis for the analysis of interactions in Kakheti.

Consequently, aggregated data was obtained from Beeline on the daytime and nighttime locations of mobile users. Based on this, flows were generated, showing the movement of people between the BSUs of Kakheti. To understand interlinkages between the BSUs, the research team analysed how many residents stayed in the same BSU during the day and how many went to each of the remaining BSUs. Data was acquired for a period of 11 days: from May 23- June 2, 2019. However, only data from the workweek was used (May 23-24 and May 27-31). The reasoning behind the decision is intuitive. Data on commuters (in transit for work, education, etc.) is the most adequate data source for delimitation of FRs (OECD, 2002) and the movement of population during weekends normally does not reflect the same functional interactions. Thus, an exclusive focus on the workweek is the only logical option. The data for the workweek was aggregated to yield more reliable results and mitigate possible irregularities in people's movements on a particular day. After the aggregation, a total of 2132 interactions were produced (flows between BSUs with one or more commuters) between 57 BSUs. The obtained interaction data was used for the delimitation of FRs with three different approaches – Chains, CURDS and Intramax.

3.3.2 Identification of competitive economic sectors in Kakheti

In order to identify the leading economic sectors for Kakheti, employment and value-added statistics from years 2011-2017 were used. The data was taken from the Business Statistics Department of the National Statistics Office of Georgia.[8]

To identify leading sub-sectors within each functional region of Kakheti, enterprises operating in each sub-sector in the region of Kakheti were mapped using GIS. The map was requested from the National Statistics Office of Georgia. Although the mapping of enterprises operating in Kakheti is not complete, the randomness of omissions and the high percentage of mapped enterprises (70-80%, according to the estimates of the representatives of the National Statistics Office of Georgia) made the use of the maps methodologically justifiable. By mapping enterprises of each subsector based on their actual location, the research team bypassed existing administrative units (municipalities of Kakheti) and was able to analyze leading economic activities within the confines of the newly defined FRs.

3.3.3 Analysis of competitive economic subsectors

To analyse the challenges and competitive advantages of leading economic subsectors in each functional region, the research team conducted face-to-face interviews with the owners of large, medium and small enterprises operating in the subsector under review. Additionally, interviews were conducted with field experts in order to gain a broader perspective on the current state of the subsector in question. Interviews were conducted throughout Kakheti in each of the seven functional regions identified at the end of the first stage of the research. Particular care was taken to include the perspectives of small, medium *and* large enterprises and to reflect each of their unique challenges in the recommendations prepared by the research team.

A total of 23 interviews were conducted during the month of August and fieldwork was completed within 2 weeks. Most interviews were held within the premises of the companies being studied but in several cases owners of enterprises were interviewed in the capital to accommodate the schedules of study respondents.

[8] http://geostat.ge/?action=page&p_id=211&lang=geo

3.4 RESEARCH LIMITATIONS

Prior to moving on to the presentation of the research results, it is important to take note of the limitations of the research design. Within the component of delineation of functional regions, the two most important limitations relate to:

- The use of data from only one mobile company

The research team's decision to partner with a single mobile company for the collection of interaction data was dictated by the limited financial resources available for the project as well as the limited experience of mobile companies operating in Georgia in collecting information for research purposes. Prior to forming the agreement with Beeline, a preliminary review was conducted to assess whether data obtained from the company would be representative of the region. The number of company's users in Kakheti stood at 109,459 while its share in the regional market amounted to roughly 30%. After a comparative analysis of the Beeline coverage map of Kakheti settlements and the map of populated areas in Kakheti, the research team determined that interaction data obtained on the users of Beeline would provide information on roughly 90% of the populated areas in Kakheti.

- The reliability of basic spatial units

BSUs used for modelling FRs in Kakheti were constructed based on the integration of community borders obtained from the National Statistics Office of Georgia and the coverage areas of mobile company towers located in Kakheti. This approach was used based on feasibility considerations, as only this type of geographical division of Kakheti allowed the collection of interaction data from the mobile company.

Within the sectoral analysis, the research team has identified the following limitations to consider when drawing research conclusions:

- Generalizing research results

The analysis of the most competitive subsectors in the FRs of Kakheti is based on 22 qualitative interviews with enterprises, field experts and a representative of a government agency. It is important to point out that due to the small sample of interviewees in each subsector, the research does not presume to draw generalizable conclusions and offer a solid evidence base for future policymaking. The aim of this component is to draw the attention of policymakers towards some of the most acute problems faced by companies and encourage further discussions and analysis on relevant topics.

- Perspective of policymakers

The focus of this research report is the perspective of enterprises. Therefore, the view of policymakers and the analysis of the policy context in each individual subsector is discussed to a lesser degree throughout the report. Time limitations of the research project did not allow for a comprehensive policy analysis and interviews with policymakers, however, future studies on the topic would benefit from such an approach.

4. RESEARCH RESULTS

4.1 IDENTIFICATION OF FUNCTIONAL REGIONS IN KAKHETI

Functional regions were modelled using data on 2132 interactions, i.e. flows between 57 BSUs in Kakheti with one or more commuters (see Fig. 1). Below, functional regions are shown as aggregated BSUs with the central BSU.

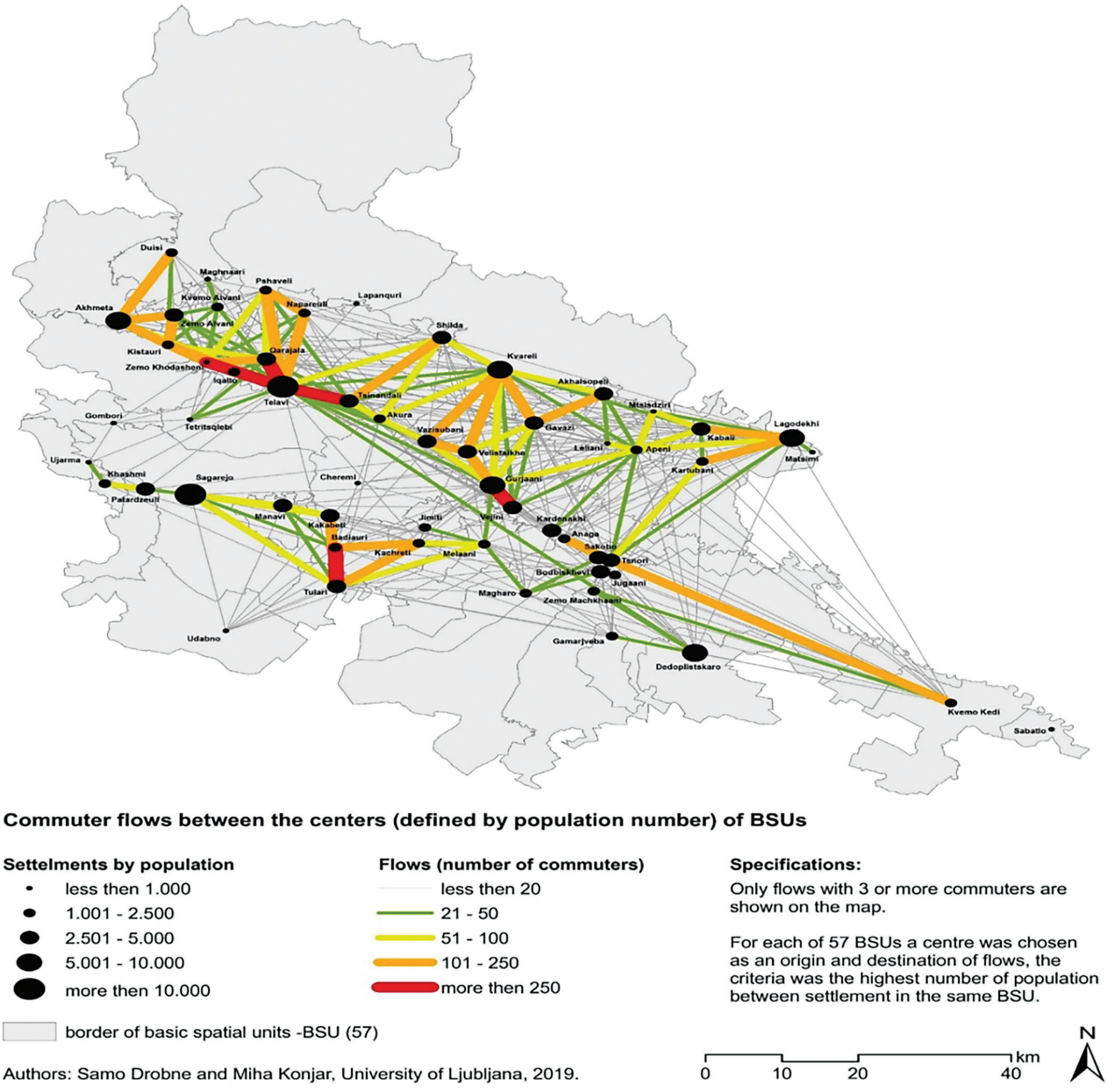

Figure 1: Interactions between basic spatial units in Kakheti, Georgia, 2019

4.1.1 Functional Regions modelled using Chains method

Chains method was the only method used in this project that allowed the modelling of FRs around pre-defined centres. The six centres of analysed FRs in the Kakheti region, which were predefined by a local expert group based on the analysis flow data obtained from the mobile company, were: Akhmeta (127), Telavi (122), Sagarejo (52), Gurjaani (93), Lagodekhi (89), and Tsnori (16).

The result of modelling six functional regions around six predefined centres using the Chains method is shown on the map 2. The resulted FRs are quite compact.

Figure 2: 6 functional regions modelled by the Chains method in Kakheti, Georgia, 2019

4.1.2 Functional Regions Modelled Using the CURDS method

The CURDS method was second method used by researchers. The method is based on the definition of four different parameters (minimal population, minimal self-containment, target population, target self-containment), which contributes to its complexity. The researchers estimated cut-off values for each parameter and so created a unique validity rule or condition for the identification of the set of FRs. To model FRs using the CURDS method, a programme code in R was applied and a set of 7 FRs was identified as the most adequate number of FRs.

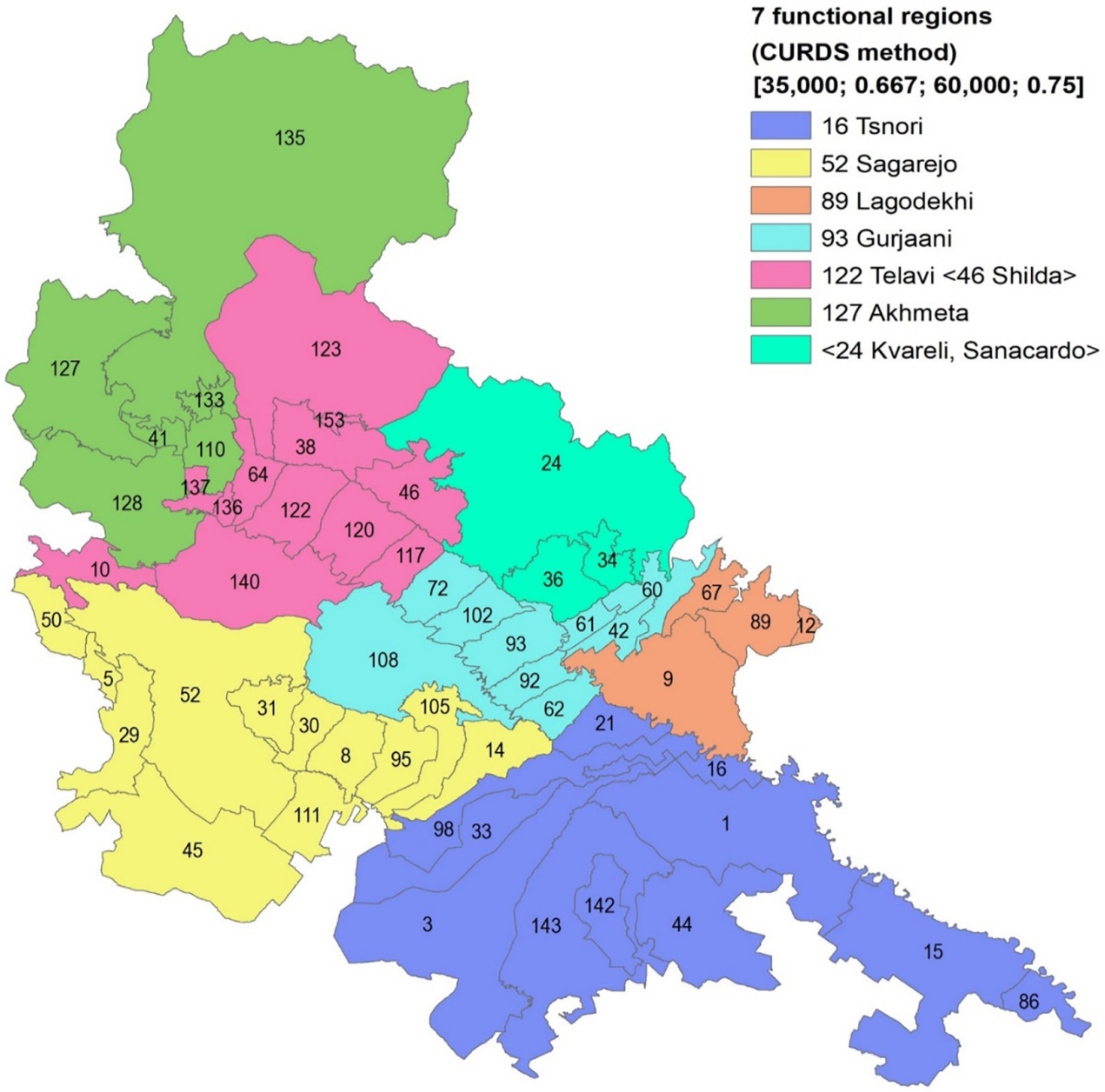

Figure 3: 7 functional regions modelled by CURDS method in Kakheti, Georgia, 2019
(minWP=35,000; minSC=0.667; tarWP=60,000; tarSC=0,75)

