

## Municipal development in the differentiated mesoregions of the western Amazon

### Desenvolvimento municipal nas mesorregiões diferenciadas da Amazônia ocidental

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#### Abstract

This paper analyzes the attractiveness and disparity in the socio-economic development of municipalities that make up the Differentiated Mesoregions High Solimões and Acre River Valley, both located in the western area of the Brazilian legal Amazon. The methodology consisted of the estimation of centrality and regional disparity indices based on population, growth, and socio-economic development data. The municipalities have improved their human development indicators but have not yet managed to advance in terms of employment and income. The convergence of socio-economic indicators was positive, demonstrating that changes in the productive and social structure of municipalities have improved their attractiveness and reduced disparities in socio-economic development. However, they remain very significant, especially when compared inter-and intra-regionally.

**Keywords:** regional development; urban economy; economic development; Amazon; Acre; Solimões.

#### Resumo

Este artigo analisa a atratividade e a disparidade no desenvolvimento socioeconômico dos municípios que compõem as Mesorregiões Diferenciadas Alto do Solimões e Vale do Rio Acre, ambas localizadas na área ocidental do espaço da Amazônia legal brasileira. A metodologia utilizada foi a estimativa dos índices de centralidade e disparidade regional a partir de dados da população, de crescimento e de desenvolvimento socioeconômico. Os resultados demonstraram que os municípios melhoraram seus indicadores de desenvolvimento humano, mas ainda não conseguiram avançar em emprego e renda. A convergência dos indicadores socioeconômicos foi positiva, demonstrando que as mudanças na estrutura produtiva e social dos municípios, melhoraram sua atratividade e diminuíram as disparidades no desenvolvimento socioeconômico. Contudo, continuam bem significativas, sobretudo quando comparadas inter e intrarregionalmente.

**Palavras-chave:** desenvolvimento regional; economia urbana; desenvolvimento econômico; Amazônia; Acre; Solimões.

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## 1 INTRODUCTION

Commonly, the terms economic growth and development are used interchangeably, but this affinity is not straight in social reality. Economic growth alludes to increases in productivity and efficiency of production factors (capital, labor, natural resources, technology), which reflect on society's quality of life. In addition, economic growth is associated with the expansion of the Gross Domestic Product (GDP), while economic development is associated with improvements in the population's living conditions, such as access to health, education, and decent employment, together with a reduction in socio-economic inequalities. Capitalist development, especially in Brazil, has risen to an increasingly unequal collectivity, not necessarily generating full economic development, which requires increasingly territorialized interventions (HADDAD, 2009; KUHN, 2015; SILVA; FERRERA DE LIMA, 2014; JOYAL, 2019).

In this context, it is relevant to study forces of dispersion and concentration, that is, the centrality and convergence of the dynamics of growth and economic development in the regions. This dynamic reflects the result of the action of economic agents (companies, families, individuals) and the effectiveness of public policies to minimize regional inequalities and stimulate the productive structure of the regions.

The actions of the Brazilian National Policy for Regional Development (PNDR) stand out as a public policy instrument, which established 13 Differentiated Mesoregions in the national territory through the implementation of the Program for the Promotion of Sustainability of Sub-Regional Spaces (PROMESO), aiming at minimizing regional inequalities. PROMESO classified the "Differentiated Mesoregions" as contiguous spaces that exceed state boundaries, configured from similar physical, economic, social, and

cultural characteristics, which allow the configuration of a political-institutional arrangement based on socio-economic development indicators (FERRERA DE LIMA; EBERHARDT, 2010; RESENDE et al., 2017; FERRERA DE LIMA, 2020). Two Differentiated Mesoregions were classified in the Western Amazon, as follows: High Solimões and Acre River Valley (BRASIL, 2010). More than a classification, PROMESO's actions aimed at mobilizing local leaders to indicate and articulate priority investments to improve the socio-economic dynamism of the Mesoregions.

In this context, the following question arises: Were there changes in the productive and social structure of municipalities that improved their attractiveness and reduced the disparities in the socio-economic development of the Differentiated Mesoregion during the PROMESO's actions? This study analyzes the attractiveness and disparity in the socio-economic development of the municipalities that make up the Differentiated Mesoregions High Solimões and Acre River Valley, located in the western portion of the Brazilian legal Amazon, to answer the question. This analysis does not intend to evaluate the PROMESO's actions, but the behavior in terms of growth and socio-economic development of municipalities in the Mesoregions during the term of the Program.

The analysis uses official data on the Gross Domestic Product (GDP), location of the population, and performance of the Firjan Municipal Development Index (FMDI) to estimate indicators of centrality and regional disparity from 2005 to 2016. This time frame determines a cycle of expressive growth in the Brazilian economy and the PROMESO term. More details of these indicators and Mesoregions will be presented in the methodological section of this paper.

