INDUSTRY 4.0 AS AN ALTERNATIVE OF COMPETITIVENESS OF CLUSTERS OF WESTERN PARANÁ, BRAZIL

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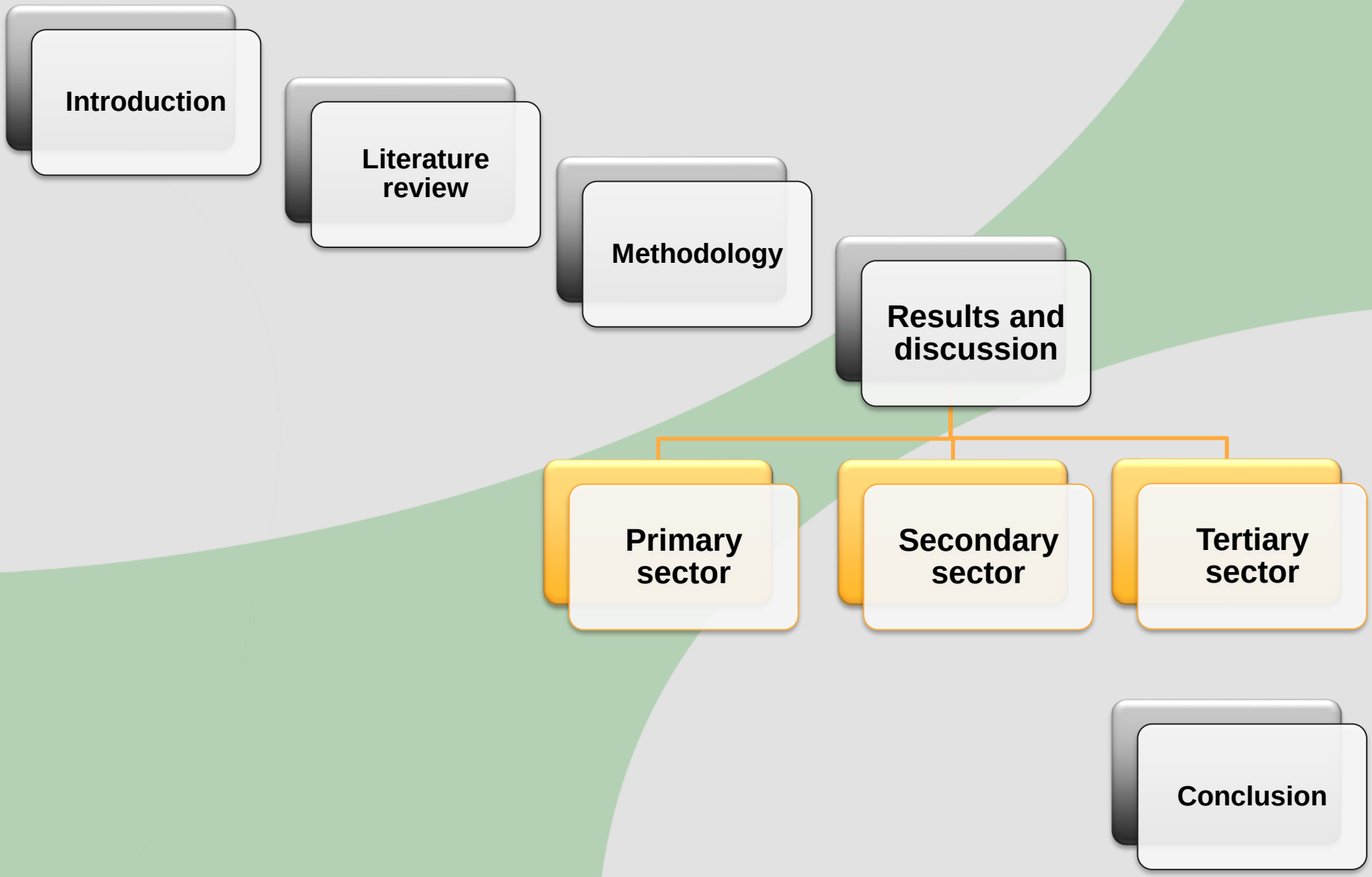
Topics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Primary sector
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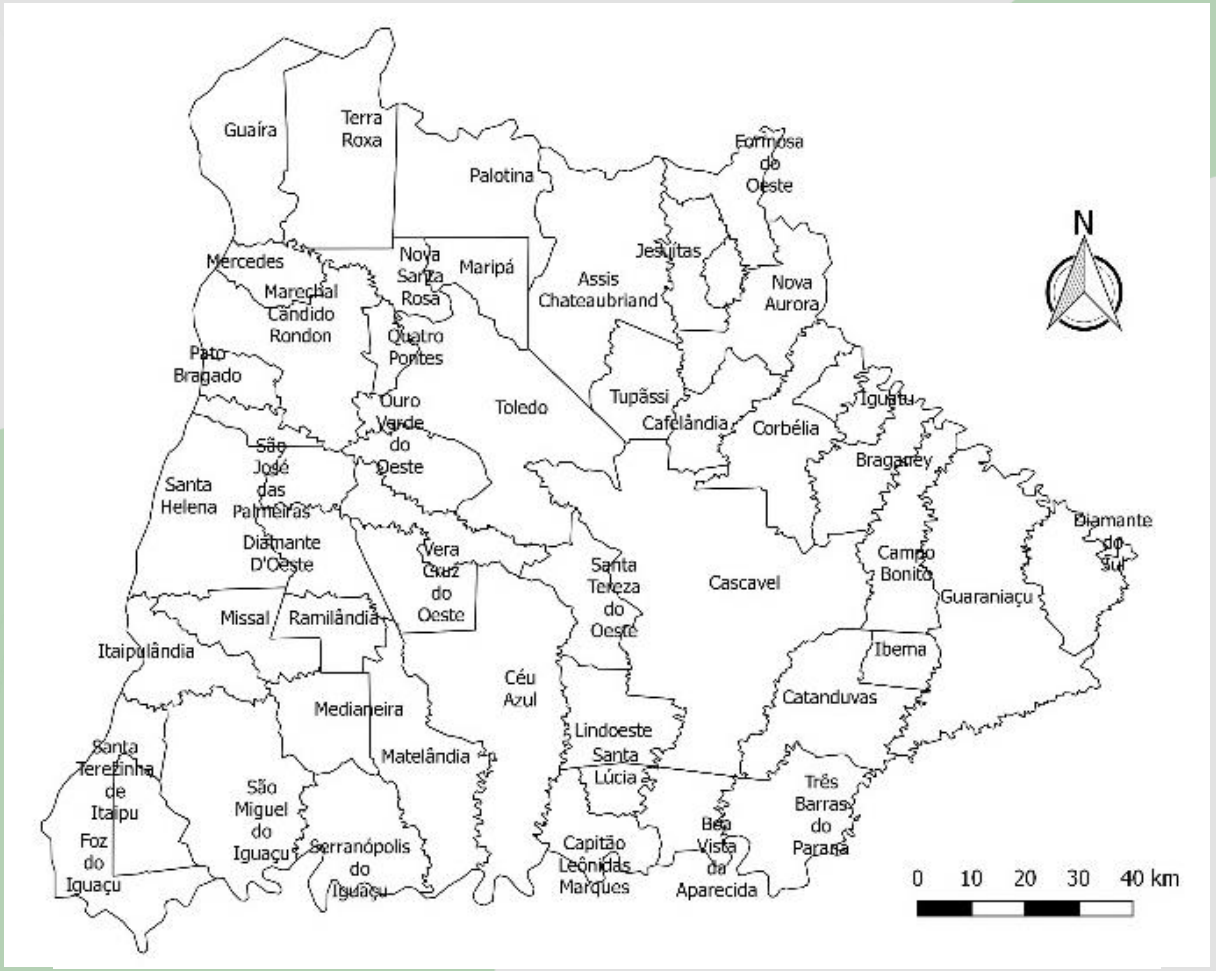
Tertiary sector
Conclusion