For the purposes of conducting a comparative analysis of different FR modelling methodologies using the FST approach (see the subchapter 4.1.4.), FR (24) was manually combined with FR (93), so that a set of 6 FRs was produced. This is comparable to the 6 FRs obtained by the Chains method (see Fig. 4). It should be noted that some FRs generated by the CURDS method are marked differently with different leading BSUs (see Fig. 3).

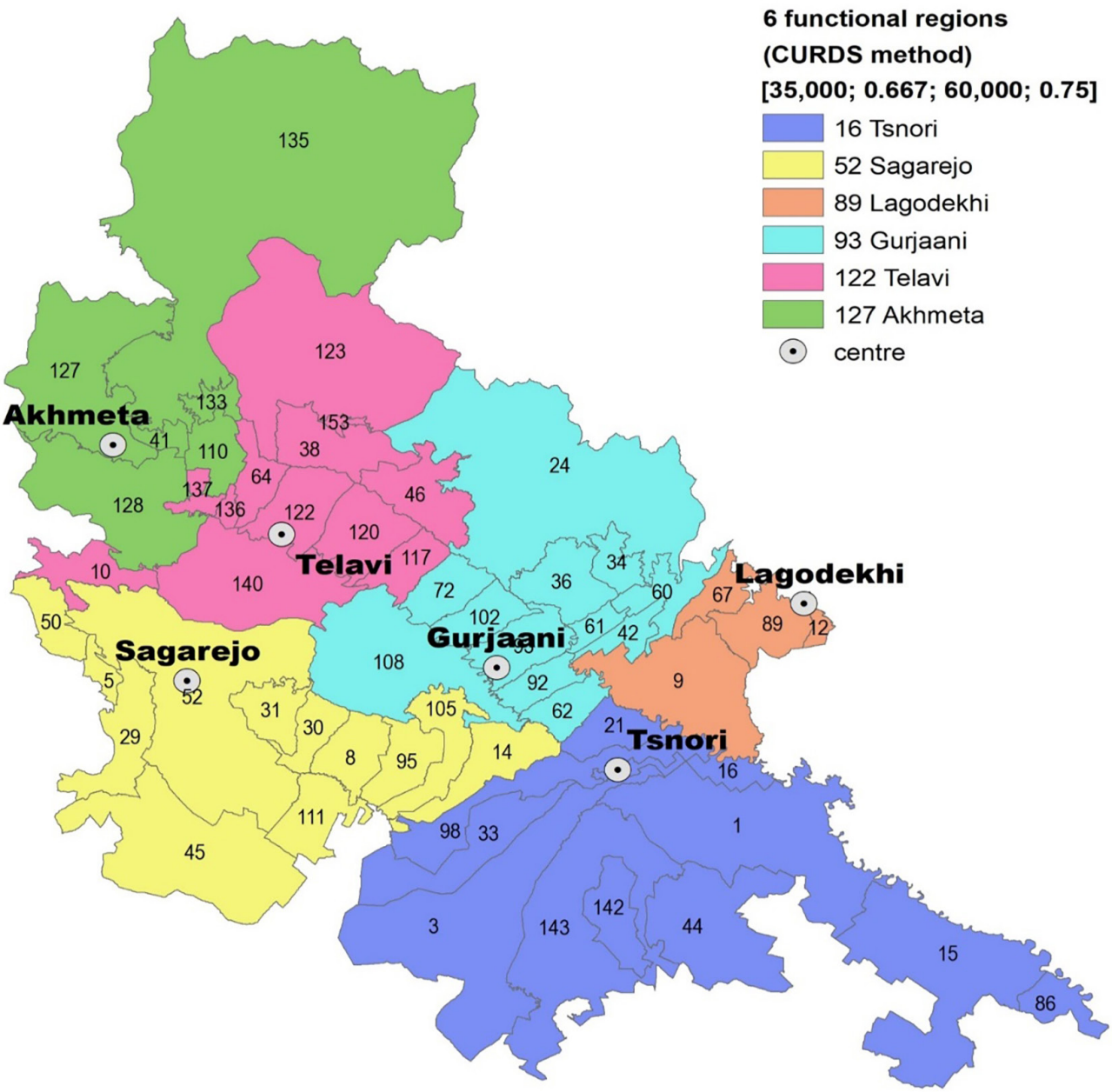

Figure 4: 6 functional regions modelled by CURDS method in Kakheti, Georgia, 2019 (minWP=35,000; minSC=0.667; tarWP=60,000; tarSC=0,75; and manual inclusion FR 24 into FR 93)

4.1.3 Functional Regions Modelled Using Intramax Method

Following the hierarchical aggregation procedure Intramax, all the modelled hierarchical sets between 2 and 12 FR were examined. A set of 8 FR was found to be the most adequate set of FRs modelled by the Intramax method. Here, the researchers' own programme code in Mathematica was developed by Samo Drobne and Miha Konjar. Two- singleton FRs (i.e. containing a single BSU) - FR (10) and FR (86) – were merged with adjacent FRs which produced the final set of 6 FRs.

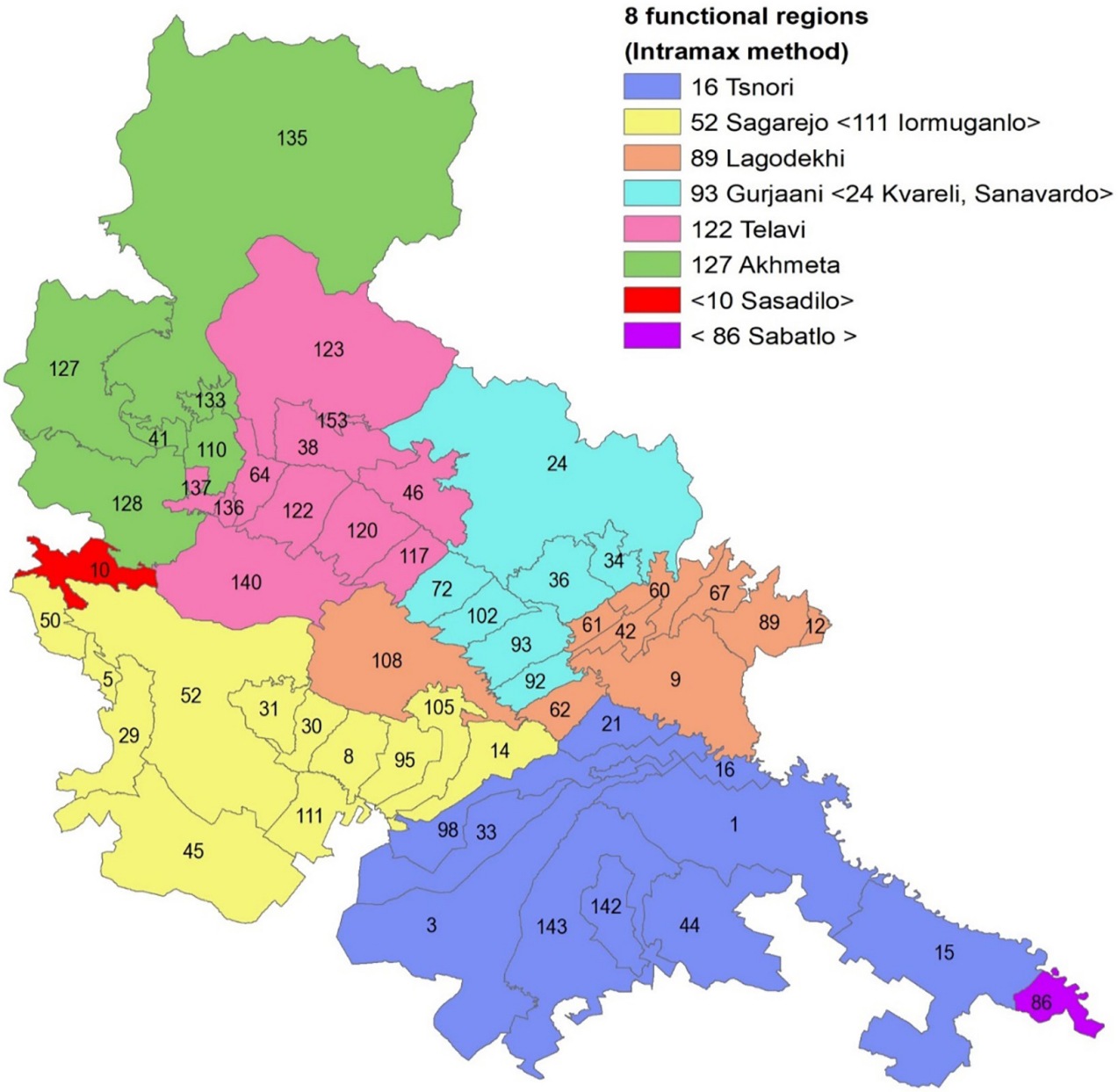

Figure 5: 8 functional regions modelled by Intramax method in Kakheti, Georgia, 2019

It should be noted that some FRs generated by the Intramax method are marked differently with different leading BSUs (see Fig. 5). For this reason, all maps were unified when modelling 6 FRs, according to the results of the Chains method (see Fig. 6).