In addition to contributing to the discussion on regional development,

especially the Differentiated Mesoregions High Solimões and Acre River Valley mentioned above, this study will also provide subsidies to assist in the monitoring of regional economies and the evaluation of planning and formulation actions of public policies undertaken by the Federal Government.

Thus, this study is structured in five sections to meet the proposed objective and methodology. The first section, composed of this introduction, presents a discussion about differentiated mesoregions to involve the development processes and contextualize the research object. The following section presents the theoretical framework that guides this research, with an emphasis on development theories, PNDR, and structural changes that encompass the population of a polarized region. The methodological procedures are exposed in the third section, while the results and discussion comprise the fourth section. The study is finished with the final considerations.

## 2 THEORETICAL FRAMEWORK

The theories of regional development originated from the theory of location and spatial geography, whose basic elements are space, where agglomerations are located, the market area, and its organization, as well as the population distribution in that space. From this perspective, the more attractive the space, the more stimuli there will be for new agglomerations and centralities (ALVES, 2016; JOYAL, 2019). However, economic development does not appear or occur simultaneously in all regions or municipalities, as it manifests itself in a concentrated way in economic growth centers marked by the driving force of attractiveness and force fields that cause polarization (PERROUX, 1977).

Thus, the classical approach of regional development theories is aligned with comparative advantage, mercantile exchange, and spatial flows of capital and

labor in stimulating the location of productive activities, especially local exporters, and the population attractiveness (KÖHLER, 2013; SILVA; FERRERA DE LIMA, 2017; WILLERS, 2016).

As discussed in the central place theory pointed out by Walter Christaller (1966) and August Lösch (1954), cities are essentially service provider centers for these populations and their regional surroundings. The distribution of economic activities in Lösch's model is interrelated to commercial, transport, and administrative elements that correlate with distance, large-scale production, and competition. According to Christaller (1966), the urban organization in the regional space results from a hierarchy of places developed by a connection between the urban and the services, that is, the secondary and tertiary sectors. The urban network in the model of centrality has different dynamics in terms of size, function, relative spatial position, and hierarchy within its region. As the attractiveness of the centers for new services and transformation activities advances, its centrality is strengthened in the region where it operates (ALVES, 2016).

The existence of central places is directly related to factors such as demographic density, per capita income, and urban productive activities. Another significant factor is the socio-economic development level of the population, which adds demand for more specific and sophisticated goods (CHRISTÄLLER, 1966; FIGUEIREDO, 2009).

Furthermore, the population tends to migrate with the advancement of activities that generate employment and income opportunities, a fact that generates an agglomeration of people in one location and causes an urbanization effect (BENKO, 1993; ENDLICH, 2007; RIPPEL; RIPPEL; MICHELON, 2011). Thus, regional development is distinguished by the expansion of per capita GDP by the change in the population location and the productive structure of the regional

economy (FERRERA DE LIMA, 2020), especially in the apparatus of renovation and strengthening of the urban network. The demographic effects of population dynamics result from the attractiveness promoted by polarizing agglomerations called central places (STAMM; FERRERA DE LIMA; SANTOS, 2017).

Legitimate possibilities of actions and development strategies began to be considered in the advancement of regional development theorization, which stimulates public policies for regional development and more local or endogenous actions (WILLERS, 2016). In this sense, in addition to public policies, endogenous development strategies can also strengthen agglomerations and attract population groups, such as cooperation networks. However, limitations can be highlighted in the construction of an effective collective project since the performance of local agents depends on their concrete participation in the implementation of strategic actions and the recognition of regionally existing problems and particularities (STAMM; FERRERA DE LIMA; SANTOS, 2017; FREITAS; LIMA, 2020).

Historically, regional development strategies have included institutional support in the State, often being responsible for the paths taken by regions and their agglomerations through intervention both in territorial ordering and in the regulation of externalities. However, currently, it is not just about deliberating resources, but better managing them in a participatory and territorially distributive way with the support of communities (MYRDAL, 1965; BEDUSCHI FILHO; ABRAMOVAY, 2004; FERRERA DE LIMA, 2020; RESENDE et al., 2017). Thus, the new perspectives boosted the regions and their centrality through the implementation of public policies for economic development, as a promoter of interventions to mitigate regional disparities.

Thus, public policies, the theory of poles, and population dynamics allow us to

understand regional socio-economic transformations, because among the dynamic effects driven by the driving forces located in central places are their effects as a result of the attractiveness of polarizing agglomerations. Furthermore, the relationships between economic development and urban agglomeration are intrinsic, as they reflect factors of attraction and spatial-sectoral agglomeration of economic activities (MARSHALL, 1985; BENKO, 1993). In other words, it is a process of historical and structural transformation in different situations, whose approach is analogous to the perspective of technical and economic progress and advancement in the qualitative levels of life in society (RIPPEL; RIPPEL; MICHELON, 2011).