Introduction

This study presents preliminary results that will justify the region and the analysis sector which will allow, later, to identify the characteristics of the industry 4.0 of the companies that form this sector.

Introduction

The objective of this paper is to identify the main characteristics of industry 4.0 and the main productive clusters of Western Paraná State, Brazil.



Introduction and Literature review

- Internet of Things
- Mobile devices
- Location detection technologies
- Smart sensors
- Big data
- Augmented reality
- Cloud computing
- Cybersecurity

Forth Industrial Revolution

- Mass Production Era
- Assembly line
- Scale economy production
- Standardized products
- Emerging of the electric energy
- Division of labour

Second Industrial Revolution

Third Industrial Revolution

- Digital revolution
- Automatization
- Information Technology (IT)

First Industrial Revolution

- Introduction of machines
- Substitution of the handicraft
- Methods of mechanic
- Use of steam energy

Introduction and Literature review

Forth Industrial Revolution

- Internet of Things
- Mobile devices
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- The Industry 4.0 consist on a set of smart processes in organizations. In order to achieve this model of production, there are some technological elements that are essential to catalyst the Smart Manufacturing.
- The results of this innovation are digitization and integration of vertical and horizontal value chains, **digitization of product and service offerings** and digital business models and **customers access**.

(Hermann, Pentek & Otto, 2015; Kennedy, 2015; Kurfuss, 2014; Salkin et al.,2018)

Introduction and Literature review

Summarizing:

Regions specialized in a certain activity ensure a high level of competitiveness in a global perspective, in which activity is a catalyst of spillover effect, contributing to the leverage of the organization and their stakeholders, consequently, reflecting in the regional development and the formation of cluster of innovation.