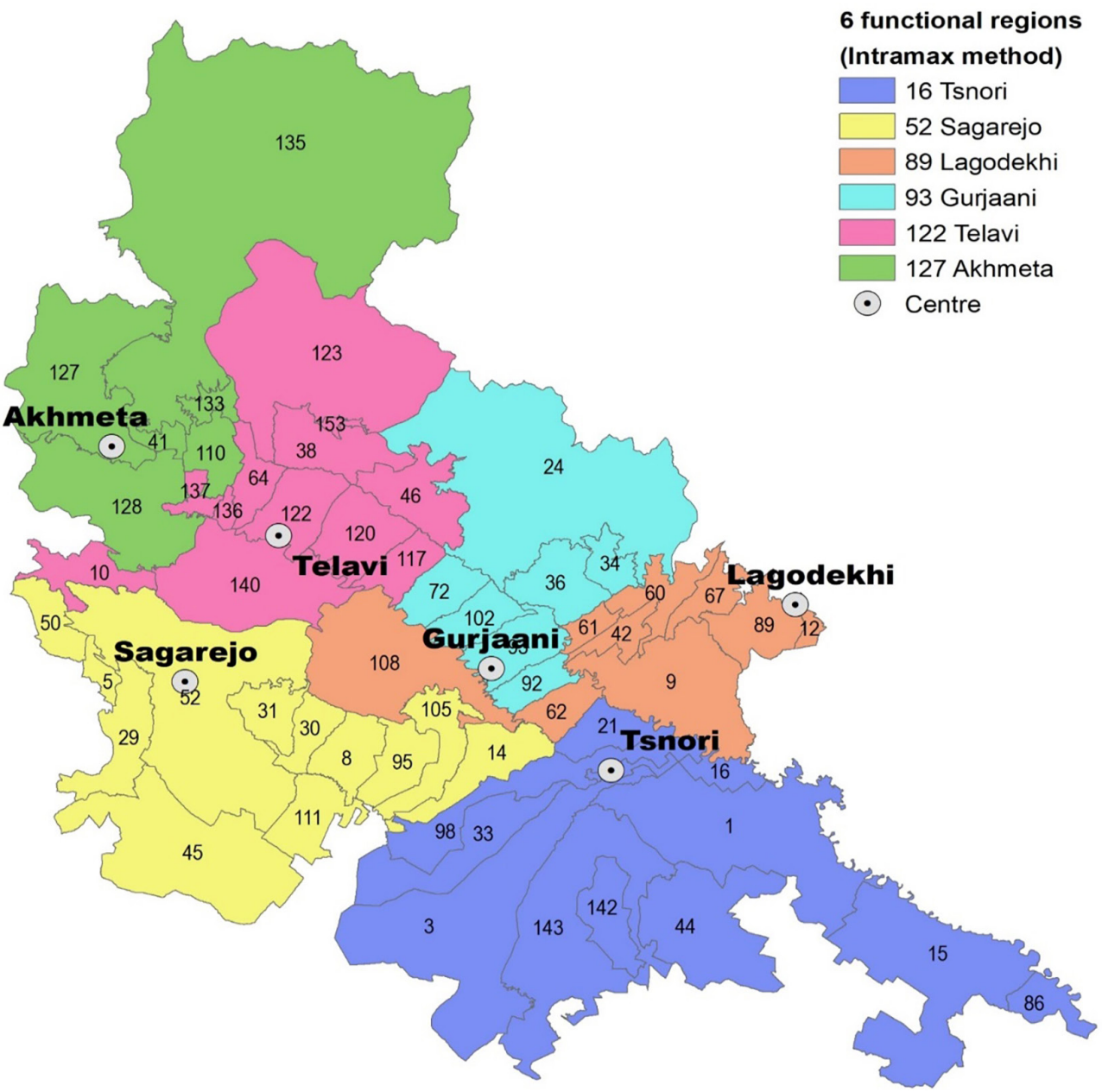

Figure 6: 6 functional regions modelled by Intramax method in Kakheti, Georgia, 2019

4.1.4 Evaluation of FRs Using FST Approach

The quality analysis of the regionalization procedures, i.e. the comparative analysis of the general membership values of FRs calculated by the FST approach, shows that differences are very small. In general, the highest membership values are given by CURDS method and the lowest by the Intramax method; the lowest membership value is for FR Lagodekhi (89) by Intramax aggregation procedure; see Tab. 1.

Additionally, mean membership values for single BSUs were calculated using each approach; see Fig. 7, 8 and 9. Lighter colours denote BSUs that should (most likely) be shifted between FRs.

Table 1: Mean membership values of the FRs / Kakheti, Georgia

Functional region / Kakheti, Georgia	Mean membership value of a functional region		
	Chains method	CURDS method	Intramax method
Kakheti, Georgia	0.9189	0.9196	0.9157
16 Tsnori	0.9277	0.9277	0.9277
52 Sagarejo	0.9599	0.9599	0.9599
89 Lagodekhi	0.8728	0.8870	0.8372
93 Gurjaani	0.8867	0.8896	0.9234
122 Telavi	0.9291	0.9290	0.9290
127 Akhmeta	0.8897	0.8871	0.8871

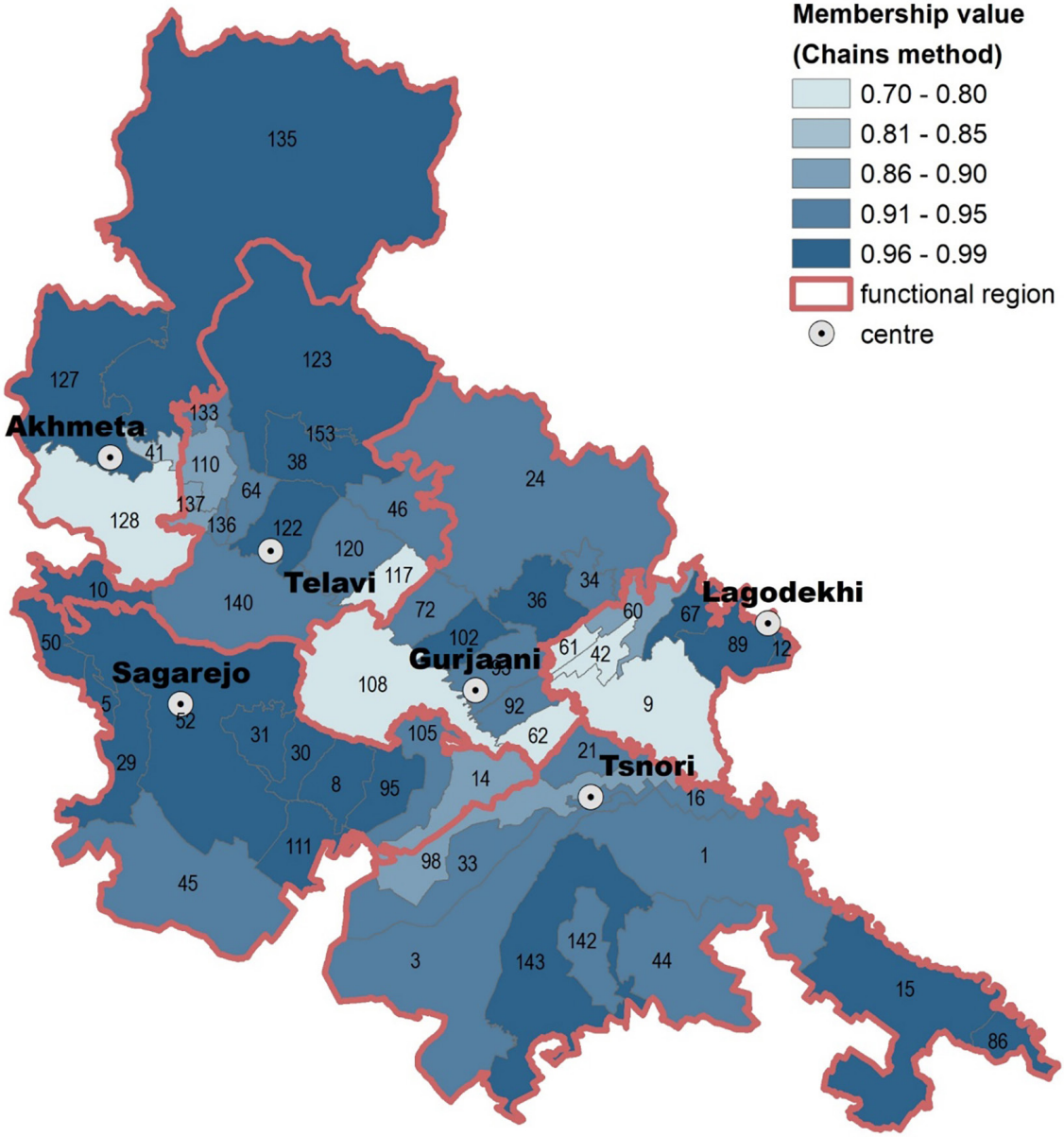

Figure 7: Membership values of BSUs in the FRs to which they were allocated using Chains method (Kakheti, Georgia, 2019)

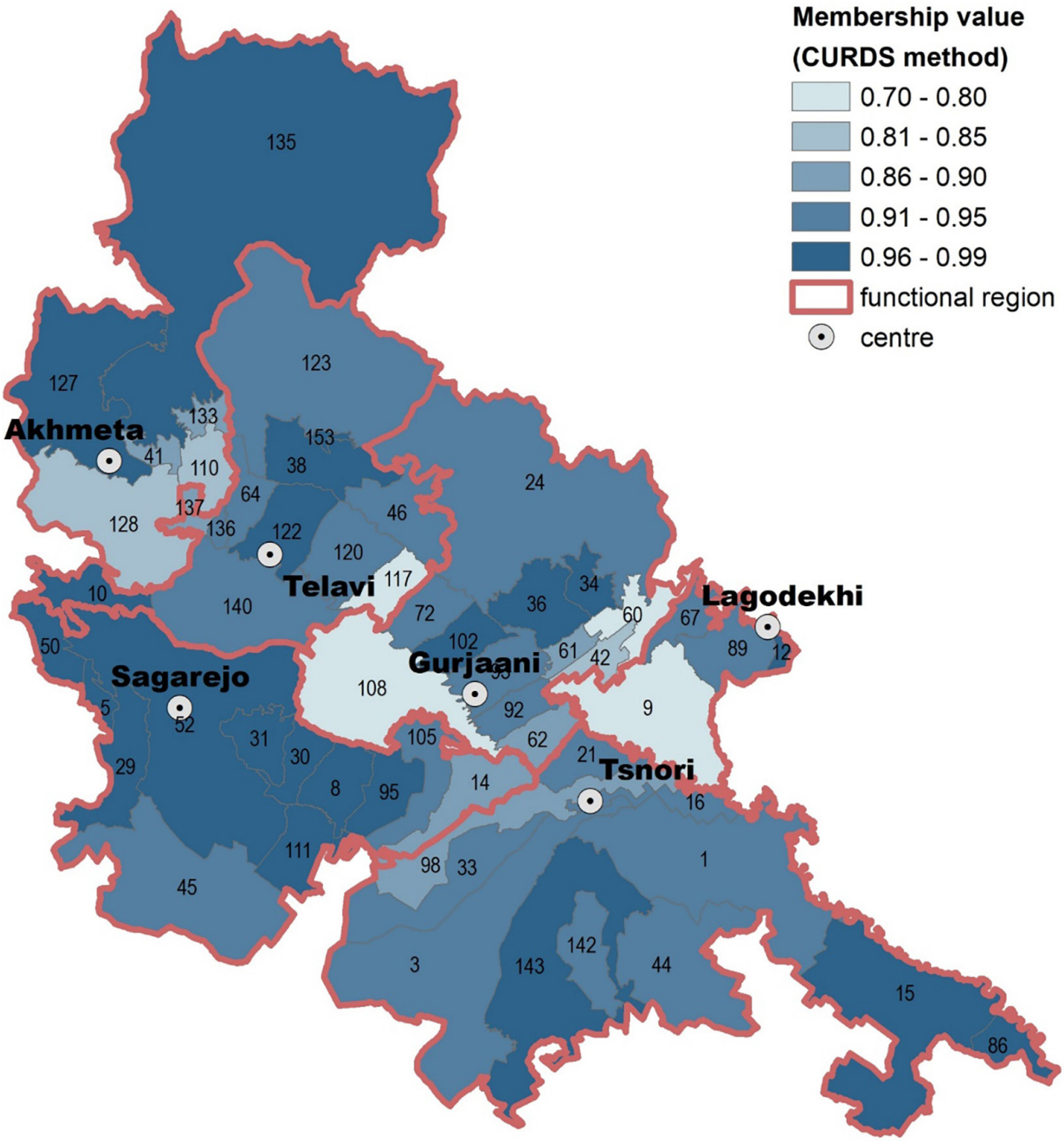

Figure 8: Membership values of BSUs in the FRs to which they were allocated using CURDS method (Kakheti, Georgia, 2019)