In Brazil, under the aegis of the Ministry of National Integration, currently, the Ministry of Regional Development, the creation of PROMESO stood out under the PNDR discussions as a public policy aimed at reducing regional inequalities and promoting socio-economic development. The relevance of PROMESO is equivalent to the recognition of the endogenous potentials of differentiated mesoregions through the promotion of priority local productive arrangements and the strengthening of regional forums, established in the PNDR guidelines (BRASIL, 2009).

PROMESO has stimulated the empowerment of regional leaders through development councils and forums in selected regions, known as differentiated, throughout the Brazilian territory. In addition, PROMESO has expanded the “voices” of different regions and, in a participatory manner, allowed recognizing potentials and vulnerabilities, indicating the forwarding of priorities in the demands of the community in terms of actions and financing of infrastructure and promotion of productive activities (FERRERA DE LIMA; EBERHARDT, 2010; FERRERA DE LIMA, 2020). Among the differentiated mesoregions, the two located in Western

Amazon were chosen: Acre River Valley and High Solimões. In Brazil, these mesoregions are among the poorest or stagnant among the Brazilian mesoregions and are in a space that demands attention both for their environmental peculiarities and for the characteristic of an agricultural and international frontier space (ALENCAR, 2005; CORTÉS; REIS; RAPOZO, 2020).

### 3 METHODOLOGY

This section presents the characterization of the study area and the methodological procedures used to understand the economic, population, municipal socio-economic development, centrality, and disparity dynamics in the Differentiated Mesoregions of High Solimões and Acre River Valley.

#### 3.1 Characterization of the study area

The units of analysis of this study

are the Brazilian municipalities located in the Differentiated Mesoregions of High Solimões and Acre River Valley, which cover 22 municipalities. In this sense, High Solimões is represented by nine municipalities in the State of Amazonas, while the Acre River Valley is represented by 11 municipalities in the State of Acre and two municipalities in the State of Amazonas, selected and distributed according to Federal Ordinance No. 954, of 24th November 2010 (BRASIL, 2010). Both Mesoregions have indigenous and riverside communities and the municipalities are characterized by a low Municipal Human Development Index (MHDI), a high index of social vulnerability, and inefficiency of public institutions (ALENCAR, 2005; CORTÉS; REIS; RAPOZO, 2020).

Figure 1 shows the map of Brazil with the Brazilian Differentiated Mesoregions, highlighting the location of the Differentiated Mesoregions that make up the study, that is, High Solimões and Acre River Valley.

Figure 1 - Brazil: Differentiated Mesoregions - 2010



Source: Adapted from the Ministry of National Integration, 2010.

Figure 1 Map of Differentiated Mesoregions: High Solimões; Acre River Valley; Mangabeiras Plateau; Araripe Plateau; Jequitinhonha/Mucuri Valley; Itabapoana Basin; Ribeira/Guaraqueçaba Valley; Great Mercosur Border; Southern Half of Rio Grande do Sul.



### 3.2 Methodological procedures

This is a documentary/bibliographic research related to the collection of information in reference databases in the area (GIL, 2002) in the electronic databases of the Institute for Applied Economic Research (IPEA/IPEADATA), the Industry Federation of the State of Rio de Janeiro (FIRJAN), and the Brazilian Institute of Geography and Statistics (SIDRA/IBGE). The period of analysis was from 2005 to 2016 due to the availability of information for all indicators. Also, the period from 2005 to 2016 is a moment of strong economic growth until the economic downturn in 2016. The data were organized, tabulated, and equated in an electronic spreadsheet of Excel version 2010.

The collected data refer to economic and population (resident population per municipality), municipal development (Firjan Municipal Development Index), and centrality and disparity dynamics (Gross Domestic Product), considering the intra-regional (relative to the Differentiated Mesoregion) and inter-regional municipal scope (relative to Brazil).

The data choice and methodological procedure are based on Christaller's Central Place Theory (1966). In this theorization, the central place acts as a locus of fundamental services for itself and related spaces or complementary regions both in the relationship between city and country and between country and city, better reflecting mutual interaction. The higher the centrality, the higher the attractiveness of productive activities located in the urban area of the municipality relative to the production and population location.

Thus, the data regarding the economic dynamics were collected from the municipalities that make up the differentiated mesoregions referring to the total GDP at current prices, disaggregated by sectors of urban economic activity (secondary and tertiary), both deflated based on the National Consumer Price Index (INPC), using 2005 as the reference

year. The percentage participation, ranking, and average annual municipal inter-regional and intra-regional variation were estimated for the analysis and discussion of the results considered.

The data, concepts, and methodology of the Brazilian Institute of Geography and Statistics (IBGE) were used through the retroplated series, i.e., the values of the old series were adjusted to the new reference year, leading the series to have similar or aligned values over time (IBGE, 2020). In the statistical series, the secondary sector corresponds to the transformation, extractive, energy, and civil construction industries; the tertiary sector corresponds to the trade of goods, provision of services, civil servants, and the military. Furthermore, the sectorial GDP at current prices excludes any tax and transport costs billed separately and includes any subsidy on the product.