(Porter, 1989 & 1998; Friedmann, 1956; Schumpeter, 1997; Vieira Filho & Fishlow, 2017).

Methodology

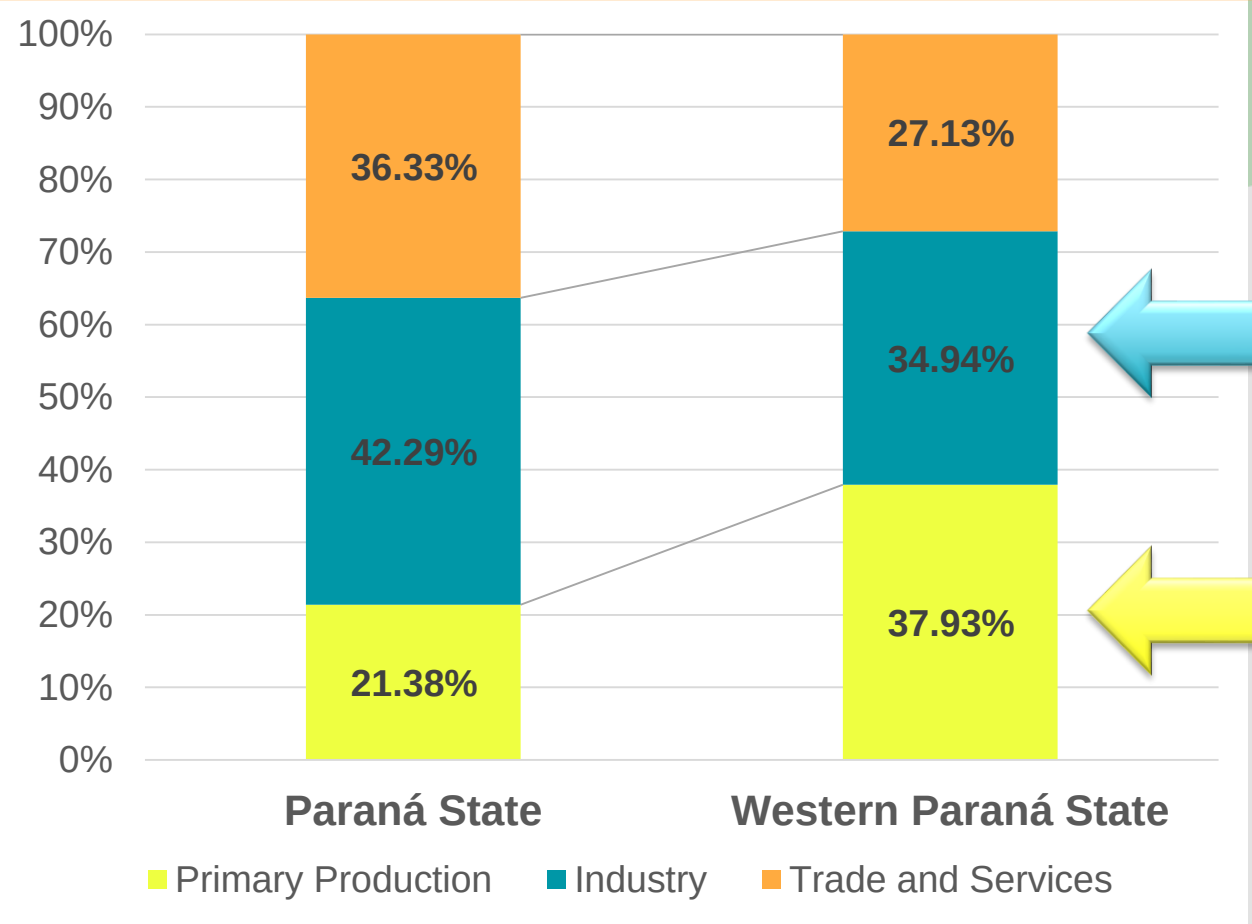
- Official data and a descriptive approach.
- Data from formal employment (*FE*) of RAIS (Annual Relation of Social Information, in Portuguese, *Relação Anual de Informações Sociais*, 2017).
- **Analysis tool:**
  - The case study on web sites of Paraná cooperatives uses a qualitative methodology, applying the dedicated web site analysis guideline proposed in Andreica (2009). Within the analysis, we use dedicated website analyzers, which also include quantitative data and traffic analyses, such as **Alexa.com, Websiteoptimization.com, Checkmycolours.com**.
  - **Locational Quotient (LQ) –** To show the more specialized sectors (it can be used to show potential cluster/sectors) in sector ***i,*** region ***j,*** with a reference region ***t*** (Paraná State)