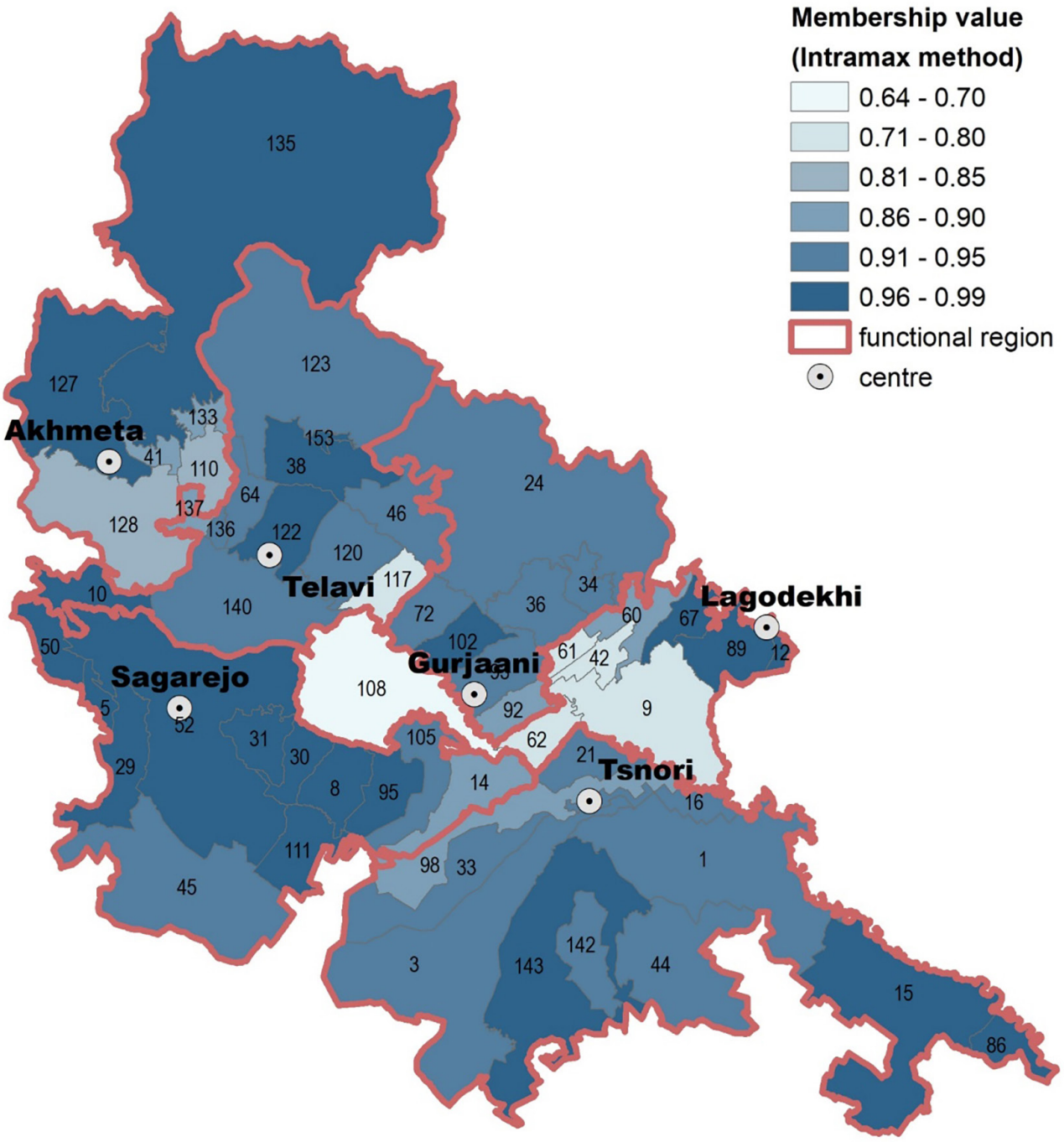

Figure 9: Membership values of BSUs in the FRs to which they were allocated using Intramax method (Kakheti, Georgia, 2019)

4.1.5 Discussion of results and the outcomes of the validation workshop

The results as presented in the previous subchapter were discussed by a local expert group within the framework of a focus group discussion. The set of seven functional regions modelled by CURDS method, as presented on the Fig. 3, was chosen as the most realistic and appropriate set of functional regions in the Kakheti region. According to the conclusions of the local expert group, the map of seven FRs had to be changed: (a) new regional centre Kvareli (24) was introduced, and (b) the name of modelled FR Tsnori (16) was changed to Sighnaghi (98). The final result of seven functional regions in Kakheti is presented in Fig. 10.

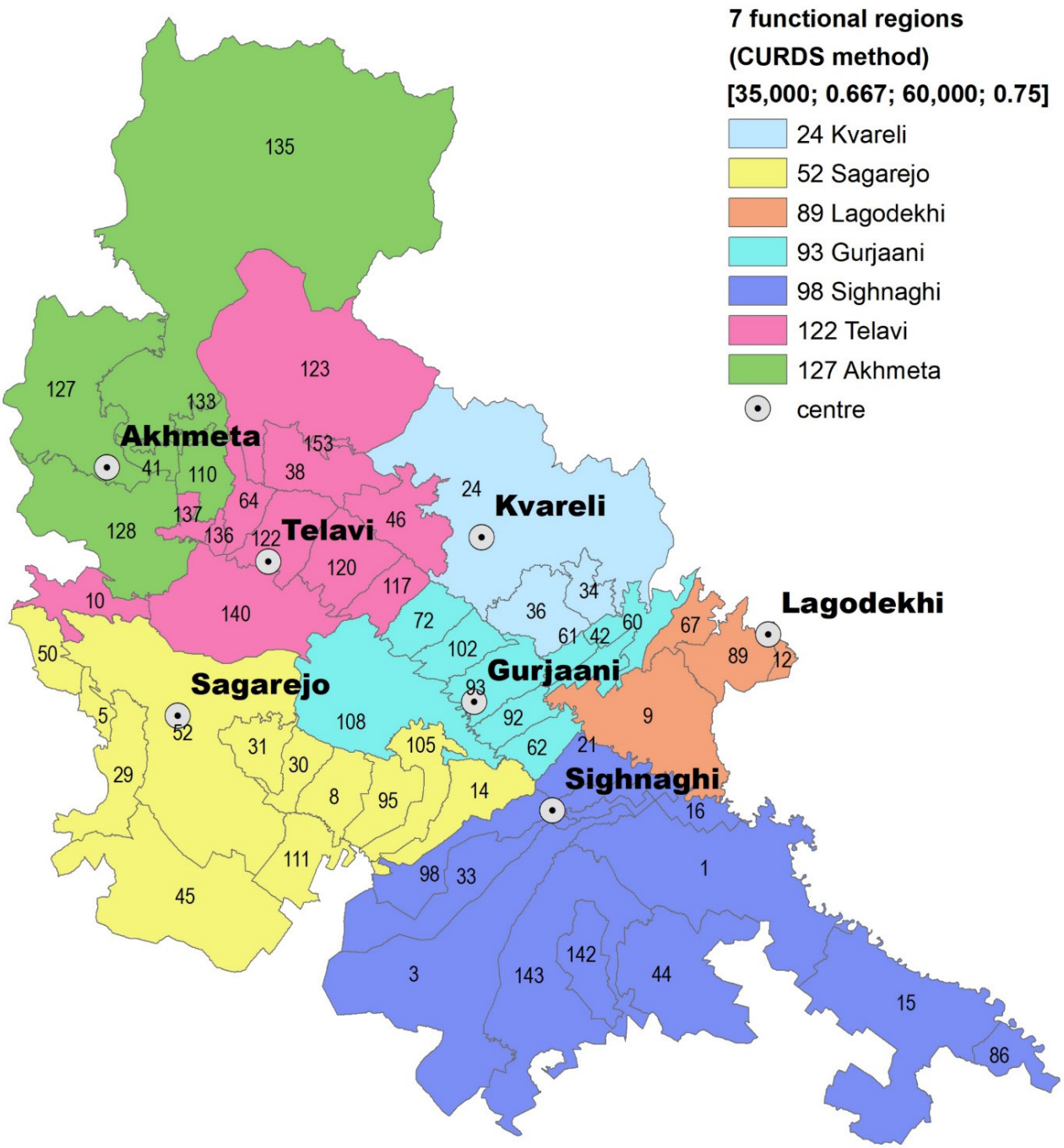

Figure 10: Final set of 7 functional regions modelled by CURDS method in Kakheti, Georgia, 2019 (minWP=35,000; minSC=0.667; tarWP=60,000; tarSC=0,75)

In addition, we analysed the quality of the regionalization procedure for 7 FRs. Membership values of the analysed BSUs vary between 0.678 for Barjiskhevi (108) and 0.99 for Kakabeti (30) (see Fig. 11). The results also show that the mean membership value for the system of 7 FRs generated by CURDS method is 0.9037. So, the membership values for single BSUs, as well as for the whole system of FRs, decreased a bit, but this is normal when the number of FRs increase; see also Tab. 2.

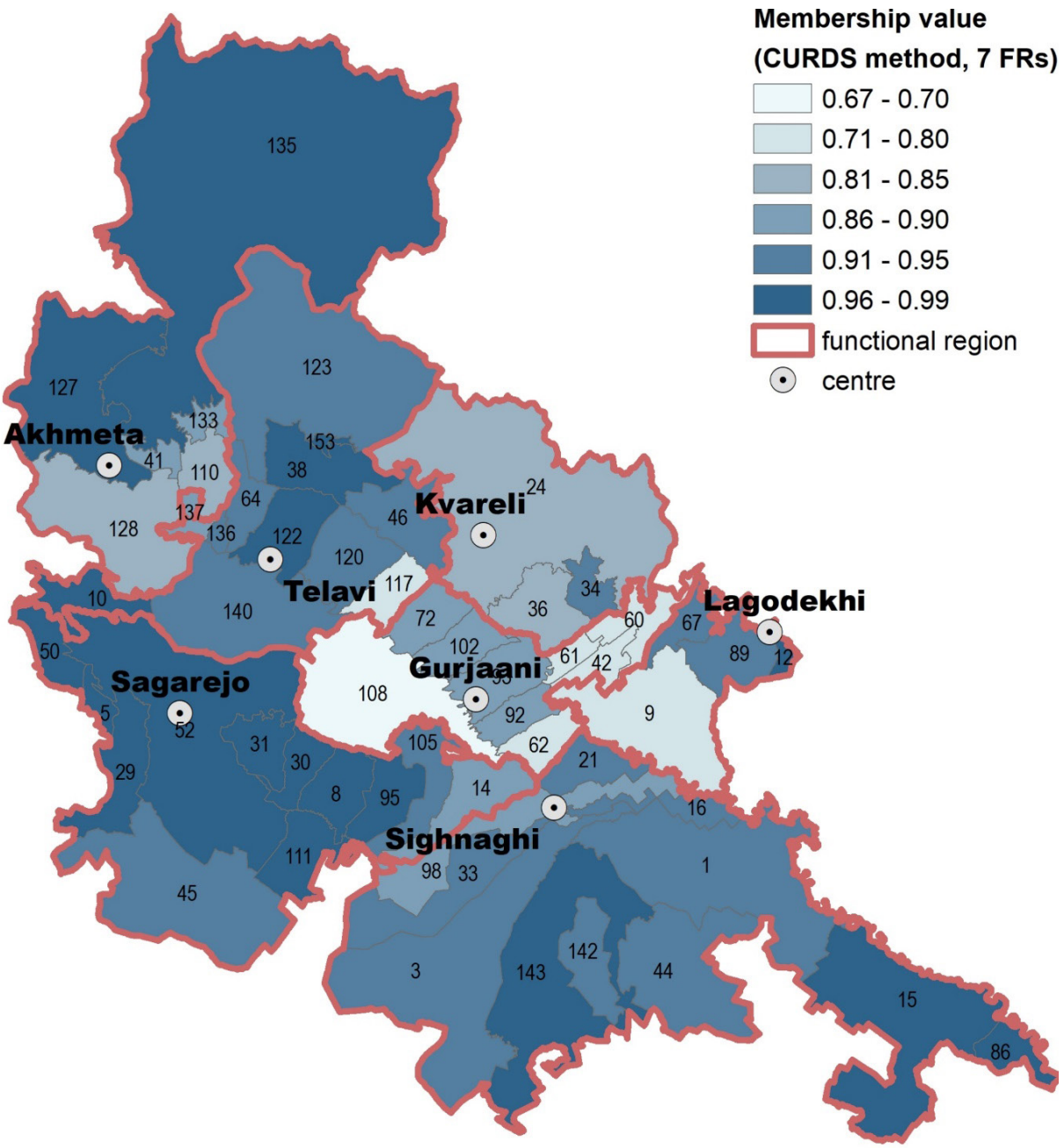

Figure 11: Membership values of BSU in the seven functional regions to which they were located using CURDS method (Kakheti, Georgia, 2019)

Table 2: Mean membership values of the seven FRs modelled by CURDS method / Kakheti, Georgia

Functional region / Kakheti, Georgia	Mean membership value of the functional region, Kakheti, Georgia
Kakheti, Georgia	0.9037
24 Kvareli	0.8590
52 Sagarejo	0.9599
89 Lagodekhi	0.8870
93 Gurjaani	0.7992
98 Signaghi	0.9277
122 Telavi	0.9290
127 Akhmeta	0.8871

A detailed overview of the membership values for single BSUs showed the BSUs with the lowest values; seven BSUs whose membership value is below 0.8 are listed in Tab. 3. All of those BSUs are located in the most crowded part of the Kakheti region on the border between FRs. Barjiskhevi (108), the BSU with the largest area, has the lowest membership value. This is normal because the area of the BSU is much larger than the areas of other BSUs located in the most populated areas of the region.