In the population dynamics, the resident population and population estimates for each municipality based on the extraction from the SIDRA/IBGE (2020) and the Institute for Applied Economic Research (IPEADATA, 2020) database were considered. The percentage participation, ranking, and average annual municipal inter-regional and intra-regional growth variation rates were estimated for the analysis and discussion.

The Firjan Municipal Development Index (FMDI) was used as a parameter in the municipal socio-economic development dynamics. This index is prepared by the Industry Federation of the State of Rio de Janeiro, considering three areas of human development, namely: employment and income, education, and health, based on official public statistics provided by the Brazilian federal government. The classification of municipalities according to FMDI: low stage of development, with an index in the range from 0.00 to 0.399; regular development, with an index in the range from 0.400 to 0.599; moderate development, with an index in the range from 0.600 and 0.799; and high stage of

development, with an index in the range from 0.800 and 1.00 (FIRJAN, 2020).

The educational dimension is estimated from data and concepts from FIRJAN (2020), considering the data on early childhood education, dropout in elementary school, age and grade distortion in elementary school, teachers with higher education in elementary school, the average number of hours and daily classes in elementary school, and the result of the basic education development index in elementary school. The health dimension is based on primary care, given the proportion of adequate prenatal care, sensitive hospitalization to primary care, and deaths due to ill-defined causes and infant deaths due to preventable causes. In addition, the employment and income dimension is

estimated from data on formal employment generation, the labor market formalization rate, income generation, actual wages in the formal labor market, and the Gini index of inequality of income in formal labor. The set of these dimensions, which make up the FMDI, provide a framework for municipal socio-economic development over time.

Specifically in the centrality dynamics, the centrality indicator, adapted from Christaller (1966) by Bidarra and Ferrera de Lima (2019), was estimated taking the intra-regional (Differentiated Mesoregion) and inter-regional (Brazil) context as the universe of analysis, weighing economic data on the total GDP and urban GDP in the secondary and tertiary sectors, as well as population data, respectively included in the equation:

$$CI = (Yurb \div M) * (Ytot \div Muniv) \quad (1)$$

Where: CI = Centrality Indicator of the differentiated mesoregion; Yurb = urban GDP (secondary and tertiary sector) of the municipality; M = municipality population; Ytot = total GDP of the municipality; and Muniv = Total population of the differentiated mesoregion or Total population of Brazil.

The following parameters are used to interpret the performance of municipalities in the Centrality Indicator (CI): low degree of centrality, when values are below 1.99; median degree of centrality, when values are between 2.00 and 4.99; and a high degree of centrality, when values are above 5.00. The higher the centrality, the higher the attractiveness of urban productive activities in the municipality.

The performance of urban economic activities, which are the basis of this indicator, is based on the assumption that, when the variation is positive, there was

economic and/or population growth related to the dynamics of the urban economy; when they are considered low, the negative variation indicates that the municipality has a cooled economy in the secondary and tertiary sectors, which are the most attractive for the population seeking employment and income (BIDARRA; FERRERA DE LIMA, 2019).

In addition to the Centrality Indicator, the regional inequality was also estimated through the Disparity Indicator (DI). The calculation of this indicator was presented by Houard and Marfouk (2000) and adapted by Raiher, Ferrera de Lima, and Ostapechen (2017) and Freitas and Ferrera de Lima (2021). In this study, DI considers the disparities between FMDIs from their convergence, i.e., their inclination or trend to the same dynamics, according to the equation:

$$DI = (FMDI_i - FMDI_{min j}) \div (FMDI_{max j} - FMDI_{min j}) \quad (2)$$

Where: FMDI<sub>i</sub> = general FMDI of the municipality of the differentiated mesoregion; FMDI<sub>min</sub> = lowest FMDI in

the municipality of the differentiated mesoregion; and FMDI<sub>max</sub> = highest FMDI in the municipality of the

differentiated mesoregion.

Thus, the results were classified as follows to interpret the dynamics of regional inequality in the Differentiated Mesoregion: convergent to the most developed, for results above 0.30; tending to convergence with the most developed, for results between 0.19 and 0.29; and divergent or stagnant relative to the most developed, for results below 0.18.

This indicator points to the convergence of development of municipalities, that is, the higher the FMDI of the Differentiated Mesoregion, compared to the maximum obtained FMDI, the closer to the most developed unit in the context of the Mesoregion (RAIHER; FERRERA DE LIMA; OSTAPECHEN, 2017; FREITAS; FERRERA DE LIMA, 2021). Thus, both CI and DI will point out if there have been changes in the productive and social structure of the municipalities that have improved their attractiveness and socio-economic development in the Differentiated Mesoregion space during the PROMESO's actions. The results for the behavior of GDP, population, and CI data were presented in a textually focusing on the most significant results. The DI results were presented in tables and in textually.