$$LQ = \frac{FE_{ij}/FE_{it}}{FE_{tj}/FE_{tt}}$$

Preliminary Results

Results and Discussion

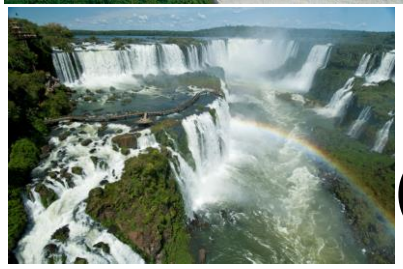
Added Tax Value, by sectors - 2016

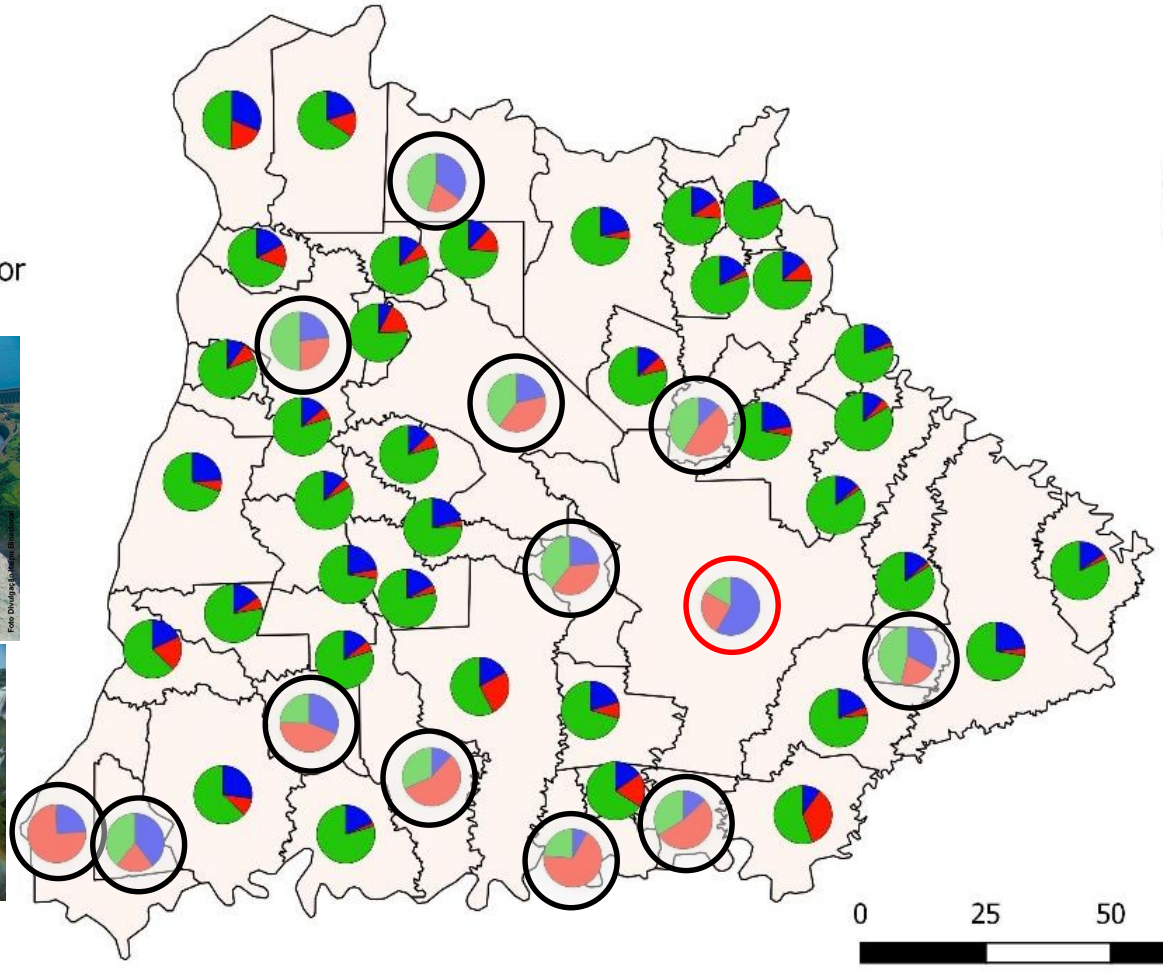


Source: prepared by the author based on IPARDES (2018).

Results and Discussion

Diagram of Added Tax Value per municipality - 2016





Source: search research.