Table 3: Mean membership values of basic spatial units with the lowest membership values (7 functional regions, CURDS method / Kakheti, Georgia)

Basic Spatial Unit (BSU)	Mean membership value
108 Barjiskhevi	0.6780
60 Mtisdziri	0.7371
61 Leliani	0.7449
42 Apeni	0.7477
9 Heretiskari, Vardisubani	0.7571
117 Akura	0.7895
62 Bakurtsikhe	0.7967

4.2 IDENTIFICATION OF LEADING ECONOMIC SECTORS AND ANALYSIS OF COMPETITIVE SUB-SECTORS IN THE FRS OF KAKHETI

To identify the leading economic sectors (the concentrated and the competitive economic sectors[9]) for the Kakheti region, regional analysis methods (location quotient (LQ)[10] and shift-share analysis[11]) were used. LQ analysis revealed the basic economic sectors of the Kakheti region. By applying Shift-share analysis, the competitive economic sectors for the Kakheti region were identified (for detailed information see Annex 2).

In choosing leading sectors based on employment data, a sector had to be both concentrated and competitive, meaning the sectors have to be identified in both LQ and shift-share. The same approach was applied in the analysis according to value added.

By Employment

Based on employment (in LQ as well as in Shift-Share) the sectors identified for the Kakheti region were:

1. Manufacturing
2. Agriculture, forestry and fishing
3. Wholesale and retail trade; repair of motor vehicles and motorcycles

Following the identification of the sectors, the research team conducted a workshop to plan out further steps in the research process. Based on the consideration of the ultimate research purpose defined at the launch of the project in consultation with the donor and the Ministry of Regional Development and Infrastructure – to analyze the challenges facing enterprises and devise strategies for their resolution – a decision was made to exclude the sector of Wholesale and Retail Trade from further analysis. This decision was taken because this category includes sale points for a variety of goods, making it difficult to conduct comprehensive analysis of economic activity and devise concrete recommendations in response to challenges.

[9] Section- according to classification of economic activities NACE rev 1.1

[10] Kirankabes, Cem; Arik, Murat. The Journal of Applied Business and Economics; Vol. 16, Iss. 3, (Jun 2014): 135-151.

[11] Curtis, W. (1972). Shift-Share Analysis as a Technique in Rural Development Research. American Journal of Agricultural Economics, 54(2), 267-270. Retrieved from http://www.jstor.org/stable/1238712; Green, R., & Allaway, A. (1985). Identification of Export Opportunities: A Shift-Share Approach. Journal of Marketing,49 (1), 83-88. doi:10.2307/1251178.

By value added

According to value added, the sectors identified in both LQ and Shift-share were:

1. Manufacturing
2. Agriculture, forestry and fishing

Finally, the following sectors were chosen for the Kakheti region:

1. Manufacturing
2. Agriculture, forestry and fishing

After choosing the leading economic sectors for Kakheti, sub-sectors in each sector were analyzed. For each functional region, the sub-sector that employs the highest number of persons was chosen (For detailed information see Annex 3).

The distribution of selected sub-sectors by functional regions is as follows:

Functional Region	Sub-sector
Kvareli	Manufacture of Wine from Grape (Wine industry)
Akhmeta	Manufacture of Wine from Grape (Wine industry)
Telavi	Manufacture of Wine from Grape (Wine industry)
Gurjaani	Manufacture of Wine from Grape (Wine industry)
Sighnaghi	Manufacture of Wine from Grape (Wine industry)
Lagodekhi	Manufacture of Wine from Grape (Wine industry)
Sagarejo	Production of eggs from poultry (Egg Industry)

As can be seen from the table above, the wine industry surfaced as the most competitive subsector in six of the seven FRs identified in Kakheti. The initial approach used throughout the fieldwork was to study competitive advantages and challenges of a subsector within the specific context of a functional region. However, in the course of interviews with enterprises and field experts, it became evident that the similarities between the functional regions were much broader and more telling than the differences, as they highlighted common trends and the most pressing issues. Therefore, the research team made the decision to discuss the results of interviews based on subsectors and highlight the differences observed between the functional regions where necessary.

4.2.1. Description of respondents

In the sub-sector Manufacturing of Wine from Grape (Wine industry), 16 interviews were conducted with the representatives of wine companies. The distribution of the interviews by company size were as follows: large - 8, medium - 1, small – 7. Moreover, interviews were conducted with a representative of the National Wine Agency and an international wine expert affiliated with the field of winemaking in Georgia.

In production of eggs from poultry (Egg industry) sub-sector, 4 interviews were conducted with company representatives. The distribution of the interviews by company size were the following: large – 2, medium – 2.

Interviews in the manufacture of wine from grape sub-sector covered the six functional regions of Kakheti. Interviews in the sub-sector of production of eggs from poultry covered one functional region of Kakheti. In both the wine and egg sub-sectors, urban as well as rural areas within the functional regions were represented.

Sub-Sector	Functional Region	Number of interviews conducted by size of company		
		Large	Medium	Small
Manufacture of wine from grape (Wine industry)	Kvareli	8	1	7
	Akhmeta			
	Telavi			
	Sighnaghi			
	Gurjaani			
	Lagodekhi			
Production of eggs from poultry (Egg industry)	Sagarejo	2	2	

4.2.2. Wine industry

4.2.2.1. Situational analysis

The history of winemaking in Georgia stretches back millennia and to this day, occupies an important role in the socioeconomic and cultural life of the country. Based on the volume of exported goods, the wine industry occupies the fourth place in the national economy[12]. During the Soviet Union era, Russia became primary destination of Georgian wine exports and this trend continued throughout the two decades following the dissolution of the USSR. The Russian market has had notoriously low demand for wine quality, which has made it easy for Georgian winemakers to meet consumer expectations. Easy access to the Russian market brought about a decline in the quality of the Georgian wine which was followed by overdependence on the Russian market for exports, as low-quality wine could not be exported to Western markets[13]. The status quo changed in 2006 when political tensions resulted in a Russian embargo on Georgian wine, crippling the industry in the short term. Subsequently, in 2007 71% of wine exports were sent to Europe and the value of exported wine totaled 31 million USD. From 2006 until the end of the embargo in 2012, an average of 42 million USD in wine was exported annually. Since 2007, exports of wine have increased more than fivefold. Although half of the wine currently still goes to Russia, the popularity of Georgian wine has increased in other European countries. The price of Georgian wine on the international market serves as an evidence of this development: from the 1990s to 2010, the average price of one litre of Georgian wine has seen a threefold increase, reaching the global average in 2010. In 2018, the American Association of Wine Economists reported that Georgian wine ranked fifth by export price. The current price of exported Georgian wine stands at an average of $3.49 per litre, trailing Austrian wine only by 2 cents. Compared to other post-Soviet countries, like Ukraine, Georgian wine is almost 5 times more expensive on the international market[14].

Global wine exports is a 37 billion USD industry, dominated by countries like France, Italy, Spain, Australia and Chile. These countries combined account for 70% of total exported wine while the top 15 exporters supply over 94% of wine to the international market. The share of Georgian wine exports in the global market is only half a percent, which ranks the country eighteenth in the world. According

[12] https://www.geostat.ge/en/modules/categories/35/external-trade?fbclid=IwAR1mUZmqVZdCncZq0U0UVFtgjlEgf5gVds-Jd0CEGoMVSTE-jcP36dQR2_jY

[13] http://eprints.tsu.ge/340/1/Wine%20Market%20and%20Competitive%20Models%20of%20Diversification%20of%20the%20Viticulture-Winemaking%20Industry%20in%20Georgia.pdf

[14] http://georgianwine.gov.ge/Ge/Files/Download/5104

to previous research, the Georgian wine industry does enjoy certain advantages. These include a large number of endemic grape varieties, favorable natural conditions, a history and tradition of winemaking, and relatively inexpensive pricing[15].

4.2.2.2. Interview Findings

Description of Products and Services

The wine producers in the Kakheti region who were interviewed for this project are mainly vertically integrated, creating the wine value chain. The companies grow the grapes, produce wine and chacha, and distribute their product on local and global markets. Moreover, the wine companies are also involved in wine tourism value chains and run their own hotels and restaurants. The services wine companies offer to tourists include wine tasting, Georgian meal tasting, wine tours, participation in the harvest, bread-making, and the production of national specialties such as Khinkali and Churchkhela. By developing wine tourism, the companies add value to their main product - wine. Hotels are mainly run by large and medium-sized companies, while small companies offer their services to tourists in their wine cellars and restaurants. Additionally, enterprises that were interviewed are also involved in the import of wines from abroad to satisfy the demand for foreign wines in high-end hotels and restaurants in Georgia.

Interviews with large wine companies sampled for the research revealed that these actors prioritize global markets for the sale of their products. For these enterprises, the local Georgian market was too small and insufficient for the scale of their production. The share of earnings from the local market in their total turnover accounted for 10-30 percent. Conversely, for the majority of the small companies that were interviewed, international markets were largely inaccessible. They primarily sold their wine locally, some of them within the functional region and others within the country. These small and medium enterprises sold wine to restaurants and grocery stores as well as to tourists visiting their wine cellars. The sale of bottled wine to tourists is limited as tourists can only take a limited amount of wine with them on an airplane. As a result, these enterprises focused on offering tourists a variety of services linked with wine production.

Diversification of markets was a priority for all large companies interviewed in the framework of this research. The Russian market was deemed unstable and bureaucratically demanding. Companies saw large potential in European countries, as well as US, Canada, Japan, China and Central Asian countries (Mongolia, Kazakhstan).

Future Prospects

The majority of wine producers interviewed for this project had plans for expanding their business. The expansion plans were predominantly related to tourism and included building guesthouses/restaurants and offering additional services to visiting tourists. Enterprises saw big potential in agricultural tourism and wished to expand their services further by involving tourists in grape harvesting, winemaking, preparation of local food specialties, etc. In the case of large enterprises, plans were largely associated with the acquisition of new markets for selling bottled wine, production of larger quantities and new varieties of wine. In the case of small family-owned wine cellars, expansion plans included renovations for building tourism infrastructure and expansion to new local and export markets for the selling of bottled wine.

Enterprises interviewed within this research project predominantly focused on the production of Kvevri wine and many produced organic wines exclusively. Producers saw the competitive advantage of Georgian wines on international market in the traditional techniques of production and large selection of unique Georgian grape varieties. The focus of producers was on quality and high value rather than quantity. Nevertheless, increasing quantity was also a priority as some producers struggled to satisfy the

[15] http://eprints.tsu.ge/340/1/Wine%20Market%20and%20Competitive%20Models%20of%20Diversification%20of%20the%20Viticulture-Winemaking%20Industry%20in%20Georgia.pdf

demand of importers and collaborated with other wine producers to collectively gather the required quantity. Based on the views of experts, the way forward for the Georgian wine industry is to produce high-value wine in larger quantities.

In speaking about high value wines, organic production dominated the conversations with winemakers and wine experts. Winemakers reported that the production of organic wine is more expensive in Europe so wine producers see their advantage on the European market within the small niche of organic wines. Entrepreneurs also highlighted that the production of organic wines is inherently linked with small-scale production, which is the only alternative for Georgia as the production scale of countries such as China and Australia is unachievable in the Georgian context.