## 4 RESULTS AND DISCUSSION

This section will present and discuss the results of economic, population, and municipal socio-economic development, centrality, and disparity dynamics in the Differentiated Mesoregions of High Solimões and Acre River Valley.

### 4.1 Centrality and disparity in the Differentiated Mesoregion of High Solimões

The socio-economic dynamics of municipalities belonging to the Differentiated Mesoregion of High Solimões presents some important considerations relative to the municipality performance in terms of economic growth,

that is, GDP growth. Intra-regionally, Atalaia do Norte, Benjamin Constant, and São Paulo de Olivença were the municipalities that improved their positions in the GDP participation relative to the Mesoregion. On the other hand, Fonte Boa, Santo Antônio do Içá, and Tonantins lost percentage participation from 2005 to 2016. Amaturá, Jutaí, and Tabatinga remained in the same position between 2005 and 2016.

Fonte Boa stood out negatively, moving from 2nd to 7th place in the regional ranking, losing percentage participation and expressiveness. In this sense, Carvalho (2010) reported that the municipality has the basic urban infrastructure, a central strategic position between the Jutaí and Japurá River basins, and an intense production and marketing process involving Pirarucu fishing. However, due to the transformations arising from the phenomenon of “sustainable management”, its articulation occurred unequally and depended on taxation and resource transfer policies, externalities that imply losses for the municipality's economy.

Tabatinga is the municipality with the highest economic relevance, surpassing the others in terms of importance in generating wealth. On the other hand, Amaturá was the municipality that showed the least expressiveness. The disparity between them in terms of GDP participation was significant due to the basic urban infrastructure that the municipality has to make viable and unfeasible economic activities in agriculture, industry, administration, education, and public health (ALENCAR, 2005).

Moreover, inter-regionally, the Differentiated Mesoregion of High Solimões is not very expressive in terms of wealth generation compared to Brazil's GDP, with Tabatinga standing out among the municipalities, but below 0.01%. Tabatinga also concentrates 25.1% of the entire population of the mesoregion, being the main center of administrative reference and provision of essential services for



several municipalities. Therefore, it is a significant central place since it is more dynamic economically and regarding its population, corroborating the central place theory and polarization pointed out by Christaller (1966) and Perroux (1977).

In this context, the average annual variation of the total GDP of the Mesoregion between 2005 and 2016 was not expressive although it increased mainly in the municipality of Atalaia do Norte, which has strategic importance due to its location on the border with Colombia and Peru (REIS et al., 2020).

Furthermore, the dynamics of the tertiary sector in Atalaia do Norte and Santo Antônio do Içá was transferred to the primary sector in this period. This change is explained by Rubim (2016) and Reis et al. (2020) as a result of demographic flows marked by the demarcation of indigenous lands and more intensive exploitation of swiddens and forest extractivism. In a different economic growth dynamic, Amaturá proportionally distributed its participation from the tertiary to the secondary and tertiary sectors due to the commercialization of fish in the channel of the Solimões River (MORAES; SCHOR; GOMES, 2010), but still inexpressive, i.e., below 3% of the total GDP of the Differentiated Mesoregion of High Solimões. Fonte Boa also drew attention due to the proportional transfer of its economic dynamics from the primary to the secondary and tertiary sectors, which corroborates the structure advocated by Silva and Ferrera de Lima (2014). Carvalho (2010) explained this structural rupture in the economy due to the intense dynamics of the fish production, processing, and marketing chain, which occurred in Fonte Boa over time.

Regarding the Centrality Indicator, Tabatinga stood out intra-regionally as the most important central place in the Differentiated Mesoregion of High Solimões (Table 1). The municipalities Benjamin Constant, Jutaí, and Tabatinga showed a high degree of centrality,

indicating the existence of attractiveness. Also, a significant increase in the degree of centrality was found from 2005 to 2016, corroborating the action of forces of attraction pointed out by Christaller (1966), Perroux (1977), and Ferrera de Lima (2016), which, in this study, are forces arising from the population attractiveness and wealth generation in urban sectors, especially in Tabatinga. Inter-regionally, the centrality of the Differentiated Mesoregion of High Solimões is low when compared to Brazil, varying between 0.002 and 0.011. In other words, the internal transformations in the economic structure and population distribution in the Mesoregion were still not enough to make it stand out in the face of the Brazilian regional dynamics.

The GDP and Centrality Indicator performance is based on economic growth. Intra-regionally, the general FMDI of High Solimões pointed to regular socio-economic development. The variable employment and income decreased for most municipalities from 2005 to 2016, showing a low development, except for Tabatinga, which showed regular development. Also, Petry et al. (2020) reported dependence on underemployment or financial assistance from city halls and social programs in the most populous municipalities. In other words, economic dynamics have affected the performance of municipalities in improving the population's living conditions.