Results and Discussion

Total Formal Employee in 2017

= 352.963

By sector

Primary Production = 13.683 (3,88%)

Industry = 101.481 (28,75%)

Trade and Services = 237.799 (67,37%)

Industrial Sector

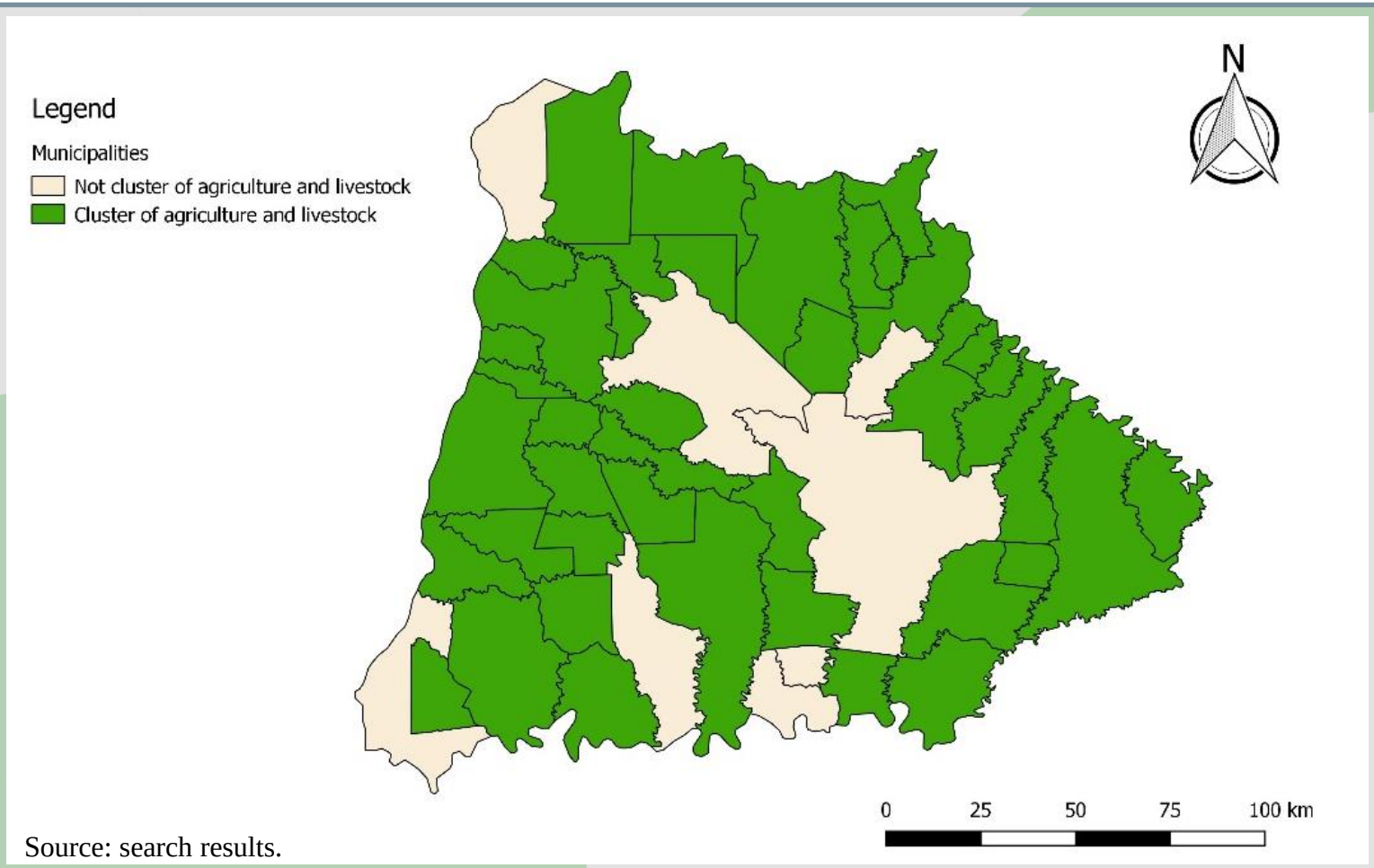
- **Extractive Mineral = 0,38%**
- **Manufacturing Industry = 83,70%**
- **Industrial Utility Services = 2,42%**
- **Building = 13,50%**

Manufacturing Industry (83,70%)

IBGE Subsetor	Micro	Small	Midsize	Large	Total	%
Non Metallic Mineral Prod.	1.859	937	254	-	**3.050**	3,59%
Metallurgical industry	2.391	1.167	-	-	**3.558**	4,19%
Mechanical industry	1.622	1.091	1.240	-	**3.953**	4,65%
Electrical and Com.	228	224	120	-	**572**	0,67%
Transportation Material	554	244	-	1.339	**2.137**	2,52%
Wood & Furniture	2.070	852	1.090	-	**4.012**	4,72%
Paper and Graphic Ind.	949	342	134	-	**1.425**	1,68%
Rubber, Smoke, Leather	682	457	373	-	**1.512**	1,78%
Chemical industry	826	904	1.495	3.831	**7.056**	8,31%
Textile industry	1.793	3.302	1.437	635	**7.167**	8,44%
Footwear Industry	65	283	239	-	**587**	0,69%
Food and beverage	2.556	4.770	5.846	**36.738**	**49.910**	**58,76%**
Total	**15.595**	**14.573**	**12.228**	**42.543**	**84.939**	100,00%
%	18,36%	17,16%	14,40%	**50,09%**	100,00%	

Results and Discussion

Locational Quotient (LQ) of agriculture and livestock in Municipalities of Western Paraná State - 2017



Source: search results.