Experts interviewed within this project warned against overreliance on organic wine as the share of organic wine in the industry is still only about 1%. One must also consider that inexpensive organic wine options have become available on the European market, creating tough competition for Georgian winemakers. Additionally, respondents said that the production of organic wine requires great skill as there are less mechanisms available to a winemaker for controlling the process of maturation and the quality of the wine. The wine producers spoke about the lack of quality control in organic wine production in Georgia, which results in organic production being used as an excuse for low quality wine.

A greater variety of grapes should be studied and utilized in the production of wine. Saperavi is already a novelty for many wine connoisseurs but it is important to keep innovating.

All interviewees had a very positive outlook on the future of the wine industry in Georgia, highlighting the immense progress achieved over the past decade. The Russian embargo on Georgian wine was largely viewed as the strongest push factor causing a drastic improvement in the quality of Georgian wine. The gradual increase in the quality of Georgian wine was the basis for strong optimism among the producers. Some of the concerns voiced by respondents were related to lack of control over the quality and types of grapes – grapes from special micro-zones are not duly protected and therefore, frequently falsified.

Challenges - Technical Skills

Respondents spoke positively about the newly developed educational programs in the field of winemaking. The dual vocational program of winemaking in Kachreti College benefits from the participation of some of the leading wine companies in Georgia as well as the partnership of foreign companies and experts. Still, the lack of technical skills in winemaking was one the most frequently mentioned challenges in the interviews with winemakers as well as experts in the field. Family traditions are often the only source of knowledge for many small producers which is sorely insufficient when one wishes to expand to foreign markets and develop wine tourism in the country. Respondents stressed the need for trainings for deepening wine producers' knowledge about the modern standards of winemaking and ways of integrating them with traditional Georgian techniques. One respondent also spoke about the lack of Kvevri-specific training in the existing educational programs despite the fact that Georgian winemaking is largely focused on producing wine in Kvevris because of its competitive advantage on the international market.

Respondents also spoke about the lack of instruction in the country on the production of organic wine. In the modern industry organic production requires very specific knowledge of techniques and regulations and such information is very scarce in Georgia. Grape growers have limited knowledge on how to deal with vine diseases and rely on hearsay or recommendations from the sellers of agricultural products.

Another knowledge gap highlighted in the interviews concerned Kvevri production. Wine producers spoke about the difficulties of finding high quality Kvevris, as well as finding specialists for the correct placement of Kvevris in the ground. As noted in the interviews, there are no schools that train specialists

in the manufacturing of Kvevris. This despite the fact that the production of wine is increasing exponentially and the majority of wine cellars focus on producing wine based on traditional Georgian techniques (i.e. using Kvevris).

Furthermore, the operation of wine enterprises in the functional regions of Kakheti was impeded by the scarcity of qualified workers in the tourism industry (tour guides, hotel professionals).

Challenges – Infrastructure and services

The most widely mentioned challenge faced by wine enterprises in the area of infrastructure was the accessibility of water. Companies operating in Gurjaani and Akhmeta functional regions complained about the lack of water infrastructure. They were forced to set up pipes on their own and cover the expenses of maintenance on a regular basis.

Enterprises interviewed within this research spoke very positively about the newly introduced electronic system of the National Wine Agency which made the process of acquiring necessary documentation more efficient and quicker. Still, respondents noted the limitations of the system in terms of search functions, errors in the names of wine varieties and other issues.

In speaking about the services that are necessary for quality winemaking and the challenges faced by small enterprises, respondents highlighted laboratories that are essential for monitoring the winemaking process and producing high quality wine. The availability of such services is particularly important in producing wine in Kvevris, where control mechanisms are limited. Some respondents reported asking larger neighboring companies to use their laboratories. However, such opportunities are not always available to small and medium enterprises while the cost of setting up a laboratory is prohibitive for enterprises of that size. It is noteworthy that cooperative associations of small and medium enterprises could be beneficial in addressing this challenge as well.

Challenges – Marketing and Sales

Marketing skills surfaced as one of the largest gaps hindering the development of wine production and wine tourism in Georgia. Experts, the government official and wine producers all spoke about the scarcity of skills among small companies to market their products, identify new local and international markets, lead negotiations, deliver products to tourists and use opportunities to expand their production. Some small-scale producers used social media to market their product and attract tourists and collaborated with local and international tour agencies to attract tourists to their wine cellars. Nevertheless, they still struggled to sell their wine and bring in sufficient numbers of tourists. Experts spoke about basic negligence on the part of entrepreneurs, such as not responding to emails from importers in a timely manner and failing to adequately present their wine and winemaking process to importers visiting their wine cellars. The National Wine Agency has previously conducted consultations by international experts on the acquisition of new markets, but the representative from the agency complained about the lack of interest from Georgian winemakers. It is to be noted that such opportunities are advertised to enterprises through email, which is a medium that is still heavily underutilized among small-scale wine producers of Kakheti.

The local market was largely described by enterprises as small and lacking the potential to allow the sale of large volumes of wine. Additionally, all respondents spoke about the challenges of receiving payments for wine sold by distributors. Producers spoke about large unpaid debts owed to them by big supermarket chains and restaurants. The local market was also considered volatile due to an unstable political environment. According to wine producers who were interviewed, the ban on flights from Russia was reflected in the reduction of local wine sales. Enterprises spoke about the reduced flows of tourists to their wine cellars as well as the slowing of sales as restaurants and shops purchase less from

winemakers. An unreliable local market drives wine producers to sell wine abroad rather than locally.

Wine exhibitions were one of the important ways for wine producers to acquire foreign markets. However, this channel remained largely inaccessible for small-scale producers. Although the National Wine Agency provides valuable support to entrepreneurs by covering 50% of the cost of participation in the exhibition, enterprises still have to cover the remaining 50% of the cost along with travel and accommodation expenses which makes the participation unaffordable for most medium and small enterprises. The National Wine Agency has developed alternative channels for small and medium enterprises by offering to exhibit their wines at small wine exhibitions abroad. Representatives of small enterprises spoke very positively about the support of the Wine Agency in this regard, however none of the small enterprises reported obtaining sales from these exhibitions. According to their testimonies, attendees tended to be interested in large producers and the small scale of their production was inadequate for their demands.

Experts interviewed for this project spoke about the development of a so-called "French Model" in Georgia in which small and medium producers take the central stage. Despite the mushrooming small wine cellars in Kakheti and throughout Georgia, the challenges faced by them in expanding production and finding markets for their products are numerous. Small enterprises encounter obstacles to exporting due to small scale of production and inability to satisfy importers' demands, lack of language and soft skills to expand to new markets and establish necessary partnerships, and a lack of resources to acquire necessary equipment and services for the production of quality wine. In speaking about these hurdles, experts emphasized the potential of cooperatives to provide valuable support to small and medium enterprises and help them in exporting their produce. There are a number of wine associations and a cooperative operating in Georgia, however the respondents interviewed within this research were very skeptical in assessing the effectiveness of their support. The affiliations of these entities were questioned by respondents, with some suspecting that they are steered by the interests of individuals or specific companies. Despite the large potential benefits of collaborative efforts among small and medium enterprises, respondents said that small family-owned enterprises view such collective organizing with suspicion. Companies said they may resist being grouped together under one label, partly because of previous agricultural collectivization during the Soviet era. Such cultural inhibitions need to be explored and addressed prior to setting up any cooperative in order to ensure ownership and support from local producers.

4.2.3. Egg Industry

4.2.3.1. Situation analysis

In Georgia, eggs that are consumed locally are mainly produced within the country and are not imported. Low numbers of chicken egg imports have been linked with strict marking regulations for importers and high transportation costs. This has created an enabling environment for the expansion of the domestic egg industry. However, the volatility of the domestic industry was evident in 2013, when the import barriers were briefly lifted by the government. In the matter of a year, imports of eggs surged from 1.3 million USD to 3 million USD. The highly competitive environment resulted in lower prices for consumers. In the shops, the price of a single egg dropped from 30 to 26 Tetri. This resulted in multiple bankruptcies of egg producers and the government was forced to bring back the regulations. Despite the reintroduction of import barriers, the poultry sector needed a few quarters to ramp up production again to satisfy local market demand, demonstrating the inelasticity of the industry[16].

Since 2013, the number of imported eggs has been on the decline, reaching 136,000 USD and 353,000 USD in 2015 and 2016, respectively. Decreasing imports have been compensated by higher domestic

[16] http://iset-pi.ge/index.php/ka/iset-economist-blog/entry/georgian-egg-prices-the-roller-coaster-ride-continues

production. In 2015, the total number of eggs produced in Georgia exceeded the domestic demand by 2 percent. According to official statistics, more than 638 million eggs were produced domestically in 2018, compared to 600 million in 2017. Meanwhile, exports of eggs have surged: from 2008 to 2013, the average annual value of eggs exported was 667,000 USD , while in the last five years this number increased more than 160 percent. Mostly, eggs are exported to Azerbaijan, Armenia and sometimes even Iraq. A small amount of poultry eggs are exported to the EU, but the number is too small to be relevant.

Unlike the number of eggs, the average farm gate value of a single egg varied between 21 to 24 Tetri, without any noticeable trending up or down. The variations in price can be explained by unstable global wheat prices. Prices also vary between regions: the lowest farm gate value of a single egg in 2018 was in the Kakheti region, while in mountainous regions like Mstkheta-Mtianeti the farm gate value of an egg was as high as 36 Tetri[17].

It is also important to note that most agricultural products in Georgia have traditionally been exempted from value added taxes. However, since 2008 eggs have been subject to the tax, and since 2012, poultry has as well[18].

4.2.3.2. Interview Findings

Description of products and services

The majority of companies interviewed in the Sagarejo functional region's subsector – Production of Egg from Poultry- only produce eggs. Such enterprises are highly concentrated in Sagarejo and its surroundings. According to the respondents, the number of such enterprises is increasing, mainly driven by the preferential taxation regime for small entrepreneurs and government programs financing such businesses and not by unsatisfied local demand.

Key markets

All of the egg producers interviewed for this project sell their product in the domestic market. The large egg producers mainly sell to the large supermarket chains in Georgia, such as Nikora and Carrefour. Some of the smaller companies recognize the importance of market diversification and cooperate with many small and medium supermarkets as well as bakeries and restaurants in order to avoid being overly dependent on a single large buyer. Small enterprises see overreliance on large supermarkets as a threat to their businesses as often large supermarkets control prices and accumulate debt, delaying the payment of received goods to egg producers for several months. These egg producers were also aware of the risks associated with small supermarkets, as sometimes small supermarkets liquidate and egg producers are not able to receive payment for delivered goods.

None of the respondents export their product to global markets. They believe that their high production costs mean they cannot compete with foreign producers. Georgian producers depend on imported raw materials, like chicken, grains, egg packaging, etc. and as the Georgian Lari depreciates, imports are increasingly expensive. Due to limited quantities and low quality of Georgian hens, the egg producers mainly import the hens from Turkey and Holland. Furthermore, the low production of grain in Georgia makes them dependent on grain imports - mostly from Russia. Some of the egg producers who were interviewed grow grain themselves, however they are not able to cover all their demand. All respondents reported purchasing packaging materials from abroad, citing low quality of local produce as the main cause.

[17] https://www.geostat.ge/en/modules/categories/35/external-trade?fbclid=IwAR1mUZmqVZdCncZq0U0UVFtgjlEgf5gVds-Jd0CEGoMVSTE-jcP36dQR2_jY

[18] http://enpard.ge/en/wp-content/uploads/2015/05/Market_Assessment__Poultry_AYEG_ENG.pdf

Future Prospects

A majority of respondents are not considering expanding their businesses in the future. The producers explained that they believe the current supply of domestically produced eggs is sufficient for the Georgian market. Moreover, they believe that Georgian egg production would not be competitive in neighboring markets, including Ukraine, Turkey and Azerbaijan. The producers believe that this is due to lower costs of grain and by extension, egg production in these countries. It should be noted that respondents had little information about the current situation of the global egg market, including supply, demand, price dynamics and cost of production.

In the interviews conducted for this research, some of the companies mentioned concerns about the threat of imported eggs disrupting the local egg industry. The coping strategy of large companies in such cases is to drastically lower the prices of eggs in conjunction with other large producers.

While egg-producing companies are unlikely to expand their businesses, they do look to the future positively. They believe that there will still be demand for their products in the future. The cheap labor force in the functional region and the proximity of the functional region to Tbilisi represent a significant competitive advantage for them.