The variable health showed a trend towards development in most municipalities, except for Atalaia do Norte and Jutaí, which remained at a low of development. Thus, Amaturá, Benjamin Constant, Santo Antônio do Içá, and São Paulo de Olivença showed regular development, while Fonte Boa and Tabatinga had a moderate development. According to Petry et al. (2020), Tabatinga and Benjamin Constant house the main hospitals in the Differentiated Mesoregion of High Solimões, providing services to the entire community. However, Alencar

(2005) and Calegare et al. (2013) drew attention to the need to implement public policies, especially those aimed at education and health in municipalities such as Amaturá and Jutaí, whose provision of basic social services is insufficient for communities.

The variable education improved significantly between 2005 and 2016, with Amaturá, Benjamin Constant, Santo Antônio do Içá, and Tabatinga showing moderate development and the other municipalities showing regular

development. According to Petry et al. (2020), Tabatinga distinguished itself as a reference for the fact that it houses units of the main Higher Education Institutions in the state, such as the State University of Amazonas (UEA), and adoption of the policy of education centers.

Inter-regionally, the FMDI of Alto do Solimões presents regular development for the variables education and health and low development for the variable employment and income when compared to the Brazilian FMDI.

Table 1 - Disparity Indicator of municipalities in the Differentiated Mesoregion of High Solimões in the State of Amazonas, Brazil – 2005 and 2016.

Municipality	DI 2005	Classification	DI 2016	Classification
Amaturá	0,37	Convergent to the most developed	0,58	Convergent to the most developed
Atalaia do Norte	0,39	Convergent to the most developed	0,41	Convergent to the most developed
Benjamin Constant	0,46	Convergent to the most developed	0,64	Convergent to the most developed
Fonte Boa	0,35	Convergent to the most developed	0,51	Convergent to the most developed
Jutaí	0,26	Tending to convergence	0,32	Convergent to the most developed
Santo Antônio do Içá	0,37	Convergent to the most developed	0,60	Convergent to the most developed
São Paulo de Olivença	0,80	Convergent to the most developed	0,55	Convergent to the most developed
Tabatinga	0,23	Tending to convergence	0,60	Convergent to the most developed
Tonantins	0,23	Tending to convergence	0,61	Convergent to the most developed

Source: Elaboration based on data from IBGE (2020a) and IPEADATA (2020).

Table 1 shows the internal disparities and the convergence of municipalities in terms of socio-economic development. Regionally, the municipalities of the Differentiated Mesoregion of High Solimões performed as convergent to the most developed, but Jutaí, Tabatinga, and Tonantins tended towards convergence in 2005. Moreover, municipalities that presented a high and medium degree of centrality indicated the existence of polarization, with GDP performance showing little variation.

## 4.2 Centrality and disparity in the Differentiated Mesoregion of Acre River Valley

In 2005, the estimated population of the Mesoregion of Acre River Valley was 477,598 inhabitants. However, the population reached 587,750 inhabitants in 2016, increasing 23% in the period. Rio Branco is the most populous municipality in the Mesoregion, comprising 64.2% of the total population in 2016. This population represented only 0.189% of the entire Brazilian population. In contrast, the

municipality of Assis Brasil corresponded to the last most populous municipality in the Mesoregion also in 2016, representing 1.2% of the total population of the Mesoregion and 0.003% of the total population of Brazil.

Intra-regionally, the results also showed that, in addition to the population, Rio Branco leads with 73% of the municipality's participation regarding the regional GDP in the Acre River Valley. Rio Branco has the largest population and concentrates the best economic performance, which reinforces the thesis of spatial concentration of economic development in centers or central places pointed out by Christaller (1966), Perroux (1977), and Ferrera de Lima (2016).

The municipalities of Plácido de Castro, Senador Guimard, Xapuri, and Boca do Acre lost percentage participation relative to the Mesoregion GDP from 2005 to 2016. Senador Guimard stood out negatively, as it moved from 2nd to 5th place in the regional ranking in the GDP participation. On the other hand, Brasiléia, Epitaciolândia, and Porto Acre improved their positions. The municipality of Epitaciolândia moved from 6th to 2nd place in the regional ranking, followed by Brasiléia, both reaching percentage participation and expressiveness. According to Silva (2017), Epitaciolândia and Brasiléia reached regional economic dynamism after the construction of the “*Carretera Interoceânica*” or “*Interoceanic Highway*”. This highway, completed in 2010, connects the main Brazilian ports in the western part of the territory to Peruvian ports in the Pacific. The intervention integrated productive agricultural zones, areas dedicated to trading, mainly exports, and favored local tourism (SANCHEZ-AREVALO; MERLO, 2020). This logistic route facilitated the production flow and export trade, also partially favored by the partial implementation of the Free Trade Area terms in the border area, that is, these events influenced the significant participation of municipalities relative to

the GDP of the Mesoregion Differentiated of Acre River Valley.