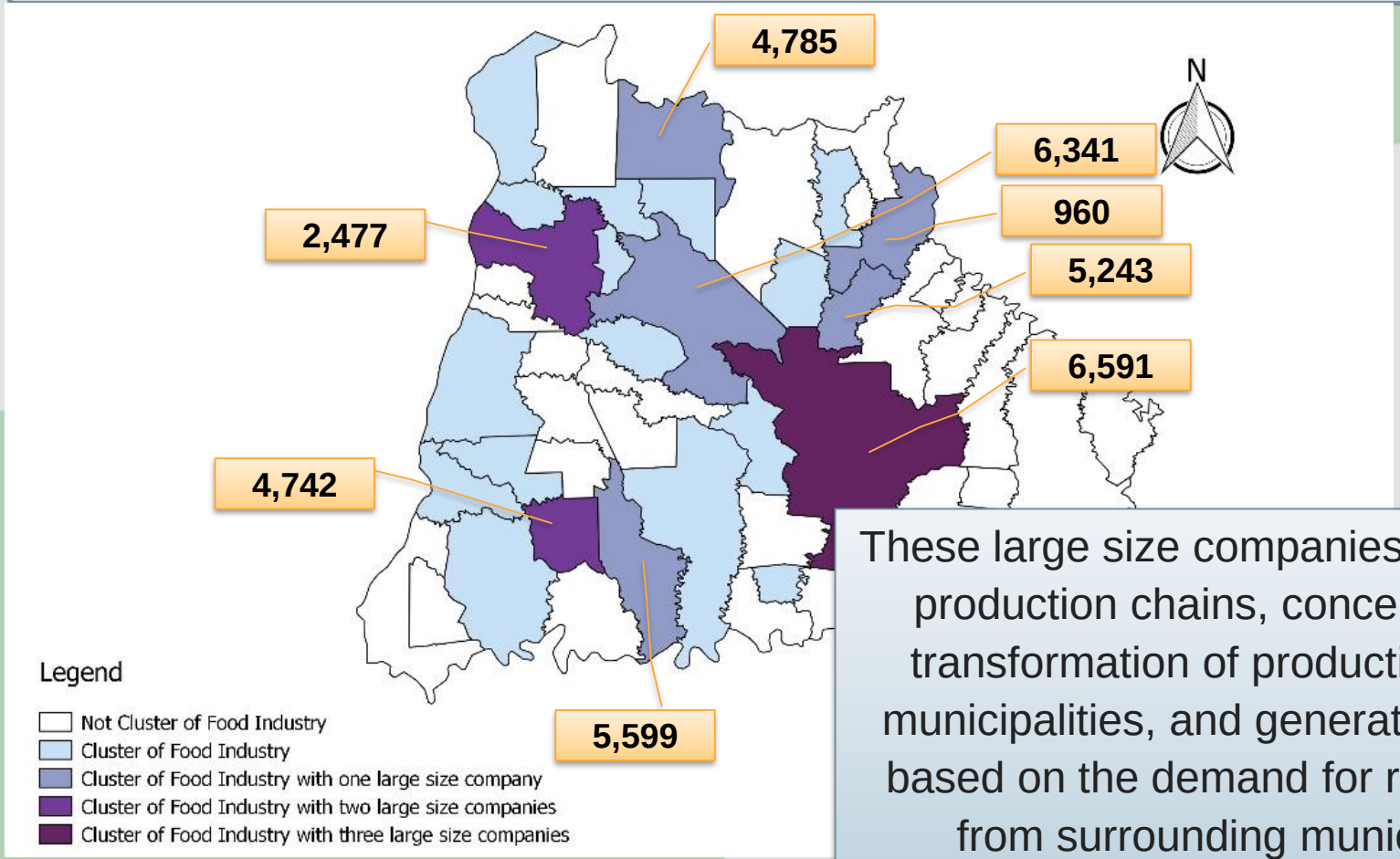
Results and Discussion

Number of Locational Quotient (LQ) of Secondary sector of Western Paraná State - 2017

Source: search results.

Results and Discussion

Locational Quotient (LQ) of food industry and number of large size companies per municipality of Western Paraná State - 2017



These large size companies create strong production chains, concentrating the transformation of production in these municipalities, and generating **linkages** based on the demand for raw materials from surrounding municipalities.

Source: search results.