Challenges - High dependence on imported inputs

Dependence on imported raw materials hinders the development of egg producing enterprises. The depreciation of the Georgian Lari increases the input prices for egg production, increases production costs and makes them less competitive with foreign producers.

Challenges - Low quality of locally produced inputs

Some of the companies reported that they experience production losses because of the poor quality of locally produced inputs for egg production, such as laying hens and packaging materials. As a result, egg producers often use products of foreign origin. They primarily import laying hens from Holland and Turkey, and packaging materials from Azerbaijan.

Challenges - Import Competition

One of the challenges for Georgian egg producers is the import of eggs from neighboring countries. The volume of imports in this sector is particularly high during the summer period. This creates excess supply in Georgia's egg market and lowers the price of eggs. As a result, Georgian producers often sell their eggs below production cost.

Challenges - Lack of information about egg world market

Most of the Georgian egg producers interviewed for this project do not have adequate information on the status of the global egg market, including prices, requirements, supply and demand, and production costs. The producers are unable to determine the export potential of the Georgian egg.

Challenges - Non-existence of business association for small egg producers

Within the functional region of Sagarejo there is an active business association of large egg producers. According to those interviewed, the main activity of the association is collaboration on pricing policy. Small producers are not members of this association and therefore do not abide by the pricing policy agreed between its members. Large producers interviewed in the framework of this research view the actions of small producers as disruptive to the market but do not see them as a source of any real threat to their businesses.

Small producers reported their willingness to create business associations in order to advocate for their interests and bind together against the influence of large enterprises. Business association would serve as a platform for the exchange of knowledge and resources.

5. CONCLUSION AND RECOMMENDATIONS

The first section of this research report identified functional regions in Kakheti, Georgia and analyzed the most competitive subsectors in each of the regions. Using data obtained from a mobile company, the research team analyzed interactions between Basic Spatial Units of Kakheti using three methods: Chains, CURDS and Intramax. The results of the three approaches were evaluated using Fuzzy Set Theory approach and validated at a workshop with field experts. Based on the FST evaluation and the workshop outcomes, results of the CURDS method - 7 functional regions were chosen as the final product of the research project. For the identification of competitive sectors and subsectors, the research relied on Location Quotient and Shift Share methodologies. Researchers analyzed the most competitive subsectors identified within each of the functional regions through in-depth interviews with companies, experts in the field and a government official. In six of the functional regions of Kakheti, manufacturing of wine from grapes surfaced as the most competitive subsector while in the seventh functional region the most competitive economic activity was egg production. Based on the analysis of interviews, the research team developed a set of recommendations to address the identified challenges and support further development of the subsectors that were studied.

5.1. WINE INDUSTRY

5.1.1. Development of technical skills among wine producers

Create support mechanisms for wine producers in Georgia to fill the knowledge gap on modern standards of grape growing and winemaking. Create a manual, conduct trainings and consultations.

The research revealed a knowledge gap among wine producers in terms of techniques for the production of conventional as well as organic wine. Information and training on conventional and organic grape growing and wine production should be provided in the form of trainings as well as hard copy manuals for grape farmers and wine producers to be used as a reference on a regular basis. The manual should include a list of the most widespread grape diseases and recommended treatments for organic and conventional wine producers.

Support the development of professional education programs related to the manufacturing of Kvevris in Georgia.

The companies interviewed for this project identified the purchase of high-quality Kvevris as a challenge. The lack of Kvevris available for purchase was caused by inadequate formalized instruction for the manufacture and handling of these vessels. Given the importance of Kvevri in the production of Georgian style wine and the increasing popularity of the technique internationally, it is of great importance to support this field of knowledge by setting up vocational programs and encouraging enterprises specializing in this field.

5.1.2. Development of soft skills among small and medium wine producers

Support for small and medium enterprises to develop their entrepreneurial and marketing skills

The lack of necessary marketing skills was emphasized in all interviews with small enterprises. This highlights the need for training opportunities in the marketing of a product, use of social networks for company development, presenting the product to consumers and importers, establishing partnerships for exporting products, etc. It is also important to use non-electronic means of communication for reaching out to targeted companies in Georgia and informing them about the educational opportunities. It is important to conduct outreach via telephone, local consultation centers, local government networks, etc.

As wine producers are involved in other types of revenue-generating activities connected to winemaking, such as the operation of hotels, restaurants, wine tasting premises, etc., it is important to increase their entrepreneurial skills and support the development of wine value chains in the region of Kakheti.

Support for small and medium enterprises to expand their sales to international markets

Although small enterprises spoke very positively about the support from the Georgian Wine Agency in taking their wine to international exhibitions, none of them mentioned closing a deal based on these opportunities.

The attendees of high-end wine exhibitions may be less accessible to small enterprises and so they have better chances of sealing sale deals on less elite platforms. It is important to introduce Georgian small-scale wine producers to more accessible markets through participation in wine festivals. This has the broader impact on popularizing Georgian wine among consumers and smaller foreign companies.

Supporting the creation of a cooperative for small and medium wine producers

The research revealed numerous challenges in the operation of small and medium wine producers. These include the small scale of production and inability to satisfy importers demands, lack of technical and soft skills to expand to new markets and establish necessary partnerships, and the lack of resources to acquire necessary equipment and services for the production of quality wine. Research respondents mentioned rudimentary examples of cooperatives that have little popularity among small producers at the moment. Creation of strong cooperatives between small and medium enterprises could become an important support mechanism in dealing with these challenges. Despite large potential benefits, some resistance is expected from small family-owned enterprises especially given the Soviet past and limited awareness about the activity and benefits of cooperatives. Local governments can play a major role in addressing these concerns and raising wine producers' awareness about the advantages of cooperatives.

5.1.3. Increasing the efficiency of administrative processes and improving infrastructure

Introduce a feedback mechanism in the electronic system of the National Wine Agency

A number of respondents mentioned that the newly introduced electronic system of the National Wine Agency, although very useful overall, is not sufficiently user-friendly due to a number of easily fixable technical shortcomings. We recommend introducing a feedback mechanism in the electronic system in order to increase its user-friendliness and efficiency.

Improve water infrastructure in the functional regions of Gurjaani and Akhmeta

Wine producers interviewed in the functional region of Gurjaani and Akhmeta highlighted the problems of water accessibility and quality as hindering factors in the wine production process. It is important to address this issue in order to support the production of quality wine and the further development of the tourism industry in the region.

5.2. EGG INDUSTRY

Support development of businesses providing inputs for egg production

The main challenge for egg producers in Georgia is their reliance on foreign inputs. Supporting businesses that provide the inputs needed for egg production, such as laying hens and packaging materials, would reduce dependence on imported goods. This would significantly reduce costs for Georgian entrepreneurs and increase their competitiveness in the global market.

Increase awareness of egg producers in global egg market trends

Georgian egg producers only consider Georgia as the key market, having little knowledge of current global egg market developments. They are unable to determine export potential in Georgia. Its important to increase the awareness of egg producers on subjects including global egg market dynamics, requirements, prices, demand, cost of production, etc. Government can play a significant role in providing egg producers with relevant information.

Diversification of grain import in Georgia

Given that the grain has a direct impact on egg production, Georgian companies in this sector cited their dependence on grain imports as a challenge. Currently they mainly import grain from Russia. Producers expect the diversification of imports would significantly reduce their expenditure on grain. Government involvement in this process would be essential.

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ANNEX 1

Shift-share Analysis

Shift-share represents one of the methods for regional analysis. This method allows for the identification of the competitive sectors for each region of Georgia by identifying the factors affecting the changes in the number of people employed and value added by certain economic sectors.

Shift-Share by employment:

Shift-share analysis explains the changes in employment through three effects: national growth rate effect (NGE); industry mix effect (IME); and competitiveness effect (CE).

$$\sum_{t}^{t+n}(e_i^{t+n} - e_i^t) = \sum_{t}^{t+n} e_i^t \left[\frac{E^{t+n}}{E^t} - 1\right] + \sum_{t}^{t+n} e_i^t \left[\frac{E_i^{t+n}}{E_i^t} - \frac{E^{t+n}}{E^t}\right] + \sum_{t}^{t+n} e_i^t \left[\frac{e_i^{t+n}}{e_i^t} - \frac{E_i^{t+n}}{E_i^t}\right]$$

$\boldsymbol{e_i^t}[\frac{\boldsymbol{E^{t+n}}}{\boldsymbol{E^t}} - 1]$ - NGE

$\boldsymbol{e_i^t}\ [\frac{\boldsymbol{E_i^{t+n}}}{\boldsymbol{E_i^t}} - \frac{\boldsymbol{E^{t+n}}}{\boldsymbol{E^t}}]$ - IME

$\boldsymbol{e_i^t}\ [\frac{\boldsymbol{e_i^{t+n}}}{\boldsymbol{e_i^t}} - \frac{\boldsymbol{E_i^{t+n}}}{\boldsymbol{E_i^t}}]$ - CE

$\boldsymbol{e_i^{t+n}}$- number of people employed in a region's i sector in the year of t+n

$\boldsymbol{e_i^t}$- number of people employed in a region's i sector in the year of t

$\boldsymbol{E_i^{t+n}}$- number of people employed in a country's i sector in the year of t+n

$\boldsymbol{E_i^t}$- number of people employed in a country's i sector in the year of t

$\boldsymbol{E^{t+n}}$- number of people employed in a country's all sector in the year of t+n

$\boldsymbol{E^t}$- number of people employed in a country's all sector in the year of t

The NGE indicates how many jobs have been created in a region's i sector because of the overall growth of the country's economy.

The IME indicates how many jobs have been created in a region's i sector because of the growth of the i industry at the national level.

The CE indicates how many jobs have been created in a region's i sector because the region is competitive in that sector.

The NGE+IME indicates the expected change of employment in a region's i sector, whereas the CE indicates the change of employment in a region's i sector due to the competitiveness of this sector in that region. Therefore, the CE is the main indicator that shows in which sector the region is competitive.

Shift-Share by value added:

The same Shift-share analysis was done by analyzing value added created in economic sectors:

$$\boldsymbol{v_i^{t+n} - v_i^t = v_i^t[\frac{V^{t+n}}{E^t} - 1] + v_i^t [\frac{V_i^{t+n}}{V_i^t} - \frac{V^{t+n}}{V^t}] + v_i^t [\frac{v_i^{t+n}}{v_i^t} - \frac{V_i^{t+n}}{V_i^t}]}$$

$\boldsymbol{v_i^t[\frac{V^{t+n}}{V^t} - 1]}$ - NGE

$\boldsymbol{v_i^t [\frac{V_i^{t+n}}{V_i^t} - \frac{V^{t+n}}{V^t}]}$ - IME

$\boldsymbol{v_i^t [\frac{v_i^{t+n}}{v_i^t} - \frac{V_i^{t+n}}{V_i^t}]}$ - CE

$\boldsymbol{v_i^{t+n}}$- value added in region's i sector in the year of t+n

v_i^t- value added in region's i sector in the year of t

$\boldsymbol{V_i^{t+n}}$- value added in the country's i sector in the year of t+n

$\boldsymbol{V_i^t}$- value added in the country's i sector in the year of t

$\boldsymbol{V^{t+n}}$- value added in all sectors in the country in the year of t+n

$\boldsymbol{V^t}$- value added in all sectors in the country in the year of t

Shift-share analysis was conducted for every economic sector in the Kakheti region and for the sectors identified as competitive in the region.

Location quotient (LQ) analysis

To identify the basic economic sectors for the Kakheti region, researchers used LQ analysis. LQ analysis reveals the basic economic sectors of a region, and indicates how concentrated an economic sector is in a single region compared to the entire country. Using this method, the basic and non-basic economic sectors for the Kakheti region were identified. A basic economic sector of a region is a sector which is more concentrated in that particular region compared to the country as a whole. If LQi>1, that means a sector is the basic economic sector of a region. If LQi<1,i that means a sector is not a basic economic sector of a region.

LQ is calculated by dividing the share of the region's economic activity in a sector, by the share of a country's economic activity in that same sector.

$$\boldsymbol{LQ = \frac{e_i}{e} / \frac{E_i}{E}}$$

where,

e_i – employment in sector i in the regional economy

e -total employment in the local region

E_i – employment in a sector i in the national economy

E - total employment in the national economy

LQ analysis will be also conducted by value added.