Inter-regionally, the Differentiated Mesoregion of Acre River Valley is not very expressive in terms of wealth generation compared to Brazil's GDP, with Rio Branco standing out, but below 0.2%. However, considering the GDP evolution between 2005 and 2016, the average annual variation of the total GDP of the municipalities was not expressive, but the average economic growth for the municipalities of the State of Acre was higher than that observed for the municipalities of the State of Amazonas. In this case, Rio Branco concentrates the generation of wealth and population compared to the Acre River Valley and High Solimões. Also, Rio Branco expanded the participation of the tertiary sector relative to the secondary sector over the period. Amaral and Ferrera de Lima (2018) had already observed this situation and pointed out the decrease in its industrial park and the expressive growth of employability in public administration, services related to civil construction, and call centers as explanatory factors. Nevertheless, there was the implementation of swine, poultry, fish, and wood agro-industries in Rio Branco during the period, which can be associated with the increased formal employment in Rio Branco and Senador Guimard. In other words, the agro-industrial expansion did not create formal jobs in the same magnitude as the tertiary sector in Rio Branco. Santos Jr et al (2011) drew attention to the chaining effect of agribusiness and its ability to stimulate the income of populations with less professional qualifications, improving the demand for goods and services.

The participation of the primary GDP of each municipality relative to the primary GDP of the Differentiated Mesoregion of Acre River Valley demonstrated that Assis Brasil, Plácido de Castro, Xapuri, and Boca do Acre were the municipalities in which the GDP of the primary sector was less expressive partially

due to difficulties related to production flow, edaphoclimatic conditions, and social and territorial conflicts (AMARAL; FERRERA DE LIMA, 2018).

Acrelândia, Bujari, Capixaba, and Pauini improved their position in the ranking. In this sense, Acrelândia had relevant participation due to the production and export of cooking bananas (NASCIMENTO; CARVALHO; SANTOS, 2008). In addition, the settlements carried out by the State in Bujari associated with the implementation of the Food Acquisition Program in the State of Acre contributed to expanding family farming, in addition to the fact that Bujari and Capixaba are the largest milk producers in the State (AMARAL; FERRERA DE LIMA, 2018). The municipalities of Brasiléia, Epitaciolândia, Rio Branco, and Senador Guiomard maintained their positions, that is, they did not show significant variation.

Intra-regionally, the Centrality Indicator not only reinforced the position of Rio Branco, which stood out as an important hub, but also pointed to the strengthening of the municipalities of Brasiléia, Epitaciolândia, and Senador Guiomard, which exhibited an ascending centrality, indicating the existence of attractiveness. The significant increase in the degree of centrality corroborated the action of forces of attraction pointed out by Christaller (1966), Perroux (1977), and Ferrera de Lima (2016). In other words, the forces of attraction in the Acre River Valley come from population concentrations, generation of wealth concentrated in urban sectors, and border migration flows. However, the centrality of the Differentiated Mesoregion of Acre River Valley is low inter-regionally compared to that of Brazil, with a representation below 0.35%.

The Differentiated Mesoregion of Acre River Valley managed to advance in economic dynamism, but it did not happen in terms of economic development, as municipal development indices relative to

formal employment and income are still relatively low. In general, the Firjan Municipal Development Index of this Mesoregion pointed to regular development, but the employment and income dimension decreased for most municipalities between 2005 and 2016, showing a low development. Silva (2017) and Amaral and Ferrera de Lima (2018) pointed to the economic crisis that occurred from 2008, the need for little labor demanded by small farmers in the primary sector, the dismissals after civil construction in the secondary sector, and the discontinuity of jobs in public administration, which directly interfered with the generation of formal employment.

Education and health showed a moderate development for most municipalities between 2005 and 2016, except for Assis Brasil, which showed regular development. According to Jakob (2011), Silva (2017), and Amaral and Ferrera de Lima (2018), the pendular migratory trend of border cities, such as Assis Brasil, Brasiléia, Epitaciolândia, and Xapuri, needs to be observed in the search for education and health infrastructure.

Based on Christaller (1966) theory, it is suggested that the polarization would be characterized, as they aggregate most of the population and concentrate wealth generation, but the municipalities neighboring the more “prosperous” areas are the least developed and more disparate, a reflection that will be considered in the Disparity Indicator.

Table 2 shows that most municipalities in the Differentiated Mesoregion of Acre River Valley converge with the most developed, except for the municipality of Porto Acre, which was divergent or stagnant. Moreover, Porto Acre presented a median degree of centrality, but even if it was low, indicating the inexistence of polarization, the GDP performance underwent many variations, including losing participation from 2005 to 2016.

**Table 2:** Disparity Indicator of municipalities in the Differentiated Mesoregion of Acre River Valley, Brazil – 2005 and 2016.