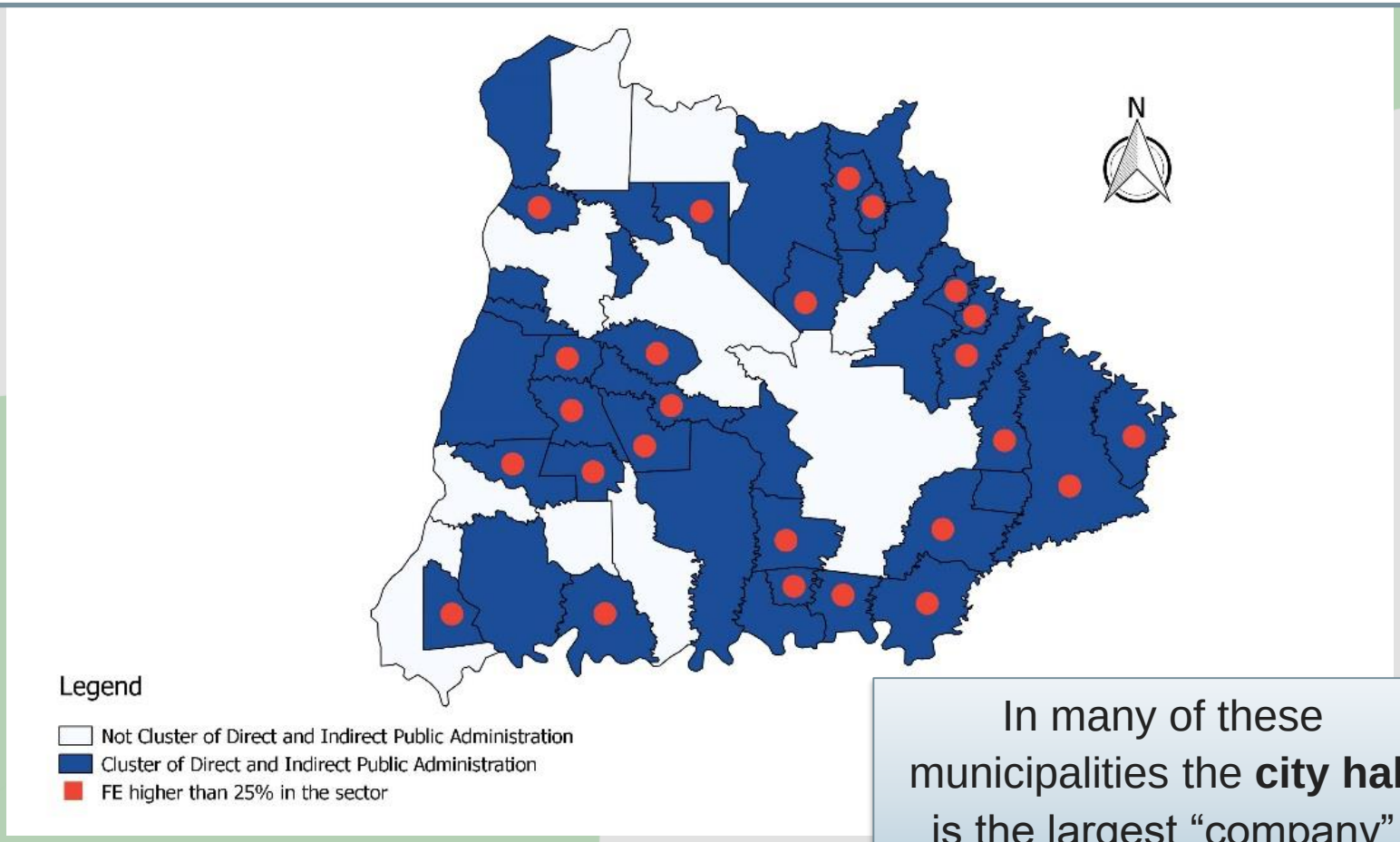
Results and Discussion

Number of Locational Quotient (LQ) of Tertiary sector of Western Paraná State - 2017

Source: search results.

Results and Discussion

Locational Quotient (LQ) of direct and indirect public administration and Formal Employment (FE) higher than 25% per Municipalities of Western Paraná State - 2017



In many of these municipalities the **city hall** is the largest “company”

Source: search results.