LQ by value added:

$$\boldsymbol{LQ = \frac{v_i}{v} / \frac{V_i}{V}}$$

where,

v_i – value added in sector i in the regional economy

v -total value added in the local region

V_i – value added in a sector i in the national economy

V - total value added in the national economy

ANNEX 2

Competitive and Concentrated Sectors for Kakheti region

2.1 RESULTS OF SHIFT-SHARE ANALYSIS

Shift-Share analysis was conducted for the Kakheti region based on employment and value added.

Employment

Based on employment the following economic sectors were identified for Kakheti region:

1. Manufacturing
2. Transportation and storage
3. Accommodation and food service activities
4. Construction
5. Wholesale and retail trade; repair of motor vehicles and motorcycles
6. Arts, entertainment and recreation
7. Agriculture, forestry and fishing
8. Professional, scientific and technical activities
9. Administrative and support service activities
10. Real estate activities
11. Other service activities

Table: Results of Shift-Share Analysis by employment in Kakheti region

	Economic Activity (Sector)	National Growth Effect (NGE)	Industrial Mix Effect (IME)	Competitive-ness Effect (CE)	Quantitative Change in Employment (2017, Compared to 2011)
1	Agriculture, forestry and fishing	438	224	322	984
2	Mining and Quarrying	209	63	-390	-118
3	Manufacturing	1607	-906	1373	2073
4	Electricity, gas, steam and air conditioning supply	368	-489	-202	-323
5	Water supply; Sewage, Waste Management and Remediation Activities	168	-351	-37	-220
6	Construction	709	-492	444	661
7	Wholesale and retail trade; repair of motor vehicles and motorcycles	1674	996	402	3072
8	Transportation and storage	83	7	558	648
9	Accommodation and food service activities	274	166	489	929
10	Information and communication	112	-36	-389	-312
11	Real estate activities	90	-36	102	155
12	Professional, scientific and technical activities	56	-12	224	268
13	Administrative and support service activities	136	-115	202	224
14	Education	99	-10	-155	-65
15	Human health and social work activities	348	2	-625	-275
16	Arts, entertainment and recreation	59	72	335	466
17	Other service activities	18	17	27	63

Source: National Statistics Office of Georgia

Value Added

Based on value added the following economic sectors were identified for the Kakheti region:

1. Manufacturing
2. Construction
3. Wholesale and retail trade; repair of motor vehicles and motorcycles
4. Transportation and storage
5. Agriculture, forestry and fishing
6. Accommodation and food service activities
7. Information and communication
8. Professional, scientific and technical activities
9. Arts, entertainment and recreation
10. Education
11. Real estate activities
12. Water supply; Sewage

Table: Results of Shift-Share Analysis by value added in Kakheti region

	Economic Activity (Sector)	National Growth Effect (NGE)	Industrial Mix Effect (IME)	Competitiveness Effect (CE)	Quantitative Change in Value Added (mln. GEL) (2017, Compared to 2011)
1	Agriculture, forestry and fishing	9	1	5	16
2	Mining and Quarrying	10	-3	-10	-3
3	Manufacturing	80	-2	83	161
4	Electricity, gas, steam and air conditioning supply	19	-4	-2	13
5	Water supply; Sewerage, Waste Management and Remediation Activities	1	0	0.5	2
6	Construction	22	5	22	49
7	Wholesale and retail trade; repair of motor vehicles and motorcycles	29	-1	21	48
8	Transportation and storage	1	0	17	19
9	Accommodation and food service activities	4	3	4	11
10	Information and communication	1	-1	2.2	3
11	Real estate activities	3	0	0.7	4
12	Professional, scientific and technical activities	1	0	2.0	4
13	Administrative and support service activities	2	0	-0.1	2
14	Education	0	0	0.9	1
15	Human health and social work activities	4	1	-1	5
16	Arts, entertainment and recreation	1	-1	1.1	1
17	Other service activities	0	0	-0.1	0

Source: National Statistics Office of Georgia

2.2 RESULTS OF LOCATION QUOTIENT

Location Quotient (LQ) analysis was conducted for the Kakheti region based on employment and value added.

Employment

Based on employment the following economic sectors were identified for the Kakheti region:

1. Agriculture, forestry and fishing
2. Mining and Quarrying
3. Manufacturing
4. Electricity, gas, steam and air conditioning supply
5. Water supply; Sewage,
6. Wholesale and retail trade; repair of motor vehicles and motorcycles

Table: Primary and secondary sectors for Kakheti region based on LQ Analysis

	Economic Activity (Sector)	Number of People Employed in Georgia (2017)	Number of People Employed in Kakheti (2017)	LQ	Primary/ Secondary
1	Agriculture, forestry and fishing	**12699**	**1685**	4.0	**Primary**
2	Mining and Quarrying	8565	569	2.0	**Primary**
3	Manufacturing	92438	5578	1.8	**Primary**
4	Electricity, gas, steam and air conditioning supply	14881	677	1.4	**Primary**
5	Water supply; Sewage, Waste Management and Remediation Activities	14805	678	1.4	**Primary**
6	Construction	76187	2298	0.9	**Secondary**
7	Wholesale and retail trade; repair of motor vehicles and motorcycles	183884	6808	1.1	**Primary**
8	Transportation and storage	56520	714	0.4	**Secondary**
9	Accommodation and food service activities	42154	1249	0.9	**Secondary**
10	Information and communication	21435	300	0.4	**Secondary**
11	Real estate activities	17699	295	0.5	**Secondary**
12	Professional, scientific and technical activities	24988	431	0.5	**Secondary**
13	Administrative and support service activities	25333	370	0.4	**Secondary**
14	Education	22637	311	0.4	**Secondary**
15	Human health and social work activities	69392	1076	0.5	**Secondary**
16	Arts, entertainment and recreation	17091	478	0.8	**Secondary**
17	Other service activities	7458	75	0.3	**Secondary**

Source: National Statistics Office of Georgia

Value Added

Based on Value Added the following economic sectors were identified for the Kakheti region:

1. Agriculture, forestry and fishing
2. Manufacturing
3. Mining and Quarrying
4. Electricity, gas, steam and air conditioning supply

Table: Primary and secondary sectors for Kakheti region based on LQ Analysis

	Economic Activity (Sector)	Value Added created in Georgia (2017) (mln. GEL)	Value Added created in Kakheti (2017) (mln. GEL)	LQ	Primary/ Secondary
1	Agriculture, forestry and fishing	146	23.2	6.4	**Primary**
2	Mining and Quarrying	310	18.0	2.4	**Primary**
3	Manufacturing	2594	201.8	3.2	**Primary**
4	Electricity, gas, steam and air conditioning supply	819	25.8	1.3	**Primary**
5	Water supply; Sewerage, Waste Management and Remediation Activities	254	3.3	0.5	**Secondary**
6	Construction	3133	61.0	0.8	**Secondary**
7	Wholesale and retail trade; repair of motor vehicles and motorcycles	4186	73.8	0.7	**Secondary**
8	Transportation and storage	1999	18.9	0.4	**Secondary**
9	Accommodation and food service activities	700	11.7	0.7	**Primary**
10	Information and communication	819	4.7	0.2	**Secondary**
11	Real estate activities	810	5.4	0.3	**Secondary**
12	Professional, scientific and technical activities	807	5.5	0.3	**Secondary**
13	Administrative and support service activities	423.4	3.6	0.3	**Secondary**
14	Education	271.3	1.6	0.2	**Secondary**
15	Human health and social work activities	1050.2	8.7	0.3	**Secondary**
16	Arts, entertainment and recreation	657.9	1	0.1	**Secondary**
17	Other service activities	57	0.2	0.1	**Secondary**

Source: National Statistics Office of Georgia

ANNEX 3

Ranking of sub-sectors in respective FRs for the identification of leading economic sub-sectors

Nace Code	Functional Region	Minimum number of people employed
Kvareli		
11.02.0	Manufacture of wine from grape	1186
47.11.0	Retail sale in non-specialized stores with food, beverages or tobacco predominating	127
46.34.1	Wholesale of beverages	120
46.75.1	wholesale of chemical products	104
01.25.0	Growing of other tree and bush fruits and nuts	101
10.39.0	Other processing and preserving of fruit and vegetables	101
11.01.0	Distilling, rectifying and blending of spirits	101
01.50.0	Mixed farming	100
01.21.0	Growing of grapes	45
47.52.0	Retail trade of hardware, paints and glass in specialized stores	28
Sagarejo		
01.47.1	Raising of poultry	386
46.23.0	Wholesale of live animals	201
47.52.0	Retail trade of hardware, paints and glass in specialized stores	164
46.21.0	Wholesale of grain, unmanufactured tobacco, seeds and animal feeds	161
11.02.0	Manufacture of wine from grape	125
47.11.0	Retail sale in non-specialized stores with food, beverages or tobacco predominating	120
12.00.0	Manufacture of tobacco products	100
46.34.1	Wholesale of beverages	100
46.69.0	Wholesale of other machinery and equipment	100
47.30.3	Retail sale of automotive fuel in specialized stores	40
Akhmeta		
11.02.0	Manufacture of wine from grape	121
47.11.0	Retail sale in non-specialized stores with food, beverages or tobacco predominating	120
47.52.0	Retail trade of hardware, paints and glass in specialized stores	38
47.30.1	Retail sale of automotive fuel in specialized stores	28
16.10.0	Sawmilling and planning of wood	23
01.47.1	Raising of poultry	21
01.11.1	Growing of cereals	20
01.41.0	Raising of dairy cattle	20
22.23.0	Manufacture of builders' ware of plastic	9
45.32.0	Retail trade of motor vehicle parts and accessories	9
Gurjaani		
11.02.0	Manufacture of wine from grape	778
47.11.0	Retail sale in non-specialized stores with food, beverages or tobacco predominating	481
46.77.1	Wholesale of waste and scrap	143
47.54.0	Retail sale of electrical household appliances in specialized stores	141
01.21.0	Growing of grapes	124
31.09.0	Manufacture of other furniture	101

01.46.0	Raising of swine/pigs	100
10.52.0	Manufacture of ice cream	100
46.34.1	Wholesale of beverages	100
47.30.9	Retail sale of automotive fuel in specialized stores	100
Telavi		
11.02.0	Manufacture of wine from grape	1259
47.11.0	Retail sale in non-specialized stores with food, beverages or tobacco predominating	710
46.39.0	Non-specialized wholesale of food, beverages and tobacco	548
46.34.1	Wholesale of beverages	344
46.90.0	Non-specialized wholesale trade	224
47.54.0	Retail sale of electrical household appliances in specialized stores	204
23.63.1	Production of fresh concrete	201
46.38.2	Wholesale of flour and cereal products	201
47.52.0	Retail sale of hardware, paints and glass in specialized stores	162
47.59.1	Retail sale of furniture	127
Sighnaghi		
47.11.0	Retail sale in non-specialized stores with food, beverages or tobacco predominating	358
47.30.1	Retail sale of automotive fuel in specialized stores	208
47.52.0	Retail sale of hardware, paints and glass in specialized store	146
11.02.0	Manufacture of wine from grape	123
47.54.0	Retail sale of electrical household appliances in specialized stores	121
46.21.0	Wholesale of grain, unmanufactured tobacco, seeds and animal feeds	102
47.30.3	Retail sale of automotive fuel in specialized stores	40
47.76.0	Retail sale of flowers, plants, seeds, fertilizers, pet animals, and pet food in specialized stores	32
01.11.1	Growing of cereals	28
10.41.0	Manufacture of oils and fats	22
Lagodekhi		
47.11.0	Retail sale in non-specialized stores with food, beverages or tobacco predominating	259
47.76.0	Retail sale of flowers, plants, seeds, fertilizers, pet animals, and pet food in specialized stores	231
11.02.0	Manufacture of wine from grape	121
47.30.1	Retail sale of automotive fuel in specialized stores	86
47.52.0	Retail sale of hardware, paints and glass in specialized stores	82
47.73.0	Dispensing chemist in specialized stores	45
47.30.3	Retail sale of automotive fuel in specialized stores	21
10.51.0	Operation of dairies and cheese making	20
11.05.0	Manufacture of beer	20
46.38.3	Wholesale of other food	20

Research