Municipality	DI 2005	Classification	DI 2016	Classification
Boca do Acre	0,38	Convergent to the most developed	0,48	Convergent to the most developed
Pauini	0,48	Convergent to the most developed	0,36	Convergent to the most developed
Acrelândia	0,52	Convergent to the most developed	0,63	Convergent to the most developed
Assis Brasil	0,56	Convergent to the most developed	0,55	Convergent to the most developed
Brasiléia	0,62	Convergent to the most developed	0,53	Convergent to the most developed
Bujari	- 0,05	Divergent from the more developed or stagnant	0,53	Convergent to the most developed
Capixaba	0,14	Tending to convergence	0,62	Convergent to the most developed
Epitaciolândia	0,48	Convergent to the most developed	0,47	Convergent to the most developed
Plácido de Castro	0,34	Convergent to the most developed	0,53	Convergent to the most developed
Porto Acre	- 0,01	Divergent from the more developed or stagnant	- 0,15	Divergent from the more developed or stagnant
Rio Branco	1,43	Convergent to the most developed	0,91	Convergent to the most developed
Senador Guiomard	0,56	Convergent to the most developed	0,53	Convergent to the most developed
Xapuri	1,15	Convergent to the most developed	0,69	Convergent to the most developed

**Source:** Research results based on data from IBGE (2020a) and IPEADATA (2020).

The results show that the municipalities of Plácido de Castro, Pauini, and Xapuri have low per capita GDP and are surrounded by neighboring municipalities with high agricultural production, harming the formation of their per capita GDP, and, consequently, their socio-economic variables. Furthermore, secondary and tertiary activities in Rio Branco negatively impact the per capita GDP of the neighboring municipalities in which they are located, as they do not encourage the expansion of the tertiary sector towards the nearest peripheral municipalities, in addition to the low industrialization level in the State of Acre, not generating formal jobs and income that could spatially impact its contiguous neighbors regarding the per capita GDP.

## 5 FINAL CONSIDERATIONS

This text analyzed the attractiveness and disparity in the socio-economic development of the municipalities that make up the Differentiated Mesoregions High Solimões and Acre River Valley, both located in the western portion of the Brazilian legal Amazon. A

documentary/bibliographic methodological procedure was used, and the analysis covered the period from 2005 to 2016, depending on the information available for all indicators. The Centrality and Disparity Indicators, estimated from GDP, population, and FMDI data, were used.

The study was not intended to evaluate the definitive and comprehensive PROMESO results. However, the research findings contribute to the planning of public policy actions for regional development. It is worth remembering that the identification of demands related to the regional problem in the western Amazon stimulates the effective articulation of society to overcome socio-economic imbalances, integrating promotion and specific assets, such as human and social capital, through partnerships and cooperation networks. Moreover, the data and results also serve as a subsidy for planning actions, as they are a preliminary diagnosis of the delay and progress of municipalities relative to the studied variables.

In this sense, the socio-economic development of the Differentiated Mesoregions of the western Amazon was marked by changes in the productive and social structure of the municipalities, as



some of them improved their attractiveness and reduced the disparities regarding the socio-economic development relative to the Differentiated Mesoregion. However, the expressed quality of life is still low compared inter-and intra-regionally, as shown by social and economic indicators.

A higher convergence in terms of economic development was observed in the Mesoregion of High Solimões although the municipality of Tabatinga (AM) stood out regarding economy and population. The poorest municipalities managed to improve their indicators and get closer to those with better positions in municipal development. However, the employment and income dimensions showed the highest weakness. Considering that the maintenance of the improvement in the education and health dimensions depends on the conditions of tax revenues, public spending, and programs managed by the municipalities, actions are needed to improve the performance of the employment and income dimension over time.

The polarization of Rio Branco is quite significant in the Mesoregion of the Acre River Valley, but some municipalities along the border managed to benefit from logistical factors and investments in family farming. However, this Mesoregion demonstrated a significant centrality favorable to Rio Branco. In this case, public policies that encourage family agroindustry, local companies, and the attractiveness of businesses in different areas are necessary.

Although the trend is that these municipalities with a high degree of centrality benefit more than other municipalities surrounding the Differentiated Mesoregion of High Solimões and Acre River Valley through the identification of central places and centrality levels, actions can be defined and priorities listed to meet the needs of each municipality. Therefore, the elaboration and integration of planning actions aimed at more assertive and swift public policies between the complementary regions and the central place are suggested. The objective

of these actions is the reduction of socio-economic and inter-and intra-regional inequalities and the generation of wealth with social equity, thus concatenating the main objectives of PROMESO, such as promoting the autonomy and sustainability of sub-regional spaces under guidelines that encourage social organization, development of endogenous potentials, and strengthening of productive bases.

Finally, further research is recommended having as object of study these Mesoregions, focusing particularly on the municipal entity. The most distant regions of Western Amazon still lack more detailed data and information and historical series that allow inferences on development actions and policies.

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