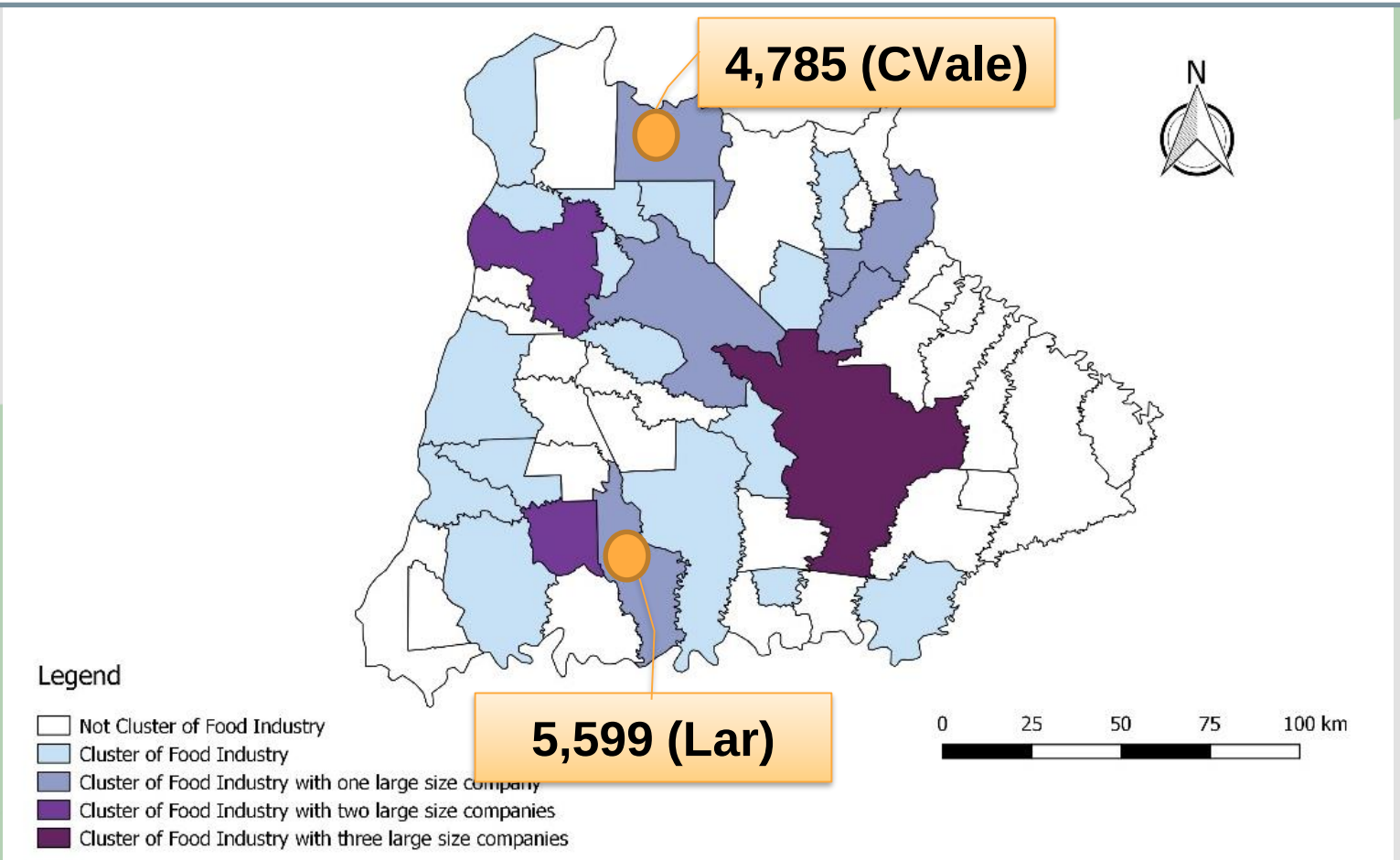
New media tools used by some representative large companies

Case Study on Main Cooperative Websites from Paraná State

- According to a ranking performed in Paraná State (Ranking, 2018), the three biggest cooperatives in Paraná are:
  - **Coamo** - http://www.coamo.com.br/site/ (with the central point in East Paraná and farms also in West Paraná)
  - **C Vale** - http://www.cvale.com.br/
  - **Lar** - http://www.lar.ind.br/v4/

Results and Discussion

Locational Quotient (LQ) of food industry and number of large size companies per municipality of Western Paraná State - 2017



Source: search results.

New Media Tools

Feature	Coamo Website http://www.coamo.com.br/site/	CVale Website http://www.cvale.com.br/	Lar Website http://www.lar.ind.br/v4/
Global Rank	1,183,934	832,904	1,561,198
Rank in Brazil	33,203	30,585	-
Traffic from Brazil	100.0%	97.7%	-
Bounce rate	60.0%	35.7%	18.20%
Daily page views per visitor	4.7	2.6	3.3
Daily time on site (min)	2:25	2:37	4:19

Bounce rate: the percentage of visitors who navigate away from the site after viewing only one page.

Conclusion

- The **region has a high potential of specialization and productive chains**.
- The analysis indicates that the agriculture and livestock farming is the “driving force” of the region.
- The development of food industry can be related to improvement of agriculture and livestock farming.
- The efforts and investments in implementing automation in the agriculture and livestock farming can strongly impact the regional development of the Western Parana State.

Next steps:

- Characterize the large food and beverage industry according to the use of technology and verify whether they use elements of industry 4.0, or industry 3.0 or earlier.
  - By application of questionnaires and interviews with company administrators.
- According to the potential use of the elements that characterize industry 4.0 we want to verify the possible impacts that the region may feel in terms of employment and income.
  - This methodology has not yet been developed.

Thank you for your attention!

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